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Contents

Intelle	ectual Property Rights	2
Legal	I notice	2
Moda	al verbs terminology	2
Forev	word	31
1	Scope	32
2	References	32
3	Definitions, symbols and abbreviations	33
3.1	Definitions	33
3.2	Symbols	34
3.3	Abbreviations	
3.4	Test tolerances	
3.5	Frequency bands grouping	
3.5.1	Introduction	
3.5.2	NR operating bands in FR1	
3.5.3	NR operating bands in FR2	
3.6	Applicability of requirements in this specification version	
3.6.1	RRC connected state requirements in DRX	
3.6.2	Number of serving carriers	
3.6.2.1		
3.6.2.2 3.6.2.3	8	
3.6.2.4		
3.6.3	Applicability for intra-band FR2	
3.6.4	Applicability for FR2 UE power classes	
3.6.5	Applicability for SDL bands	
3.6.6	Applicability of requirements for NGEN-DC operation	
3.6.7	Applicability of QCL	
4	SA: RRC_IDLE state mobility	
4.1	Cell Selection	
4.2	Cell Re-selection	
4.2.1	Introduction	
4.2.2	Requirements	
4.2.2.1	1 2	
4.2.2.2		
4.2.2.3	1 •	
4.2.2.4	1 2	
4.2.2.5 4.2.2.6		
4.2.2.7	1 1 5 5 1	
5	SA: RRC_INACTIVE state mobility	46
5.1	Cell Re-selection	
5.1.1	Introduction	46
5.1.2	Requirements	
5.1.2.1		
5.1.2.2	Č	
5.1.2.3	1 •	
5.1.2.4		
5.1.2.5		
5.1.2.6	1 1 6 6 1	
5.1.2.7	1	
5.2	Void	
6	RRC_CONNECTED state mobility	47

6.1	Handover	47
6.1.1	NR Handover	47
6.1.1.1	Introduction	47
6.1.1.2	NR FR1 - NR FR1 Handover	47
6.1.1.2.1	Handover delay	
6.1.1.2.2	Interruption time	
6.1.1.3	NR FR2- NR FR1 Handover	
6.1.1.3.1	Handover delay	
6.1.1.3.2	Interruption time	
6.1.1.4	NR FR2- NR FR2 Handover	
6.1.1.4.1	Handover delay	
6.1.1.4.2	Interruption time	
6.1.1.5	NR FR1- NR FR2 Handover	
6.1.1.5.1	Handover delay	
6.1.1.5.2	Interruption time	
6.1.2	NR Handover to other RATs	
6.1.2.1	NR – E-UTRAN Handover	
6.1.2.1.1	Introduction	
6.1.2.1.2	Handover delay	
6.1.2.1.3	Interruption time	
6.2	RRC Connection Mobility Control	
6.2.1	SA: RRC Re-establishment	
6.2.1.1	Introduction	
6.2.1.2	Requirements	
6.2.1.2.1	UE Re-establishment delay requirement	
6.2.2	Random access	
6.2.2.1	Introduction	
6.2.2.2	Requirements	
6.2.2.2.1	Contention based random access	
6.2.2.2.2	Non-Contention based random access	
6.2.2.2.3		
6.2.3	UE behaviour when configured with supplementary UL	
6.2.3.1	Introduction	
6.2.3.1	Requirements	
6.2.3.2.1	RRC connection release with redirection to NR	
6.2.3.2.1	RRC connection release with redirection to NR	
0.2.3.2.2	RRC connection release with redirection to E-O I RAIN	
7 Ti	ming	57
7.1	UE transmit timing	57
7.1.1	Introduction	
7.1.2	Requirements	
7.1.2.1	Gradual timing adjustment	
7.1.2.2	Void	
7.2	UE timer accuracy	
7.2.1	Introduction	
7.2.2	Requirements	
7.3	Timing advance	
7.3.1	Introduction.	
7.3.2	Requirements	
7.3.2.1	Timing Advance adjustment delay	
7.3.2.2	Timing Advance adjustment accuracy	
7.4	Cell phase synchronization accuracy	
7.4.1	Definition	
7.4.2	Minimum requirements	
7.5.2	Maximum Transmission Timing Difference	
7.5.1	Introduction	
7.5.2	Minimum Requirements for inter-band EN-DC	
7.5.2.1	Minimum Requirements for inter-band synchronous EN-DC	
7.5.3	Minimum Requirements for intra-band EN-DC	
7.5.4	Minimum Requirements for NR Carrier Aggregation	
7.5.5	Minimum Requirements for inter-band NE-DC	
7.5.5.1	Minimum Requirements for inter-band synchronous NE-DC	

7.5.6	Minimum Requirements for inter-band NR DC	63
7.6	Maximum Receive Timing Difference	63
7.6.1	Introduction	
7.6.2	Minimum Requirements for inter-band EN-DC	
7.6.2.1	Minimum Requirements for inter-band synchronous EN-DC	64
7.6.3	Minimum Requirements for intra-band EN-DC	64
7.6.4	Minimum Requirements for NR Carrier Aggregation	65
7.6.5	Minimum Requirements for inter-band NE-DC	
7.6.5.1	Minimum Requirements for inter-band synchronous NE-DC	66
7.6.6	Minimum Requirements for inter-band NR DC	
7.7	deriveSSB-IndexFromCell tolerance	
7.7.1	Minimum requirements.	
7.8	Void	
8	Signalling characteristics	67
8.1	Radio Link Monitoring	67
8.1.1	Introduction	67
8.1.2	Requirements for SSB based radio link monitoring	68
8.1.2.1	Introduction	
8.1.2.2	Minimum requirement	
8.1.2.3	Measurement restrictions for SSB based RLM	
8.1.3	Requirements for CSI-RS based radio link monitoring	
8.1.3.1	Introduction	
8.1.3.2	Minimum requirement	
8.1.3.3	Measurement restrictions for CSI-RS based RLM	
8.1.4	Minimum requirement at transitions	
8.1.5	Minimum requirement for UE turning off the transmitter	
8.1.6	Minimum requirement for L1 indication	
8.1.7	Scheduling availability of UE during radio link monitoring	/ 3
8.1.7.1	Scheduling availability of UE performing radio link monitoring with a same subcarrier spacing as PDSCH/PDCCH on FR1	75
8.1.7.2	Scheduling availability of UE performing radio link monitoring with a different subcarrier	
	spacing than PDSCH/PDCCH on FR1	
8.1.7.3	Scheduling availability of UE performing radio link monitoring on FR2	75
8.1.7.4	Scheduling availability of UE performing radio link monitoring on FR1 or FR2 in case of FR1-	
	FR2 inter-band CA and NR-DC	76
8.2	Interruption	76
8.2.1	EN-DC Interruption	76
8.2.1.1	Introduction	76
8.2.1.2	Requirements	
8.2.1.2	<u>*</u>	
8.2.1.2		
8.2.1.2	ı	
8.2.1.2.		
8.2.1.2.		
8.2.1.2.		
8.2.1.2.		
8.2.1.2. 8.2.2	SA: Interruptions with Standalone NR Carrier Aggregation	
8.2.2.1	Introduction	
8.2.2.2	Requirements	
8.2.2.2.	1	
8.2.2.2.	1	
8.2.2.2.		
8.2.2.2.	1	
8.2.2.2.		
8.2.2.2		
8.2.3	NE-DC Interruptions	
8.2.3.1	Introduction	86
8.2.3.2	Requirements	
8.2.3.2		86
8.2.3.2	2 Interruptions at transitions from non-DRX to DRX	86
8.2.3.2		

8.2.3.2.4	Interruptions at SCell activation/deactivation	88
8.2.3.2.5	Interruptions during measurements on SCC	
8.2.3.2.6	Interruptions at UL carrier RRC reconfiguration	89
8.2.3.2.7	Interruptions due to Active BWP switching Requirement	
8.2.4	NR-DC: Interruptions	
8.2.4.1	Introduction	
8.2.4.2	Requirements	
8.2.4.2.1	Interruptions at PSCell/SCell addition/release	
8.2.4.2.2	Interruptions at SCell activation/deactivation.	
8.2.4.2.3	Interruptions during measurements on SCC	
8.2.4.2.4	Interruptions at UL carrier RRC reconfiguration	
8.2.4.2.5	Interruptions due to Active BWP switching Requirement	
8.2.4.2.6	Interruptions at transitions between active and non-active during DRX	
8.2.4.2.7	Interruptions at transitions from non-DRX to DRX	
8.3	SCell Activation and Deactivation Delay	
8.3.1	Introduction	
8.3.2	SCell Activation Delay Requirement for Deactivated SCell	
8.3.3	SCell Deactivation Delay Requirement for Activated SCell	
8.4	UE UL carrier RRC reconfiguration delay	
8.4.1	Introduction	
8.4.2	UE UL carrier configuration delay requirement	
8.4.3 8.5	UE UL carrier deconfiguration delay requirement	
8.5 8.5.1	Link Recovery Procedures	
8.5.1 8.5.2	Introduction	
8.5.2.1	Requirements for SSB based beam failure detection	
8.5.2.1	Minimum requirement	
8.5.2.3	Measurement restriction for SSB based beam failure detection	
8.5.3	Requirements for CSI-RS based beam failure detection	
8.5.3.1	Introduction	
8.5.3.2	Minimum requirement	
8.5.3.3	Measurement restrictions for CSI-RS beam failure detection	
8.5.4	Minimum requirement for L1 indication	
8.5.5	Requirements for SSB based candidate beam detection	
8.5.5.1	Introduction	
8.5.5.2	Minimum requirement	
8.5.5.3	Measurement restriction for SSB based candidate beam detection	
8.5.6	Requirements for CSI-RS based candidate beam detection	
8.5.6.1	Introduction	
8.5.6.2	Minimum requirement	107
8.5.6.3	Measurement restriction for CSI-RS based candidate beam detection	108
8.5.7	Scheduling availability of UE during beam failure detection	109
8.5.7.1	Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1	109
8.5.7.2	Scheduling availability of UE performing beam failure detection with a different subcarrier spacing than PDSCH/PDCCH on FR1	109
8.5.7.3	Scheduling availability of UE performing beam failure detection on FR2	
8.5.7.4	Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-	
	FR2 inter-band CA and NR DC	110
8.5.8	Scheduling availability of UE during candidate beam detection	
8.5.8.1	Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1	
8.5.8.2	Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1	
8.5.8.3	Scheduling availability of UE performing L1-RSRP measurement on FR2	
8.5.8.4	Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC	
8.5.9	Minimum requirement at transitions for beam failure detection	
8.6	Active BWP switch delay	
8.6.1	Introduction	
8.6.2	DCI and timer based BWP switch delay	
8.6.3	RRC based BWP switch delay	

8.7	Void	
8.8	NE-DC: E-UTRAN PSCell Addition and Release Delay	113
8.8.1	Introduction	
8.8.2	E-UTRAN PSCell Addition Delay Requirement	
8.8.3	E-UTRAN PSCell Release Delay Requirement	
8.9	NR-DC: PSCell Addition and Release Delay	
8.9.1	Introduction	
8.9.2	PSCell Addition Delay Requirement	
8.9.3	PSCell Release Delay Requirement	
8.10	Active TCI state switching delay	
8.10.6	Active TCI state list update delay	
8.11	PSCell Change	118
9 N	Measurement Procedure	.118
9.1	General measurement requirement	
9.1.1	Introduction	
9.1.2	Measurement gap	
9.1.2.1	EN-DC: Measurement Gap Sharing	126
9.1.2.1a	SA: Measurement Gap Sharing	127
9.1.2.1b	NE-DC: Measurement Gap Sharing	127
9.1.2.1c	NR-DC: Measurement Gap Sharing	128
9.1.3	UE Measurement capability	
9.1.3.1	EN-DC: Monitoring of multiple layers using gaps	
9.1.3.1a		
9.1.3.1b		
9.1.3.1c	NR-DC: Monitoring of multiple layers using gaps	
9.1.3.2	EN-DC: Maximum allowed layers for multiple monitoring	
9.1.3.2a	SA: Maximum allowed layers for multiple monitoring	
9.1.3.2b		
9.1.3.2c		
9.1.4	Capabilities for Support of Event Triggering and Reporting Criteria	
9.1.4.1	Introduction	
9.1.4.2	Requirements	
9.1.5	Carrier-specific scaling factor	
9.1.5.1	Monitoring of multiple layers outside gaps	134
9.1.5.1.1		125
01510	gaps SA mode: carrier-specific scaling factor for SSB-based measurements performed outside	133
9.1.5.1.2	gapsgaps	124
9.1.5.1.3		130
9.1.3.1.3	gapsgaps	
9.1.5.1.4		130
J.1.J.1.¬	gapsgaps	137
9.1.5.2	Monitoring of multiple layers within gaps	
9.1.5.2.1		.137
J.11.5.2.1	gaps	138
9.1.5.2.2	· · · · · · · · · · · · · · · · · · ·	
9.1.5.2.3		
9.1.5.2.4		
9.1.6	Minimum requirement at transitions	
9.2	NR intra-frequency measurements	
9.2.1	Introduction	
9.2.2	Requirements applicability	
9.2.3	Number of cells and number of SSB	
9.2.3.1	Requirements for FR1	
9.2.3.2	Requirements for FR2	
9.2.4	Measurement Reporting Requirements	
9.2.4.1	Periodic Reporting	
9.2.4.2	Event-triggered Periodic Reporting	144
9.2.4.3	Event Triggered Reporting.	
9.2.5	Intrafrequency measurements without measurement gaps	145
9.2.5.1	Intrafrequency cell identification	145

9.2.5.2	Measurement period	
9.2.5.3	Scheduling availability of UE during intra-frequency measurements	
9.2.5.3.1	Scheduling availability of UE performing measurements in TDD bands on FR1	149
9.2.5.3.2	Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1	149
9.2.5.3.3	Scheduling availability of UE performing measurements on FR2	
9.2.5.3.4	Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA	
9.2.5.4	SFTD Measurements between PCell and PSCell	
9.2.5.4.1	Introduction	
9.2.5.4.2	SFTD Measurement delay	
9.2.5.4.3	SFTD Measurement Reporting Delay	
9.2.6	Intra-frequency measurements with measurement gaps	
9.2.6.1	Void	
9.2.6.2	Intra-frequency cell identification	152
9.2.6.3	Intra-frequency Measurement Period	
9.3	NR inter-frequency measurements	
9.3.1	Introduction	
9.3.2	Requirements applicability	
9.3.2.1	Void	
9.3.2.2	Void	
9.3.3	Number of cells and number of SSB	
9.3.3.1	Requirements for FR1	
9.3.3.2	Requirements for FR2	
9.3.4	Inter-frequency cell identification	
9.3.4.1	Void	
9.3.4.2	Void	
9.3.5 9.3.5.1	Inter-frequency measurements	
9.3.5.1 9.3.5.2	VoidVoid	
9.3.5.2	VoidVoid	
9.3.5.3 9.3.6	Inter-frequency measurements reporting requirements.	
9.3.6.1	Periodic Reporting	
9.3.6.2	Event-triggered Periodic Reporting.	
9.3.6.3	Event-triggered Reporting	
9.3.7	Void	
9.3.8	Inter-frequency SFTD measurement requirements	
9.3.8.1	Introduction	
9.3.8.2	SFTD Measurement delay	
9.3.8.3	SFTD Measurement reporting delay	
9.4	Inter-RAT measurements	
9.4.1	Introduction	
9.4.2	NR – E-UTRAN FDD measurements	
9.4.2.1	Introduction	160
9.4.2.2	Requirements when no DRX is used	161
9.4.2.3	Requirements when DRX is used	161
9.4.2.4	Measurement reporting requirements	162
9.4.2.4.1	Periodic Reporting	162
9.4.2.4.2	Event-Triggered Periodic Reporting	162
9.4.2.4.3	Event-Triggered Reporting	162
9.4.3	NR – E-UTRAN TDD measurements	
9.4.3.1	Introduction	
9.4.3.2	Requirements when no DRX is used	
9.4.3.3	Requirements when DRX is used	
9.4.3.4	Measurement reporting requirements	
9.4.3.4.1	Periodic Reporting	
9.4.3.4.2	Event-Triggered Periodic Reporting	
9.4.3.4.3	Event-Triggered Reporting	
9.4.4	Inter-RAT RSTD measurements	
9.4.4.1	NR – E-UTRAN FDD RSTD measurements	
9.4.4.1.1	Introduction	
9.4.4.1.2	Requirements	166

9.4.4.2	NR – E-UTRAN TDD RSTD measurements	
9.4.4.2.1		
9.4.4.2.2	1	
9.4.5	Inter-RAT E-CID measurements	
9.4.5.1	NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements	
9.4.5.1.1		
9.4.5.1.2	1	
9.4.5.1.3		
9.4.5.2	NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements	
9.4.5.2.1 9.4.5.2.2		
9.4.5.2.2 9.4.5.2.3		
9.4.3.2.3 9.5	L1-RSRP measurements for Reporting	
9.5.1	Introduction	
9.5.2	Requirements applicability	
9.5.3	Measurement Reporting Requirements	
9.5.3.1	Periodic Reporting	
9.5.3.2	Semi-Persistent Reporting.	
9.5.3.3	Aperiodic Reporting	
9.5.4	L1-RSRP measurement requirements	
9.5.4.1	SSB based L1-RSRP Reporting	175
9.5.4.2	CSI-RS based L1-RSRP Reporting	177
9.5.5	Measurement restriction for CSI-RS and SSB for L1-RSRP measurement	
9.5.5.1	Measurement restriction for SSB based L1-RSRP	
9.5.5.2	Measurement restriction for CSI-RS based L1-RSRP	
9.5.6	Scheduling availability of UE during L1-RSRP measurement	181
9.5.6.1	Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1	181
9.5.6.2	Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier	
	spacing than PDSCH/PDCCH on FR1	
9.5.6.3	Scheduling availability of UE performing L1-RSRP measurement on FR2	181
9.5.6.4	Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of	
0.5	FR1-FR2 inter-band CA	
9.6	NE-DC: Measurements	
9.6.1	Introduction	
9.6.2	SFTD Measurements	
9.6.2.1 9.6.2.2	Introduction	
	*	
10 N	Measurement Performance requirements	.183
10.1	NR measurements	183
10.1.1	Introduction	183
10.1.2	Intra-frequency RSRP accuracy requirements for FR1	184
10.1.2.1	Intra-frequency SS-RSRP accuracy requirements	
10.1.2.1.	·	
10.1.2.1.	· · · · · · · · · · · · · · · · · · ·	
10.1.2.2	Void	
10.1.3	Intra-frequency RSRP accuracy requirements for FR2	
10.1.3.1	Intra-frequency SS-RSRP accuracy requirements	
10.1.3.1.	•	
10.1.3.1. 10.1.3.2	· · · · · · · · · · · · · · · · · · ·	
10.1.3.2	Void	
10.1.4	Inter-frequency RSRP accuracy requirements for FR1	
10.1.4.1	· · · · · · · · · · · · · · · · · · ·	
10.1.4.1.		
10.1.4.1.	Void	
10.1.5	Inter-frequency RSRP accuracy requirements for FR2.	
10.1.5.1	Inter-frequency SS-RSRP accuracy requirements	
10.1.5.1.		
10.1.5.1.	·	
10.1.5.2	Void	

10.1.6	RSRP Measurement Report Mapping	
10.1.7	Intra-frequency RSRQ accuracy requirements for FR1	
10.1.7.1	Intra-frequency SS-RSRQ accuracy requirements in FR1	
10.1.7.1.1		
10.1.8	Intra-frequency RSRQ accuracy requirements for FR2	
10.1.8.1	Intra-frequency SS-RSRQ accuracy requirements in FR2	
10.1.8.1.1		
10.1.9	Inter-frequency RSRQ accuracy requirements for FR1	
10.1.9.1	Inter-frequency SS-RSRQ accuracy requirements in FR1	
10.1.9.1.1		
10.1.9.1.2		
10.1.10	Inter-frequency RSRQ accuracy requirements for FR2	
10.1.11	RSRQ report mapping	
10.1.12	Intra-frequency SINR accuracy requirements for FR1	
10.1.13	Intra-frequency SINR accuracy requirements for FR2	
10.1.14	Inter-frequency SINR accuracy requirements for FR1	
10.1.15	Inter-frequency SINR accuracy requirements for FR2	
10.1.16	SINR report mapping	
10.1.17	Power Headroom	
10.1.18	P _{CMAX,c,f}	
10.1.19 10.1.20	L1-RSRP accuracy requirements for FR1	
10.1.20	L1-RSRP accuracy requirements for FR2 SFTD accuracy requirements	
10.1.21	E-UTRAN measurements	
10.2	Introduction	
10.2.1	E-UTRAN RSRP measurements	
10.2.2	E-UTRAN RSRQ measurements	
10.2.3	E-UTRAN RSTD measurements	
10.2.4	E-UTRAN RS-SINR measurements	
10.2.3	E-0 I RAIV RS-5HVR incasurements	213
11 V	oid	215
Ammore	(normativa). Tost Cases	216
	(normative): Test Cases	
	A (normative): Test Cases	
A.1 Pu	rpose of annex	216
A.1 Pu	equirement classification for statistical testing	216
A.1 Pu A.2 Ro A.2.1	rpose of annexequirement classification for statistical testing	216 216
A.1 Pt A.2 Ro A.2.1 A.2.1.1	rpose of annex	216 216 216
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2	rpose of annex	216 216 216 216
A.1 Pu A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3	rpose of annex	216216216216216
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2	rpose of annex	216216216216216
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4	ripose of annex	216216216216216217
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4	rpose of annex	216216216216217217
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 RI	rpose of annex	216216216216216217217218
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1	rpose of annex	216216216216217217218218
A.1 Pt A.2 Re A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 RI A.3.1 A.3.1.1	ripose of annex	216216216216217217218218218
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1 A.3.1.1.1	ripose of annex	216216216216217217218218218218
A.1 Pt A.2 Ro A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.1.1	ripose of annex	216216216216217217218218218219
A.1 Pt A.2 Ro A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2	ripose of annex	216216216216217217218218218219222
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2 A.3.1.2.1	ripose of annex	216216216216217217218218218218219222
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1	ripose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements RM test configurations Reference measurement channels PDSCH FDD TDD CORESET for RMSI scheduling FDD TDD TDD TDD TDD	216216216216217217218218219219222223
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2 A.3.1.2.1 A.3.1.2.1	ripose of annex equirement classification for statistical testing	216216216216217217218218218219222222222223
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	ripose of annex equirement classification for statistical testing	216216216216217217218218218219222222223226226
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	rpose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements RM test configurations Reference measurement channels PDSCH FDD TDD CORESET for RMSI scheduling FDD TDD CORESET for RMC scheduling FDD TDD TDD TDD TDD TDD TDD TDD TDD TDD	216216216216217217218218219222223226226227228
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	rpose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements RM test configurations Reference measurement channels PDSCH FDD TDD CORESET for RMSI scheduling FDD TDD CORESET for RMC scheduling FDD TDD TDD TDD TDD TDD TDD TD	216216216216217217218218219222223226226227228
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	rpose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements RM test configurations Reference measurement channels PDSCH FDD TDD CORESET for RMSI scheduling FDD TDD CORESET for RMC scheduling FDD TDD TDD TDD TDD TDD TDD TDD TDD TDD	216216216216217217218218218219222222223226226227228229
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	rpose of annex	216216216216217217218218218219222222223226226227228229229
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	equirement classification for statistical testing	216216216216217217218218218219222223226226227228229230230
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	ripose of annex	216216216216217217218218218219222223226226229229230231
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	ripose of annex	216216216216217217218218219222223226226227228229230231231

A.3.3.1	DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms	232
A.3.3.2	DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms	
A.3.3.3	DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity	
A.3.3.4	DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity	
A.3.3.5	DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity	
A.3.3.6	DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms	
A.3.3.7	DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity	
A.3.3.8	DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity	
A.3.3.9	DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms	
A.3.3.10	DRX Configuration 10: DRX cycle = 640 ms and TAT = 500 ms	
A.3.3.11	DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity	
A.3.3.12	DRX Configuration 12: DRX cycle = 640 ms and TAT = Infinity	
A.3.4	Test Cases with Different Channel Bandwidths	
A.3.4.1	Test Cases with Different E-UTRA Channel Bandwidths	
A.3.4.1.1	Introduction	
A.3.4.1.2	Principle of testing	
A.3.5	Test Cases for Synchronous and Asynchronous DC Operations	
A.3.5.1	EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations	
A.3.5.1.1	Introduction	
A.3.5.1.2	Principle of Testing	237
A.3.6	Antenna configurations	
A.3.6.1	Antenna configurations for FR1	
A.3.6.1.1	Antenna connection for 4 Rx capable UEs	
A.3.6.1.1	•	
A.3.6.1.1		
A.3.6.2	Antenna configurations for FR2	
A.3.7	EN-DC test setup	
A.3.7.1	Introduction	
A.3.7.2	E-UTRAN Serving Cell Parameters	
A.3.7.2.1	E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1	
A.3.7.2.2	E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2	
A.3.7A	NR FR1-FR2 test setup	
A.3.7B	Void	
A.3.7C	LTE-FR1/FR2 test setup	
A.3.7D	NE-DC test setup.	
A.3.7D.1	Introduction.	
A.3.7D.2	E-UTRAN Serving Cell Parameters	
A.3.7D.2	· · · · · · · · · · · · · · · · · · ·	
A.3.7D.2		
A.3.8	PRACH configurations.	
A.3.8.1	Introduction	
A.3.8.2	PRACH configurations in FR1	
A.3.8.2.1	FR1 PRACH configuration 1	
A.3.8.2.2	FR1 PRACH configuration 2	
A.3.8.2.3	FR1 PRACH configuration 3	
A.3.8.2.4	FR1 PRACH configuration 4	
A.3.8.3	PRACH configurations in FR2	
A.3.8.3.1	FR2 PRACH configuration 1	
A.3.8.3.2	FR2 PRACH configuration 2	
A.3.8.3.3	FR2 PRACH configuration 3	
A.3.8.3.4	FR2 PRACH configuration 4	
A.3.9	BWP configurations	
A.3.9.1	· · · · · · · · · · · · · · · · · · ·	
A.3.9.2	Introduction	250
11.3.7.2	Introduction Downlink BWP configurations	
A.3.9.2.1		250
	Downlink BWP configurations	250 250
A.3.9.2.1	Downlink BWP configurations	
A.3.9.2.1 A.3.9.2.2 A.3.9.3	Downlink BWP configurations Initial BWP Dedicated BWP	
A.3.9.2.1 A.3.9.2.2 A.3.9.3	Downlink BWP configurations Initial BWP Dedicated BWP Uplink BWP configurations	
A.3.9.2.1 A.3.9.2.2 A.3.9.3 A.3.9.3.1	Downlink BWP configurations Initial BWP Dedicated BWP Uplink BWP configurations Initial BWP	
A.3.9.2.1 A.3.9.2.2 A.3.9.3 A.3.9.3.1 A.3.9.3.2	Downlink BWP configurations Initial BWP Dedicated BWP Uplink BWP configurations Initial BWP Dedicated BWP	

A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz	252
A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz	
A.3.10.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz	
A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MI	
A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MI	Hz254
A.3.10.2 SSB Configurations for FR2	
A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	256
A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.11 SMTC Configurations	
A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms	
A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms	
A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms	
A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms	
A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms	
A.3.11.6 SMTC pattern 6: SMTC period = 20 ms with SMTC duration = 5 ms	
A.3.12 Test Cases with Different CC Configurations	
A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations	
A.3.12.1.1 Introduction	259
A.3.12.1.2 Principle of testing	
A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations	259
A.3.12.2.1 Introduction	
A.3.12.2.2 Principle of testing	
A.3.13 Test Cases in SA and EN-DC Operations	
A.3.13.1 Introduction	259
A.3.13.2 Principle of Testing	
A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers	260
A.3.13A.1 Introduction	
A.3.13A.2 Principle of Testing in EN-DC	
A.3.13A.3 Principle of Testing in SA	
A.3.13A.4 Principle of Testing in E-UTRA	
A.3.13B Test Cases for EN-DC and NE-DC Operations	
A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations	
A.3.13B.1.1 Introduction	
A.3.13B.1.2 Principle of Testing	
A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations	
A.3.13B.2.1 Introduction	
A.3.13B.2.2 Principle of Testing	
A.3.14 CSI-RS configurations	
A.3.14.1 FDD	
A.3.14.2 TDD	
A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases	
A.3.15.1 Setup 1: Single AoA in Rx beam peak direction	
A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction	
A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction	
A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction	
A.3.15.3 Setup 3: 2 AoAs	
A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak	
A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change direction	266
A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction	
A.3.16 TCI State Configuration	266
A.3.16.1 Introduction	
A.3.16.2 TCI states	266
A.3.17 Configurations of CSI-RS for tracking	267
A.3.17.1 Configuration of CSI-RS for tracking for FR1	267

A.3.17.1.		
A.3.17.1.		
A.3.17.2	Configuration of CSI-RS for tracking for FR2	
A.3.17.2.		
A.3.18	Additional definitions related to OTA testing for FR2 RRM test cases	
A.3.18.1	Introduction	
A.3.18.2	PRACH Power Measurement	270
A.4 EN	N-DC tests with all NR cells in FR1	270
A.4.1	Void	
A.4.2	Void	
A.4.3	RRC_CONNECTED state mobility	
A.4.3.1	Void	
A.4.3.2 A.4.3.2.1	RRC Connection Mobility Control	
A.4.3.2.1 A.4.3.2.2	VoidRandom Access	
A.4.3.2.2 A.4.3.2.2		
A.4.3.2.2. A.4.3.2.2.		
	1	
A.4.3.2.2		
A.4.3.2.3	Void	
A.4.4	Timing	
A.4.4.1	UE transmit timing	
A.4.4.1.1	NR UE Transmit Timing Test for FR1	
A.4.4.1.1	1	
A.4.4.1.1	1	
A.4.4.2	UE timer accuracy	
A.4.4.3	Timing advance	
A.4.4.3.1	EN-DC FR1 timing advance adjustment accuracy	
A.4.4.3.1	1	
A.4.4.3.1		
A.4.4.3.1	1	
A.4.5	Signaling characteristics	
A.4.5.1	Radio link Monitoring	
A.4.5.1.1	Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in	
	non-DRX mode	
A.4.5.1.1.	1	
A.4.5.1.1	1	286
A.4.5.1.2	Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in	200
	non-DRX mode	
A.4.5.1.2.	1	290
A.4.5.1.3	Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in	
	DRX mode	290
A.4.5.1.3.	*	290
A.4.5.1.3		292
A.4.5.1.4	Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in	202
	DRX mode	
A.4.5.1.4.		
A.4.5.1.4.	1	296
A.4.5.1.5	EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based	•
	RLM in non-DRX mode	296
A.4.5.1.5	*	
A.4.5.1.5	•	299
A.4.5.1.6		
	RLM in non-DRX mode	
A.4.5.1.6		
A.4.5.1.6		303
A.4.5.1.7	EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based	
	RLM in DRX mode	
A.4.5.1.7	•	
A.4.5.1.7		307
A.4.5.1.8	EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based	٠
	RLM in DRX mode	307

A.4.5.1.8.1	Test Purpose and Environment	307
A.4.5.1.8.2	Test Requirements	
A.4.5.2	Interruption	
A.4.5.2.1	E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in	
	synchronous EN-DC	311
A.4.5.2.1.1	Test Purpose and Environment	
A.4.5.2.1.2	Test Requirements	
A.4.5.2.2	E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in	
	asynchronous EN-DC	314
A.4.5.2.2.1	Test Purpose and Environment	
A.4.5.2.2.2	Test Requirements	
A.4.5.2.3	E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in	
	synchronous EN-DC	317
A.4.5.2.3.1	Test Purpose and Environment	
A.4.5.2.3.2	Test Requirements	
A.4.5.2.4	E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in	
	asynchronous EN-DC	320
A.4.5.2.4.1	Test Purpose and Environment	
A.4.5.2.4.2	Test Requirements	
A.4.5.2.5	E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in	
	synchronous EN-DC	325
A.4.5.2.5.1	Test Purpose and Environment	
A.4.5.2.5.2	Test Requirements	
A.4.5.2.6	E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in	
11	asynchronous EN-DC.	327
A.4.5.2.6.1	Test Purpose and Environment	
A.4.5.2.6.2	Test Requirements	
A.4.5.2.7	Void	
A.4.5.3.1	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle	
A.4.5.3.1.1	Test Purpose and Environment	
A.4.5.3.1.2	Test Requirements	
A.4.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 320 ms SCell measurement cycle	
A.4.5.3.2.1	Test Purpose and Environment	
A.4.5.3.2.2	Test Requirements	
A.4.5.3.3	SCell Activation and deactivation of unknown SCell in FR1	
A.4.5.3.3.1	Test Purpose and Environment.	
A.4.5.3.3.2	Test Requirements	
A.4.5.4	UE UL carrier RRC reconfiguration Delay	
A.4.5.4.1	UE UL carrier RRC reconfiguration Delay	
A.4.5.4.1.1	Test Purpose and Environment	
A.4.5.4.1.2	Test Requirements	
A.4.5.5	Beam Failure Detection and Link recovery procedures	
A.4.5.5.1	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-	5 13
11.1.3.3.1	based BFD and LR in non-DRX mode	343
A.4.5.5.1.1	Test Purpose and Environment	
A.4.5.5.1.2	Test Requirements	
A.4.5.5.2	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-	
11.1.3.3.2	based BFD and LR in DRX mode	349
A.4.5.5.2.1	Test Purpose and Environment.	
A.4.5.5.2.2	Test Requirements	
A.4.5.5.3	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-	333
11.4.3.3.3	RS-based BFD and LR in non-DRX mode	355
A.4.5.5.3.1	Test Purpose and Environment.	
A.4.5.5.3.2	Test Requirements	
A.4.5.5.4	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-	501
11.7.3.3.4	RS-based BFD and LR in DRX mode	361
A.4.5.5.4.1	Test Purpose and Environment	
A.4.5.5.4.1 A.4.5.5.4.2		
A.4.5.6.1	Test Requirements DCI-based and Timer-based Active BWP Switch	
A.4.5.6.1.1	E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC	
A.4.5.6.1.1 A.4.5.6.1.1.1	· · · · · · · · · · · · · · · · · · ·	
A.4.5.6.1.1.1 A.4.5.6.1.1.2	Test Purpose and Environment	
Λ.4.3.0.1.1.2	10st requirements	500

A.4.5.6.1.2	E-UTRAN - NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in	
	synchronous EN-DC	.369
A.4.5.6.1.2.1	Test Purpose and Environment	369
A.4.5.6.1.2.2	Test Requirements	372
A.4.5.6.2	RRC-based Active BWP Switch	373
A.4.5.6.2.1.1	Test Purpose and Environment	373
A.4.5.6.2.1.2	Test Requirements	377
A.4.5.7	PSCell addition and release delay	377
A.4.5.7.1	Addition and Release Delay of known NR PSCell	377
A.4.5.7.1.1	Test purpose and environment	377
A.4.5.7.1.2	Test Requirements	380
A.4.6 Me	easurement procedure	381
A.4.6.1	Intra-frequency Measurements	.381
A.4.6.1.1	EN-DC event triggered reporting tests without gap under non-DRX	.381
A.4.6.1.1.1	Test purpose and Environment	.381
A.4.6.1.1.2	Test parameters	381
A.4.6.1.1.3	Test Requirements	.384
A.4.6.1.2	EN-DC event triggered reporting tests without gap under DRX	.384
A.4.6.1.2.1	Test purpose and Environment	384
A.4.6.1.2.2	Test parameters	384
A.4.6.1.2.2	Test Requirements	387
A.4.6.1.3	EN-DC event triggered reporting tests with per-UE gaps under non-DRX	.387
A.4.6.1.3.1	Test purpose and Environment	387
A.4.6.1.3.2	Test parameters	387
A.4.6.1.3.3	Test Requirements	390
A.4.6.1.4	EN-DC event triggered reporting tests with per-UE gaps under DRX	.390
A.4.6.1.4.1	Test purpose and Environment	
A.4.6.1.4.2	Test parameters	
A.4.6.1.4.3	Test Requirements	
A.4.6.1.5	EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading	.393
A.4.6.1.5.1	Test purpose and Environment	393
A.4.6.1.5.2	Test parameters	393
A.4.6.1.5.3	Test Requirements	395
A.4.6.1.6	EN-DC event triggered reporting tests with SSB index reading with per-UE gaps	.396
A.4.6.1.6.1	Test purpose and Environment	396
A.4.6.1.6.2	Test parameters	396
A.4.6.1.6.3	Test Requirements	397
A.4.6.2	Inter-frequency Measurements	.398
A.4.6.2.1	EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX	
	is not used	.398
A.4.6.2.1.1	Test Purpose and Environment	.398
A.4.6.2.1.2	Test Requirements	.401
A.4.6.2.2	EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used	401
A.4.6.2.2.1	Test Purpose and Environment	
A.4.6.2.2.2	Test Requirements	
A.4.6.2.3	Void	
A.4.6.2.4	Void	
A.4.6.2.5	EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is	.+05
A.4.0.2.3	not used	405
A.4.6.2.5.1	Test Purpose and Environment	
A.4.6.2.5.2	Test Requirements	
A.4.6.2.6	EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is	.400
71.4.0.2.0	used	.408
A.4.6.2.6.1	Test Purpose and Environment.	
A.4.6.2.6.2	Test Requirements	
A.4.6.2.7	Void	
A.4.6.2.8	Void	
A.4.6.3	Void	
A.4.6.4	L1-RSRP measurement for beam reporting.	
A.4.6.4.1	SSB based L1-RSRP measurement when DRX is not used	
A.4.6.4.1.1	Test Purpose and Environment	
	▲	

A.4.6.4.1.2	Test parameters	412
A.4.6.4.1.3	Test Requirements	
A.4.6.4.2	SSB based L1-RSRP measurement when DRX is used	
A.4.6.4.2.1	Test Purpose and Environment	
A.4.6.4.2.2	Test parameters	
A.4.6.4.2.3	Test Requirements	
A.4.6.4.3	CSI-RS based L1-RSRP measurement when DRX is not used	
A.4.6.4.3.1	Test Purpose and Environment	
A.4.6.4.3.2	Test parameters	
A.4.6.4.3.3	Test Requirements	
A.4.6.4.4	CSI-RS based L1-RSRP measurement when DRX is used	
A.4.6.4.4.1	Test Purpose and Environment	
A.4.6.4.4.2	Test parameters.	
A.4.6.4.4.3	Test Requirements	
	easurement Performance requirements	
A.4.7.1	SS-RSRP	
A.4.7.1.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.1.1.1	Test Purpose and Environment	
A.4.7.1.1.2	Test parameters	
A.4.7.1.1.3	Test Requirements	
A.4.7.1.2	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.1.2.1	Test Purpose and Environment	
A.4.7.1.2.2	Test parameters	
A.4.7.1.2.3	Test Requirements	
A.4.7.1.3	Void	
A.4.7.2	SS-RSRQ	
A.4.7.2.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	428
A.4.7.2.1.1	Test Purpose and Environment	428
A.4.7.2.1.2	Test Parameters	428
A.4.7.2.1.3	Test Requirements	431
A.4.7.2.2	EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.2.2.1	Test Purpose and Environment	
A.4.7.2.2.2	Test Parameters	
A.4.7.2.2.3	Test Requirements	
A.4.7.3	SS-SINR	
A.4.7.3.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.3.1.1	Test Purpose and Environment.	
A.4.7.3.1.2	Test Parameters	
A.4.7.3.1.3	Test Requirements	
A.4.7.3.2	EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	437
A.4.7.3.2.1	Test Purpose and Environment.	
A.4.7.3.2.1	Test Parameters	
A.4.7.3.2.2 A.4.7.3.2.3	Test Requirements	
A.4.7.4	L1-RSRP measurement for beam reporting	
A.4.7.4 A.4.7.4.1	SSB based L1-RSRP measurement.	
A.4.7.4.1.1	Test Purpose and Environment	
A.4.7.4.1.2	Test Pagainments	
A.4.7.4.1.3	Test Requirements	
A.4.7.4.2	CSI-RS based L1-RSRP measurement on resource set with repetition off	
A.4.7.4.2.1	Test Purpose and Environment	
A.4.7.4.2.2	Test parameters	
A.4.7.4.2.3	Test Requirements	
A.4.7.5	SFTD accuracy	
A.4.7.5.1	SFTD accuracy	
A.4.7.5.1.1	Test Purpose and Environment	448
A.4.7.5.1.2	Test Parameters	
A.4.7.5.1.3	Test Requirements	451
A.4.7.5.2	Void	
A.4.7.5.3	Void	451
A.4.8 V	oid	451
A AA NIE E	NC took with all ND calls in ED1	151
A.4A NE-L	C test with all NR cells in FR1	451

A.4A.1 S	ignaling characteristics	
A.4A.1.1	E-UTRAN PSCell addition	.451
A.4A.1.1.1	Test purpose and environment	.451
A.4A.1.1.2	Test Requirements	.456
A.4A.1.2	Active BWP switch	.456
A.4A.1.2.1	E-UTRAN PSCell – NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-DRX in synchronous NE-DC.	456
A.4A.1.2.1.	·	
	leasurement performance	
A.4A.2.1	SFTD accuracy	
A.4A.2.1.1	SFTD accuracy	
A.4A.2.1.1 A.4A.2.1.1.		
A.4A.2.1.1. A.4A.2.1.1.	1	
A.4A.2.1.1.1	•	
	DC tests with one or more NR cells in FR2	
	oid	
	oid	
	RC_CONNECTED state mobility	
A.5.3.1	Void	
A.5.3.2	RRC Connection Mobility Control	.466
A.5.3.2.1	Void	.466
A.5.3.2.2	Random Access	.466
A.5.3.2.2.1	Contention based random access test in FR2 for PSCell/SCell in EN-DC	.466
A.5.3.2.2.2	Non-contention based random access test in FR2 for PSCell/SCell in EN-DC	
A.5.3.2.3	Void	
	iming	
A.5.4.1	UE transmit timing	
A.5.4.1.1	NR UE Transmit Timing Test for FR2	
A.5.4.1.1 A.5.4.1.1.1		
	Test Purpose and environment	
A.5.4.1.1.2	Test requirements	
A.5.4.2	UE timer accuracy	
A.5.4.3	Timing advance	
A.5.4.3.1	EN-DC FR2 timing advance adjustment accuracy	
A.5.4.3.1.1	Test Purpose and Environment	
A.5.4.3.1.2	Test Parameters	
A.5.4.3.1.3	Test Requirements	.479
A.5.5 S	ignaling characteristics	.479
A.5.5.1	Radio link Monitoring	.479
A.5.5.1.1	Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode	470
A.5.5.1.1.1	Test Purpose and Environment	
A.5.5.1.1.2	Test Requirements	
		.403
A.5.5.1.2	Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode	.484
A.5.5.1.2.1	Test Purpose and Environment	
A.5.5.1.2.2	Test Requirements	
A.5.5.1.3	Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in	
A 5 5 1 2 1	DRX mode	
A.5.5.1.3.1	Test Purpose and Environment	
A.5.5.1.3.2	Test Requirements	.491
A.5.5.1.4	Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode	.491
A.5.5.1.4.1	Test Purpose and Environment	
A.5.5.1.4.2	Test Requirements	
A.5.5.1.5	EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based	
- 1.0.0.1.0	RLM in non-DRX mode	.494
A.5.5.1.6	EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based	. 177
11.J.J.1.U	RLM in non-DRX mode	.497
A.5.5.1.7	EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based	501

A.5.5.1.8	EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based	
	RLM in DRX mode	
A.5.5.1.8.2	Test Requirements	
A.5.5.1.9	EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2	
A.5.5.1.9.1	Test Purpose and Environment	
A.5.5.1.9.2	Test Requirements	
A.5.5.2	Interruption	512
A.5.5.2.1	E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in	
	synchronous EN-DC	
A.5.5.2.1.1	Test Purpose and Environment	
A.5.5.2.1.2	Test Requirements	514
A.5.5.2.2	E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in	
	asynchronous EN-DC	
A.5.5.2.2.1	Test Purpose and Environment	514
A.5.5.2.2.2	Test Requirements	517
A.5.5.2.3	E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in	
	synchronous EN-DC	517
A.5.5.2.3.1	Test Purpose and Environment	517
A.5.5.2.3.2	Test Requirements	520
A.5.5.2.4	E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in	
	asynchronous EN-DC	521
A.5.5.2.4.1	Test Purpose and Environment	
A.5.5.2.4.2	Test Requirements	
A.5.5.2.5	E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in	
	synchronous EN-DC	524
A.5.5.2.5.1	Test Purpose and Environment	
A.5.5.2.5.2	Test Requirements	
A.5.5.2.6	E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in	
	asynchronous EN-DC	52e
A.5.5.2.6.1	Test Purpose and Environment	
A.5.5.2.6.2	Test Requirements	
A.5.5.3.1	SCell Activation and deactivation of SCell in FR2 intra-band	
A.5.5.3.1.1	Test Purpose and Environment	
A.5.5.3.1.2	Test Requirements	
A.5.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle	
A.5.5.3.2.1	Test Purpose and Environment	
A.5.5.3.2.2	Test Requirements	
A.5.5.3.3	Void	
A.5.5.3.4	Void	
A.5.5.3.5	SCell Activation and deactivation of SCell in FR2	
A.5.5.3.5.1	Test Purpose and Environment	
A.5.5.3.5.2	Test Requirements	
A.5.5.4	Void	
A.5.5.5	Beam Failure Detection and Link recovery procedures.	
A.5.5.5.1	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-	
11.0.0.0.1	based BFD and LR in non-DRX mode	538
A.5.5.5.1.1	Test Purpose and Environment	
A.5.5.5.1.2	Test Requirements	
A.5.5.5.2	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-	5 12
11.3.3.3.2	based BFD and LR in DRX mode	543
A.5.5.5.2.1	Test Purpose and Environment	
A.5.5.5.2.2	Test Requirements	
A.5.5.5.3	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-	
11.0.0.0.0	RS-based BFD and LR in non-DRX mode	5/16
A.5.5.5.3.1	Test Purpose and Environment	
A.5.5.5.3.1 A.5.5.5.3.2	Test Requirements	
A.5.5.5.4	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-	
11.3.3.3.4	RS-based BFD and LR in DRX mode	550
A.5.5.5.4.1	Test Purpose and Environment	
A.5.5.5.4.1 A.5.5.5.4.2	Test Requirements	
A.5.5.5.5 A.5.5.5.5	EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for	
11.3.3.3.3	EN-DC scheduling availability restriction during beam railule Detection and Link Recovery for EP2 PSCall configured with SSR based RED and I P in non DPY mode	553

A.5.5.5.1	Test Purpose and Environment	
A.5.5.5.5.2	Test Requirements	559
A.5.5.6	Active BWP switch	
A.5.5.6.1	DCI-based and Timer-based Active BWP Switch	559
A.5.5.6.1.1	E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC.	559
A.5.5.6.1.1.1	Test Purpose and Environment	559
A.5.5.6.1.1.2	Test Requirements	562
A.5.5.6.1.2	E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in	
	synchronous EN-DC	562
A.5.5.6.1.2.1	Test Purpose and Environment	
A.5.5.6.1.2.2	Test Requirements	
A.5.5.6.2	RRC-based Active BWP Switch	
A.5.5.6.2.1	E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC.	
A.5.5.6.2.1.1	Test Purpose and Environment	
A.5.5.6.2.1.2	Test Requirements	
A.5.5.7	PSCell addition and release delay	
A.5.5.7.1	Addition and Release Delay of NR PSCell	
A.5.5.7.1.1	Test purpose and environment	
A.5.5.7.1.2	Test Requirements	
A.5.5.8	Active TCI state switch delay	
A.5.5.8.1	MAC-CE based active TCI state switch	
A.5.5.8.1.1	E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state	
A.5.5.8.1.1.1	Test Purpose and Environment	
A.5.5.8.1.1.2	Test Requirements	
A.5.5.8.2	RRC based active TCI state switch	
A.5.5.8.2.1	E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state	
A.5.5.8.2.1.1	Test Purpose and Environment	
A.5.5.8.2.1.2	Test Requirements	
	asurement procedure	
A.5.6.1	Intra-frequency Measurements	
A.5.6.1.1	EN-DC event triggered reporting test without gap under non-DRX	
A.5.6.1.1.1	Test purpose and Environment	
A.5.6.1.1.2	Test Requirements	
A.5.6.1.2	EN-DC event triggered reporting test without gap under DRX	
A.5.6.1.2.1	Test purpose and Environment	
A.5.6.1.2.2	Test Requirements	
A.5.6.1.3	EN-DC event triggered reporting test with per-UE gaps under non-DRX	
A.5.6.1.3.1	Test purpose and Environment	
A.5.6.1.3.2	Test Requirements	
A.5.6.1.4	EN-DC event triggered reporting test with per-UE gaps under DRX	588
A.5.6.1.4.1	Test purpose and Environment	
A.5.6.1.4.2	Test Requirements	
A.5.6.2	Inter-frequency Measurements	
A.5.6.2.1	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	
	is not used	592
A.5.6.2.1.1	Test Purpose and Environment	
A.5.6.2.1.2	Test Requirements	
A.5.6.2.2	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	
	is used.	595
A.5.6.2.2.1	Test Purpose and Environment	
A.5.6.2.2.2	Test Requirements	
A.5.6.2.3	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	not used	598
A.5.6.2.3.1	Test Purpose and Environment	
A.5.6.2.3.2	Test Requirements	
A.5.6.2.4	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	used	601
A.5.6.2.4.1	Test Purpose and Environment	
A.5.6.2.5	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	
	is not used	604
A.5.6.2.5.1	Test Purpose and Environment	
A.5.6.2.5.2	Test Requirements	

A.5.6.2.6	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used	
A.5.6.2.6.1	Test Purpose and Environment	
A.5.6.2.6.2	Test Requirements	
A.5.6.2.7	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	012
11.3.0.2.7	not used	612
A.5.6.2.7.1	Test Purpose and Environment	
A.5.6.2.7.2	Test Requirements	
A.5.6.2.8	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	used	616
A.5.6.2.8.1	Test Purpose and Environment	
A.5.6.2.8.2	Test Requirements	
A.5.6.3	L1-RSRP measurement for beam reporting	621
A.5.6.3.1	SSB based L1-RSRP measurement when DRX is not used	621
A.5.6.3.1.1	Test Purpose and Environment	
A.5.6.3.1.2	Test parameters	
A.5.6.3.1.3	Test Requirements	
A.5.6.3.1.3	Test Requirements	
A.5.6.3.2	SSB based L1-RSRP measurement when DRX is used	
A.5.6.3.2.1	Test Purpose and Environment	
A.5.6.3.2.2	Test parameters	
A.5.6.3.2.3	Test Requirements	
A.5.6.3.3	CSI-RS based L1-RSRP measurement when DRX is not used	
A.5.6.3.3.1	Test Purpose and Environment	
A.5.6.3.3.2	Test parameters	627
A.5.6.3.3.3	Test Requirements	
A.5.6.3.4	CSI-RS based L1-RSRP measurement when DRX is used	
A.5.6.3.4.1 A.5.6.3.4.2	Test Purpose and Environment	
A.5.6.3.4.2 A.5.6.3.4.3	Test parameters Test Requirements	
	easurement Performance requirements	
A.5.7.1	SS-RSRP	
A.5.7.1.1	EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	
A.5.7.1.1	Test Purpose and Environment	
A.5.7.1.1.2	Test parameters.	
A.5.7.1.1.3	Test Requirements	
A.5.7.1.2	EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	
A.5.7.1.2.1	Test Purpose and Environment.	
A.5.7.1.2.2	Test parameters	
A.5.7.1.2.3	Test Requirements	
A.5.7.1.3	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell	
A.5.7.1.3.1	Test Purpose and Environment	
A.5.7.1.3.2	Test parameters	
A.5.7.1.3.3	Test Requirements	643
A.5.7.2	SS-RSRQ	643
A.5.7.2.1	EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	643
A.5.7.2.1.1	Test Purpose and Environment	
A.5.7.2.1.2	Test Parameters	644
A.5.7.2.1.3	Test Requirements	
A.5.7.2.2	EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.5.7.2.2.1	Test Purpose and Environment	
A.5.7.2.2.2	Test Parameters	
A.5.7.2.2.3	Test Requirements	
A.5.7.3	SS-SINR	
A.5.7.3.1	EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.5.7.3.1.1	Test Purpose and Environment	
A.5.7.3.1.2	Test Parameters	
A.5.7.3.1.3	Test Requirements	
A.5.7.3.2	EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.5.7.3.2.1	Test Personators	
A.5.7.3.2.2	Test Parameters	
A.5.7.3.2.3	Test Requirements	051

A.5.7.4	L1-RSRP measurement for beam reporting	651
A.5.7.4.1	SSB based L1-RSRP measurement	651
A.5.7.4.1.1	Test Purpose and Environment	651
A.5.7.4.1.2	Test parameters	652
A.5.7.4.1.3	Test Requirements	654
A.5.7.4.2	CSI-RS based L1-RSRP measurement on resource set with repetition off	655
A.5.7.4.2.1	Test Purpose and Environment	655
A.5.7.4.2.2	Test parameters	655
A.5.7.4.2.3	Test Requirements	657
A.5.8 V	pid	658
A.6 NR s	tandalone tests with all NR cells in FR1	659
	A: RRC_IDLE state mobility	
A.6.1.1	Cell re-selection to NR	
A.6.1.1.1	Cell reselection to FR1 intra-frequency NR case	
A.6.1.1.1	Test Purpose and Environment	
A.6.1.1.1.2	Test Parameters	
A.6.1.1.1.3	Test Requirements	
A.6.1.1.2	Cell reselection to FR1 inter-frequency NR case	
A.6.1.1.2.1	Test Purpose and Environment	
A.6.1.1.2.2	Test Parameters	
A.6.1.1.2.3	Test Requirements	
A.6.1.2.1	Cell reselection to higher priority E-UTRAN	
A.6.1.2.1.1	Test Purpose and Environment	
A.6.1.2.1.2	Test Parameters	
A.6.1.2.1.3	Test Requirements	
A.6.1.2.2	Cell reselection to lower priority E-UTRAN	
A.6.1.2.2.1	Test Purpose and Environment	
A.6.1.2.2.2	Test Parameters	
A.6.1.2.2.3	Test Requirements	
	A: RRC_INACTIVE state mobility	
	RC_CONNECTED state mobility	
A.6.3.1.1	Intra-frequency handover from FR1 to FR1; known target cell	
A.6.3.1.1.1	Test Purpose and Environment	
A.6.3.1.1.2	Test Parameters	
A.6.3.1.1.3	Test Requirements	
A.6.3.1.2	Intra-frequency handover from FR1 to FR1; unknown target cell	
A.6.3.1.2.1	Test Purpose and Environment	
A.6.3.1.2.2	Test Parameters	674
A.6.3.1.2.3	Test Requirements	675
A.6.3.1.3	Inter-frequency handover from FR1 to FR1; unknown target cell	
A.6.3.1.3.1	Test Purpose and Environment	676
A.6.3.1.3.2	Test Parameters	676
A.6.3.1.3.3	Test Requirements	677
A.6.3.1.4	SA NR - E-UTRAN handover	678
A.6.3.1.4.1	Test Purpose and Environment	678
A.6.3.1.4.2	Test Requirements	681
A.6.3.1.5	SA NR - E-UTRAN handover with unknown target cell	681
A.6.3.1.5.1	Test Purpose and Environment	681
A.6.3.1.5.2	Test Requirements	
A.6.3.2.1	SA: RRC Re-establishment	
A.6.3.2.1.1	Intra-frequency RRC Re-establishment in FR1	
A.6.3.2.1.2	Inter-frequency RRC Re-establishment in FR1	
A.6.3.2.1.3	Intra-frequency RRC Re-establishment in FR1 without serving cell timing	
A.6.3.2.2	Random Access	
A.6.3.2.2.1	Contention based random access test in FR1 for NR standalone	
A.6.3.2.2.2	Non-Contention based random access test in FR1 for NR standalone	
A.6.3.2.3.1	Redirection from NR in FR1 to NR in FR1	
A.6.3.2.3.2	Redirection from NR in FR1 to E-UTRAN	
	ming	
A.6.4.1.1	NR UE Transmit Timing Test for FR1	
A.6.4.1.1.1	Test Purpose and environment	704

A.6.4.1.1.2	Test requirements	706
A.6.4.3.1	SA FR1 timing advance adjustment accuracy	707
A.6.4.3.1.1	Test Purpose and Environment	
A.6.4.3.1.2	Test Parameters	
A.6.4.3.1.3	Test Requirements	
A.6.5 Signa	ılling characteristics	
A.6.5.1.1	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode	
A.6.5.1.1.1	Test Purpose and Environment	
A.6.5.1.1.2	Test Requirements	
A.6.5.1.2	Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-	/ 13
11.0.5.11.2	DRX mode	713
A.6.5.1.2.1	Test Purpose and Environment	
A.6.5.1.2.2	Test Requirements	
A.6.5.1.3	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in	
	DRX mode	717
A.6.5.1.3.1	Test Purpose and Environment	717
A.6.5.1.3.2	Test Requirements	
A.6.5.1.4	Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX	
	mode	720
A.6.5.1.4.1	Test Purpose and Environment	720
A.6.5.1.4.2	Test Requirements	724
A.6.5.1.5	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in	
	non-DRX mode	
A.6.5.1.5.1	Test Purpose and Environment	
A.6.5.1.5.2	Test Requirements	728
A.6.5.1.6	Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-	
	DRX mode	
A.6.5.1.6.1	Test Purpose and Environment	
A.6.5.1.6.2	Test Requirements	732
A.6.5.1.7	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in	722
A 65171	DRX mode	
A.6.5.1.7.1 A.6.5.1.7.2	Test Purpose and Environment	
A.6.5.1.8	Test Requirements	/ 33
	mode	
A.6.5.1.8.1	Test Purpose and Environment	
A.6.5.1.8.2	Test Requirements	
A.6.5.2.1	Interruptions during measurements on deactivated NR SCC in FR1	739
A.6.5.3.1	SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell	
	measurement cycle	
A.6.5.3.1.1	Test Purpose and Environment	
A.6.5.3.1.2	Test Requirements	746
A.6.5.3.2	SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell	716
A 6 5 2 2 1	measurement cycle	
A.6.5.3.2.1 A.6.5.3.2.2	Test Purpose and Environment Test Requirements	
A.6.5.3.3	SCell Activation and deactivation of unknown SCell in FR1 in non-DRX	
A.6.5.3.3.1	Test Purpose and Environment	
A.6.5.3.3.2	Test Requirements	
A.6.5.4.1	UE UL carrier RRC reconfiguration Delay	
A.6.5.4.1.1	Test Purpose and Environment	
A.6.5.4.1.2	Test Requirements	
A.6.5.4.2	Void	
A.6.5.5.1	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD	Э г
	and LR in non-DRX mode	754
A.6.5.5.1.1	Test Purpose and Environment	
A.6.5.5.1.2	Test Requirements	
A.6.5.5.2	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD	
	and LR in DRX mode	758
A.6.5.5.2.1	Test Purpose and Environment	
A.6.5.5.2.2	Test Requirements	762

A.6.5.5.3	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based	7.00
165521	BFD and LR in non-DRX mode	
A.6.5.5.3.1	Test Purpose and Environment	
A.6.5.5.3.2	Test Requirements	/68
A.6.5.5.4	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode	768
A.6.5.5.4.1	Test Purpose and Environment	768
A.6.5.5.4.2	Test Requirements	772
A.6.5.6.1	DCI-based and Timer-based Active BWP Switch	772
A.6.5.6.1.1	NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA	772
A.6.5.6.1.2	NR FR1 DL active BWP switch with non-DRX in SA	776
A.6.5.6.2	RRC-based Active BWP Switch	779
A.6.5.6.2.1	NR FR1 DL active BWP switch of Cell with non-DRX in SA	779
A.6.6 M	leasurement procedure	782
A.6.6.1.1	SA event triggered reporting tests without gap under non-DRX	782
A.6.6.1.1.1	Test purpose and Environment	782
A.6.6.1.1.2	Test parameters	
A.6.6.1.1.3	Test Requirements	784
A.6.6.1.2	SA event triggered reporting tests without gap under DRX	
A.6.6.1.2.1	Test purpose and Environment	
A.6.6.1.2.2	Test parameters	
A.6.6.1.2.3	Test Requirements	
A.6.6.1.3	SA event triggered reporting tests with per-UE gaps under non-DRX	
A.6.6.1.3.1	Test purpose and Environment	
A.6.6.1.3.2	Test parameters	
A.6.6.1.3.3	Test Requirements	
A.6.6.1.4	SA event triggered reporting tests with per-UE gaps under DRX	
A.6.6.1.4.1	Test purpose and Environment	
A.6.6.1.4.2	Test parameters	
A.6.6.1.4.3	Test Requirements	
A.6.6.1.5	SA event triggered reporting tests without gap under non-DRX with SSB index reading	
A.6.6.1.5.1	Test purpose and Environment	
A.6.6.1.5.2	Test parameters	
A.6.6.1.5.3	Test Requirements	
A.6.6.1.6	SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading	
A.6.6.1.6.1	Test purpose and Environment	
A.6.6.1.6.2	Test parameters	
A.6.6.1.6.3	Test Requirements	
A.6.6.2.1	SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not	
	used	795
A.6.6.2.1.1	Test Purpose and Environment	
A.6.6.2.1.2	Test Requirements	
A.6.6.2.2	SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used.	
A.6.6.2.2.1	Test Purpose and Environment	
A.6.6.2.2.2	Test Requirements	
A.6.6.2.3	Void	
A.6.6.2.4	Void	
A.6.6.2.5	SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used	
A.6.6.2.5.1	Test Purpose and Environment	
A.6.6.2.5.2	Test Requirements	
A.6.6.2.6	SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used	
A.6.6.2.6.1	Test Purpose and Environment	
A.6.6.2.6.2	Test Requirements	
A.6.6.2.7	Void	
A.6.6.2.8	Void	
A.6.6.3	Inter-RAT Measurements	
A.6.6.3.1	SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1	
A.6.6.3.1.1	Test Purpose and Environment	
A.6.6.3.1.2	Test Requirements	
A.6.6.3.2	SA NR - E-UTRAN event-triggered reporting in DRX in FR1	
A.6.6.3.2.1	Test Purpose and Environment	
A.6.6.3.2.2	Test Requirements	816

A.6.6.4	L1-RSRP measurement for beam reporting	
A.6.6.4.1	SSB based L1-RSRP measurement when DRX is not used	816
A.6.6.4.1.1	Test Purpose and Environment	816
A.6.6.4.1.2	Test parameters	817
A.6.6.4.1.3	Test Requirements	818
A.6.6.4.2	SSB based L1-RSRP measurement when DRX is used	819
A.6.6.4.2.1	Test Purpose and Environment	819
A.6.6.4.2.2	Test parameters	819
A.6.6.4.2.3	Test Requirements	821
A.6.6.4.3	CSI-RS based L1-RSRP measurement when DRX is not used	821
A.6.6.4.3.1	Test Purpose and Environment	821
A.6.6.4.3.2	Test parameters	821
A.6.6.4.3.3	Test Requirements	823
A.6.6.4.4	CSI-RS based L1-RSRP measurement when DRX is used	823
A.6.6.4.4.1	Test Purpose and Environment	823
A.6.6.4.4.2	Test parameters	823
A.6.6.4.4.3	Test Requirements	
A.6.7 M	easurement Performance requirements	826
A.6.7.1.1	SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.1.1.1	Test Purpose and Environment	
A.6.7.1.1.2	Test parameters	
A.6.7.1.1.3	Test Requirements	
A.6.7.1.2	SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.1.2.1	Test Purpose and Environment	
A.6.7.1.2.2	Test parameters	
A.6.7.1.2.3	Test Requirements	
A.6.7.1.3	Void	
A.6.7.2	SS-RSRQ	
A.6.7.2.1	SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.2.1.1	Test Purpose and Environment	
A.6.7.2.1.2	Test Parameters	
A.6.7.2.1.3	Test Requirements	
A.6.7.2.2	SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.2.2.1	Test Purpose and Environment.	
A.6.7.2.2.2	Test Parameters	
A.6.7.2.2.3	Test Requirements	
A.6.7.3.1	SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.3.1.1	Test Purpose and Environment	
A.6.7.3.1.2	Test Parameters	
A.6.7.3.1.3	Test Requirements	
A.6.7.3.2	SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.3.2.1	Test Purpose and Environment.	
A.6.7.3.2.2	Test Parameters	
A.6.7.3.2.3	Test Requirements	
A.6.7.4.1	SSB based L1-RSRP measurement	
A.6.7.4.1.1	Test Purpose and Environment	
A.6.7.4.1.2	Test parameters	
A.6.7.4.1.3	Test Requirements	
A.6.7.4.1.3	CSI-RS based L1-RSRP measurement on resource set with repetition off	
A.6.7.4.2.1	Test Purpose and Environment	
A.6.7.4.2.1 A.6.7.4.2.2	Test parameters	
A.6.7.4.2.3	•	
A.6.7.5.1	Test Requirements	
A.6.7.5.1 A.6.7.5.1.1		
A.6.7.5.1.1 A.6.7.5.1.2	Test Purpose and Environment.	
A.6.7.5.1.2 A.6.7.5.1.3	Test Paguirements	
A.6.7.5.1.3 A.6.7.6.1	Test Requirements	
A.6.7.6.1 A.6.7.6.1.1	SA: inter-RAT measurement accuracy with FR1 serving cell	
A.6.7.6.1.1 A.6.7.6.1.2	Test parameters	
	Test Pagnirements	
A.6.7.6.1.3	Test Requirements	
A.6.7.7.1	SA: inter-RAT measurement accuracy with FR1 serving cell	
A.6.7.7.1.1	Test Purpose and Environment	801

A.6.7.7.1.2	Test parameters	
A.6.7.7.1.3	Test Requirements	865
A.7 NR stand	alone tests with one or more NR cells in FR2	.866
	RC_IDLE state mobility	
A.7.1.1.1	Cell reselection to FR2 intra-frequency NR case	
A.7.1.1.1	Test Purpose and Environment	
A.7.1.1.1.2	Test Parameters	
A.7.1.1.3	Test Requirements	868
A.7.1.1.2	Cell reselection to FR2 inter-frequency NR case	868
A.7.1.1.2.1	Test Purpose and Environment	
A.7.1.1.2.2	Test Parameters	
A.7.1.1.2.3	Test Requirements	870
	RC_INACTIVE state mobility	
	CONNECTED state mobility	
	ndover	
A.7.3.1.1	Inter-frequency handover from FR1 to FR2; unknown target cell	
A.7.3.1.1.1	Test Purpose and Environment	
A.7.3.1.1.2	Test Parameters	
A.7.3.1.1.3	Test Requirements	
A.7.3.1.2	Intra-frequency handover from FR2 to FR2; unknown target cell	
A.7.3.1.2.1	Test Purpose and Environment	
A.7.3.1.2.2	Test Parameters	
A.7.3.1.2.3	Test Requirements	
A.7.3.1.3	Inter-frequency handover from FR2 to FR2; unknown target cell	
A.7.3.1.3.1	Test Purpose and Environment	
A.7.3.1.3.2	Test Parameters	
	Requirements	
A.7.3.2.1	SA: RRC Re-establishment	
A.7.3.2.1.1 A.7.3.2.1.2	Intra-frequency RRC Re-establishment in FR2	
A.7.3.2.1.2 A.7.3.2.1.3	Inter-frequency RRC Re-establishment in FR2	
A.7.3.2.1.3 A.7.3.2.1.3.1	Test Purpose and Environment	
A.7.3.2.1.3.1 A.7.3.2.1.3.2	Test Parpose and Environment Test Requirements	
A.7.3.2.1	Random Access	
A.7.3.2.2.1	Contention based random access test in FR2 for NR Standalone	
A.7.3.2.2.1 A.7.3.2.2.2	Non-contention based random access test in FR2 for NR Standalone	
A.7.3.2.3	SA: RRC Connection Release with Redirection	
A.7.3.2.3.1	Redirection from NR in FR2 to NR in FR2	
	Z	
A.7.4.1.1	NR UE Transmit Timing Test for FR2	
A.7.4.1.1.1	Test Purpose and environment	
A.7.4.1.1.2	Test requirements	
A.7.4.3.1	SA FR2 timing advance adjustment accuracy	
A.7.4.3.1.1	Test Purpose and Environment	
A.7.4.3.1.2	Test Parameters	
A.7.4.3.1.3	Test Requirements	901
A.7.5 Signal	ing characteristics	
A.7.5.1.1	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in	
	non-DRX mode	902
A.7.5.1.1.1	Test Purpose and Environment	902
A.7.5.1.1.2	Test Requirements	905
A.7.5.1.2	Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-	
		905
A.7.5.1.2.1	Test Purpose and Environment	905
A.7.5.1.2.2	Test Requirements	909
A.7.5.1.3	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in	
	DRX mode	
A.7.5.1.3.1	Test Purpose and Environment	
A.7.5.1.3.2	Test Requirements	911
A.7.5.1.4	Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX	012

A.7.5.1.4.	1 Test Purpose and Environment	912
A.7.5.1.4.		
A.7.5.1.5	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode	
A.7.5.1.5.		
A.7.5.1.5.	•	
A.7.5.1.6	Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode	
A.7.5.1.6.		
A.7.5.1.6.		
A.7.5.1.7	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode	
A.7.5.1.7.		922
A.7.5.1.7.		
A.7.5.1.8	Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode	
A.7.5.1.8.		
A.7.5.1.8.		
A.7.5.1.9	UE Radio Link Monitoring Scheduling Restrictions on FR2	
A.7.5.1.9.		
A.7.5.1.9.	•	
A.7.5.2.1	Interruptions during measurements on deactivated NR SCC in FR2	
A.7.5.3.1	SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX	
A.7.5.3.1.		
A.7.5.3.1. A.7.5.3.1.	<u>*</u>	
A.7.5.3.1. A.7.5.3.2	SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2	
A.7.5.3.2 A.7.5.3.2.		
A.7.5.3.2.	1	941
A.7.5.5.1	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode	
A.7.5.5.1.	T · · · · · · · · · · · · · · · · · · ·	
A.7.5.5.1.	1	946
A.7.5.5.2	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode	
A.7.5.5.2.		
A.7.5.5.2.	2 Test Requirements	950
A.7.5.5.3	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode	950
A.7.5.5.3.	1 Test Purpose and Environment	950
A.7.5.5.3.	2 Test Requirements	955
A.7.5.5.4	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode	
A.7.5.5.4.		
A.7.5.5.4.		
A.7.5.5.5	Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode	
A.7.5.5.5.		
A.7.5.5.5.	•	
A.7.5.6.1	DCI-based and Timer-based Active BWP Switch	
A.7.5.6.1.		
A.7.5.6.1.	ı	
A.7.5.6.2	RRC-based Active BWP Switch	
A.7.5.7.1	Addition and Release Delay of known NR PSCell	
A.7.5.7.1.		
A.7.5.7.1. A.7.5.7.2	Addition and Release Delay of unknown NR PSCell	
A.7.5.7.2. A.7.5.7.2.	·	
A.7.5.7.2. A.7.5.8.1	MAC-CE based active TCI state switch.	
A.7.5.8.1 A.7.5.8.2	RRC based active TCI state switch	
A.7.5.8.2 A.7.6	Measurement procedure	
1 1. / .U	measurement procedure	, , , 0

A.7.6.1.1	SA event triggered reporting test without gap under non-DRX	
A.7.6.1.1.1	Test purpose and Environment	
A.7.6.1.1.2	Test Requirements	
A.7.6.1.2	SA event triggered reporting test without gap under DRX	
A.7.6.1.2.1	Test purpose and Environment	
A.7.6.1.2.2	Test Requirements	
A.7.6.1.3	SA event triggered reporting test with per-UE gaps under non-DRX	
A.7.6.1.3.1	Test purpose and Environment	
A.7.6.1.3.2	Test Requirements	
A.7.6.1.4	SA event triggered reporting test with per-UE gaps under DRX	
A.7.6.1.4.1	Test purpose and Environment	
A.7.6.1.4.2	Test Requirements	1002
A.7.6.2.1	SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)	1003
A.7.6.2.1.1	Test Purpose and Environment	
A.7.6.2.1.2	Test Requirements	
A.7.6.2.1.2	SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used	1007
11.7.0.2.2	(PCell in FR2)	1007
A.7.6.2.2.1	Test Purpose and Environment	1007
A.7.6.2.2.2	Test Requirements	1009
A.7.6.2.3	SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used	
	(PCell in FR2)	1010
A.7.6.2.3.1	Test Purpose and Environment	1010
A.7.6.2.3.2	Test Requirements	1014
A.7.6.2.4	SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)	1014
A.7.6.2.4.1	Test Purpose and Environment	
A.7.6.2.4.2	Test Requirements	
A.7.6.2.5	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not	1010
A.7.0.2.3	used (PCell in FR1)	.1017
A.7.6.2.5.1	Test Purpose and Environment	
A.7.6.2.5.2	Test Requirements	
A.7.6.2.6	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)	
A.7.6.2.6.1	Test Purpose and Environment	
A.7.6.2.6.2	Test Requirements	
A.7.6.2.7	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used	1023
A.7.0.2.7	(PCell in FR1)	1024
A.7.6.2.7.1	Test Purpose and Environment	
A.7.6.2.7.2	Test Requirements	1027
A.7.6.2.8	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)	1027
A.7.6.2.8.1	Test Purpose and Environment	
A.7.6.2.8.2	Test Requirements	
A.7.6.3	L1-RSRP measurement for beam reporting	
A.7.6.3.1	SSB based L1-RSRP measurement when DRX is not used	
A.7.6.3.1.1	Test Purpose and Environment	
A.7.6.3.1.2	Test parameters	
A.7.6.3.1.3	Test Requirements	
A.7.6.3.2	SSB based L1-RSRP measurement when DRX is used	
A.7.6.3.2.1	Test Purpose and Environment	
A.7.6.3.2.2	Test parameters	
A.7.6.3.2.3	Test Requirements	
A.7.6.3.3	CSI-RS based L1-RSRP measurement when DRX is not used	1035
A.7.6.3.3.1	Test Purpose and Environment	
A.7.6.3.3.2	Test parameters	
A.7.6.3.3.3	Test Requirements	
A.7.6.3.4	CSI-RS based L1-RSRP measurement when DRX is used	
A.7.6.3.4.1	Test Purpose and Environment	
A.7.6.3.4.2	Test parameters	
A.7.6.3.4.3	Test Requirements	1040
A.7.7 M	Seasurement Performance requirements	1040

A.7.7.1.1 SA intra-frequency case measurement accu	racy with FR2 serving cell and FR2 target cell104
	104
- · ·	racy with FR2 serving cell and FR2 target cell104
•	
A.7.7.1.3 SA inter-frequency measurement accuracy	with FR1 serving cell and FR2 target cell1049
A.7.7.1.3.1 Test Purpose and Environment	1049
	104
	105
	105
A.7.7.2.1 SA intra-frequency measurement accuracy	with FR2 serving cell and FR2 target cell105
A.7.7.2.1.1 Test Purpose and Environment	
A.7.7.2.1.2 Test Parameters	
A.7.7.2.1.3 Test Requirements	
	with FR2 serving cell and FR2 TDD target cell1053
A.7.7.2.2.1 Test Purpose and Environment	
A.7.7.2.2.2 Test Parameters	
A.7.7.3.1 SA intra-frequency case measurement accu	racy with FR2 serving cell and FR2 target cell105.
A.7.7.3.1.1 Test Purpose and Environment	
A.7.7.3.1.2 Test Parameters	
A.7.7.3.2 SA Inter-frequency measurement accuracy	with FR2 serving cell and FR2 TDD target cell1057
A.7.7.3.2.1 Test Purpose and Environment	105′
A.7.7.3.2.2 Test Parameters	105′
A.7.7.3.2.3 Test Requirements	
A.7.7.4.1 SSB based L1-RSRP measurement	
A.7.7.4.1.1 Test Purpose and Environment	
A.7.7.4.1.2 Test parameters	
A.7.7.4.1.3 Test Requirements	106
A.7.7.4.2 CSI-RS based L1-RSRP measurement on r	esource set with repetition off1062
A.7.7.4.2.1 Test Purpose and Environment	1062
A.7.7.4.2.2 Test parameters	
A.7.7.4.2.3 Test Requirements	
A.8 E-UTRA standalone tests for NR RRM	106
	NR target Cell in FR1 106.
	<u>e</u>
<u> </u>	
<u>-</u>	
	nont Dalay in non DPV
	nent Delay in non-DRX107
	mont Doloy in DRV
	nent Delay in DRX107
<u>-</u>	
-	
	sts for FR1 without SSB time index detection when
A.8.4.2.1.1 Test Purpose and Environment	
A.O.4.7.1.7. Test Kedillements	

A.8.4.	.2.2	NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when	
		DRX is used	
A.8.4.		Test Purpose and Environment	
A.8.4.		Test Requirements	
A.8.4.	.2.3	NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DR	
		is not used	
A.8.4.		Test Purpose and Environment	
A.8.4.		Test Requirements	
A.8.4.	.2.4	NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DR	
	2.4.1	is used	
A.8.4.		Test Purpose and Environment	
A.8.4.		Test Requirements	1093
A.8.4.	.2.5	NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when	1004
A.8.4.	251	DRX is not used Test Purpose and Environment	
		1	
A.8.4. A.8.4.		Test Requirements	1090
A.o.4.	.2.0	NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used	1007
A.8.4.	261	Test Purpose and Environment.	
A.8.4.		Test Purpose and Environment. Test Requirements	
A.8.4. A.8.4.		NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DR	
A.o.4.	.2.1	is not used	
A.8.4.	271	Test Purpose and Environment	
A.8.4.		Test Purpose and Environment. Test Requirements	
A.8.4. A.8.4.		NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DR	
A.o.4.	.2.0	is used	
A.8.4.	281	Test Purpose and Environment.	
A.8.4.		Test Parpose and Environment	
A.8.5		asurement performance	
A.8.5.		SFTD accuracy	
A.8.5.		Test Purpose	
A.8.5.		Test Environment	
A.8.5.		Test Requirements	
A.8.5.		E-UTRA – NR Inter-RAT Measurement Performance requirements	
A.8.5.		SS-RSRP	
A.8.5.		E-UTRAN – NR inter-RAT measurements with FR1 target cell	
A.8.5.		E-UTRAN – NR inter-RAT measurements with FR2 target cell	
	2.1.2.1	Test Purpose and Environment	
	2.1.2.2	Test Parameters	
	2.1.2.3	Test Requirements	
A.8.5.	.2.2	SS-RSRQ	
A.8.5.	.2.2.1	E-UTRAN – NR inter-RAT measurements with FR1 target cell	
A.8.5.	.2.2.2	E-UTRAN – NR inter-RAT measurements with FR2 target cell	
A.8.5.	2.2.2.1	Test Purpose and Environment	
A.8.5.	2.2.2.2	Test Parameters	1119
A.8.5.	2.2.2.3	Test Requirements	1121
A.8.5.	.2.3	SS-SINR	
A.8.5.	.2.3.1	E-UTRAN – NR inter-RAT measurements with FR1 target cell	1121
A.8.5.		E-UTRAN – NR inter-RAT measurements with FR2 target cell	1124
	2.3.2.1	Test Purpose and Environment	1124
	2.3.2.2	Test Parameters	
A.8.5.	.2.3.2.3	Test Requirements	1126
Anne	ex B (no	ormative): Conditions for RRM requirements applicability for operating band	s .1127
B.1	Condi	tions for NR RRC_IDLE state mobility	1127
B.1.1		roduction	
B.1.2		nditions for measurements on NR intra-frequency cells for cell re-selection	
B.1.3		nditions for measurements on NR inter-frequency cells for cell re-selection	
B.2			
ບ.∠		tions for UE measurements procedures and performance requirements in	1120

B.2.1	Introduction	1129
B.2.1.1	General	1129
B.2.1.2	Derivation of Minimum SSB_RP values for FR1	1129
B.2.1.3	Derivation of Minimum SSB_RP values for FR2	1129
B.2.1.3.1	Minimum SSB_RP values for Rx Beam Peak angle of arrival	1129
B.2.1.4	Gain to SS-RSRP measurement point for FR1	1131
B.2.1.5	Gain to SS-RSRP measurement point for FR2	1131
B.2.1.5.1	Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival	1131
B.2.2	Conditions for NR intra-frequency measurements	1131
B.2.3	Conditions for NR inter-frequency measurements	1132
B.2.4	Conditions for NR L1-RSRP reporting	1134
B.2.4.1	Conditions for SSB based L1-RSRP reporting	1134
B.2.4.2	Conditions for CSI-RS based L1-RSRP reporting	
B.2.5	Conditions for RRC connection release with redirection to NR	1136
B.2.6	Void	1137
B.2.6.1	Void	1137
B.2.6.2	Void	1137
B.3 RI	RM Requirements Exceptions	1137
B.3.1	Introduction	
B.3.2	Receiver sensitivity relaxation for CA	
B.3.2.1	Receiver sensitivity relaxation for UE supporting CA in FR1	
B.3.2.2	Receiver sensitivity relaxation for UE configured with CA in FR1	
B.3.2.2.1	Inter-band carrier aggregation	
B.3.2.2.2	Reference sensitivity exceptions due to UL harmonic interference for CA	
B.3.2.2.3	Reference sensitivity exceptions due to intermodulation interference due to 2UL CA	
B.3.2.3	Receiver sensitivity relaxation for UE supporting CA in FR2	
B.3.2.4	Receiver sensitivity relaxation for UE configured with CA in FR2	
B.3.2.4.1	Intra-band contiguous carrier aggregation	
B.3.2.4.2	Intra-band non-contiguous carrier aggregation	
B.3.3	Receiver sensitivity relaxation for DC	
B.3.3.1	Receiver sensitivity relaxation for EN-DC	1138
B.3.3.2	Receiver sensitivity relaxation for NE-DC	1138
B.3.4	Receiver sensitivity relaxation for SUL	1138
B.3.4.1	Receiver sensitivity relaxation for UE supporting SUL in FR1	1138
B.3.4.2	Receiver sensitivity relaxation for UE configured with SUL in FR1	
B.3.4.2.1	Reference sensitivity exceptions due to UL harmonic interference for SUL	
Annex (C (informative): Change history	1140
History		1148

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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where:

- x the first digit:
 - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies requirements for support of Radio Resource Management for the FDD and TDD modes of New Radio (NR). These requirements include requirements on measurements in NR and the UE as well as requirements on node dynamical behaviour and interaction, in terms of delay and response characteristics.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]	3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".
[2]	3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
[3]	3GPP TS 38.213: "NR; Physical layer procedures for control".
[4]	3GPP TS 38.215: "NR; Physical layer measurements".
[5]	3GPP TS 38.533: "NR; User Equipment (UE) conformance specification; Radio Resource Management (RRM)".
[6]	3GPP TS 38.211: "NR; Physical channels and modulation".
[7]	3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
[8]	3GPP TS 38.212 "NR; Multiplexing and channel coding".
[9]	3GPP TS 38.202: "NR; Physical layer services provided by the physical layer".
[10]	3GPP TS 38.300: "NR; Overall description; Stage-2".
[11]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[12]	3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
[13]	3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
[14]	3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
[15]	3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".
[16]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".
[17]	3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multiconnectivity", Stage 2.
[18]	3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
[19]	3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[20]	3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[21]	3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".
[22]	3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
[23]	3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
[24]	3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA); Overall description".
[25]	3GPP TS 36.101: "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
[26]	3GPP TS 38.214: "NR; Physical layer procedures for data".
[27]	3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".
[28]	Void.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [11] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [11].

Active DL BWP: Active DL bandwidth part as defined in TS 38.213 [3].

Blackbox Approach: Testing methodology, in which the UE internal implementation of certain specific UE functionality involved in the test, is unknown.

Control Resource Set: As defined in TS 38.213 [3].

DL BWP: DL bandwidth part as defined in TS 38.213 [3].

EN-DC: E-UTRA-NR Dual Connectivity as defined in clause 4.1.2 of TS 37.340 [17].

en-gNB: As defined in TS 37.340 [17].

FR1: Frequency range 1 as defined in clause 5.1 of TS 38.104 [13].

FR2: Frequency range 2 as defined in clause 5.1 of TS 38.104 [13].

gNB: as defined in TS 38.300 [10].

Master Cell Group: As defined in TS 38.331 [2].

Multi-Radio Dual Connectivity: Dual Connectivity between E-UTRA and NR nodes, or between two NR nodes, as defined in TS 37.340 [17].

ng-eNB: As defined in TS 38.300 [10].

NE-DC: NR-E-UTRA Dual Connectivity as defined in clause 4.1.3.2 of TS 37.340 [17].

NGEN-DC: NG-RAN E-UTRA-NR Dual Connectivity as defined in clause 4.1.3.1 of TS 37.340 [17].

NR-DC: NR-NR Dual Connectivity as defined in clause 4.1.3.3 of TS 37.340 [17].

Primary Cell: As defined in TS 38.331 [2].

Quasi Co-Location: As defined in TS 38.214 [26].

RLM-RS resource: A resource out of the set of resources configured for RLM by higher layer parameter RLM-RS-List [2] as defined in TS 38.213 [3].

SA operation mode: Operation mode when the UE is configured with at least PCell and not any MR-DC.

Secondary Cell: As defined in TS 38.331 [2].

Secondary Cell Group: As defined in TS 38.331 [2].

Serving Cell: As defined in TS 38.331 [2].

SMTC: An SSB-based measurement timing configuration configured by *SSB-MeasurementTimingConfiguration* as specified in TS 38.331 [2].

Special Cell: As defined in TS 38.331 [2].

SSB: SS/PBCH block as defined in clause 7.8.3 of TS 38.211 [6].

Timing Advance Group: As defined in TS 38.331 [2].

3.2 Symbols

SSB_RP

Srxlev

Squal

 T_{c}

Sintrasearch

For the purposes of the present document, the following symbols apply:

measured at the UE antenna connector

Snonintrasearch Defined in TS 38.304, subclause 5.2.4.7

• •	
$rac{BW_{Channel}}{\hat{E}s}$	Channel bandwidth, defined in TS 38.101-1, 38.101-2 and 38.101-3 subclause 3.2 Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector
F_C	RF reference frequency on the channel raster, given in table 5.4.2.2-1 in TS 38.101-1 and 38.101-2
$F_{C,low}$	The Fc of the lowest carrier, expressed in MHz
Io	The total received power density, including signal and interference, as measured at the UE antenna connector.
Ioc	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized to the chip rate) of a band limited noise source (simulating interference from cells, which are not defined in a test procedure) as measured at the UE antenna connector.
Iot	The received power spectral density of the total noise and interference for a certain RE (power integrated over the RE and normalized to the subcarrier spacing) as measured at the UE antenna connector
N_{oc}	The power spectral density of a white noise source (average power per RE normalised to the
	subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector
n_{PRB}	Physical Resource Block number as defined in clause 3.2 in TS 38.211.
N_{TA}	Timing offset between uplink and downlink radio frames at the UE, as defined in clause 4.2 in TS 38.213.
N_{TAoffset}	Fixed timing advance offset, as defined in clause 7.1.2.2 in TS 38.133.
$P_{ m CMAX}$	Configured UE transmitted power as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3.
$P_{\text{CMAX,c}}$	Configured UE transmitted power on a serving cell c as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3
S	Cell Selection Criterion defined in TS 38.304, subclause 5.2.3.2 for NR

Cell selection RX level, defined in TS 38.304, subclause 5.2.3.2

Cell selection quality, defined in TS 38.304, subclause 5.2.3.2

Basic time unit, defined in clause 4.1 of TS 38.211 [6].

Received (linear) average power of the resource elements that carry NR synchronisation burst,

Defined in TS 38.304, subclause 5.2.4.7 for E-UTRAN amd 38.304 subclause 5.2.4.7 for NR

 $\begin{array}{lll} T_{reselection} & Defined in TS \ 25.304, subclause \ 5.2.6.1.5 \\ T_{reselectionRAT} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionUTRA} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionGERAN} Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ Thresh_{x, \ high} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ Thresh_{x, \ low} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ Thresh_{serving, \ low} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ Defined in TS \ 38.304 \ ,$

T_s Reference time unit, defined in clause 4.1 of TS 38.211 [6].

 $T_{UE_re\text{-}establish_delay} \quad \text{Time between the moments when any of the conditions requiring RRC re-establishment as defined}$

in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the

target PCell.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

BFD Beam Failure Detection BFD-RS BFD Reference Signal BLER Block Error Rate

BM-RS Beam Management Reference Signal

BWP Bandwidth Part
CA Carrier Aggregation
CBD Candidate Beam Detection
CC Component Carrier
CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information
CSI-RS CSI Reference Signal
DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal DRX Discontinuous Reception E-CID Enhanced Cell ID E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

EN-DC E-UTRA-NR Dual Connectivity
FDD Frequency Division Duplex

FR Frequency Range

HARQ Hybrid Automatic Repeat Request

HO Handover L1-RSRP Layer 1 RSRP

MAC Medium Access Control
MCG Master Cell Group
MG Measurement Gap
MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MIB Master Information Block

MN Master Node

MR-DC Multi-Radio Dual Connectivity
NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NR-DC NR-NR Dual Connectivity

OFDM Orthogonal Frequency Division Multiplexing
OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel

PCC Primary Component Carrier

PCell Primary Cell

PDCCH Physical Downlink Control Channel
PDSCH Physical Downlink Shared Channel
PLMN Public Land Mobile Network

PRACH Physical RACH PSCell Primary SCell

PSS Primary Synchronization Signal pTAG Primary Timing Advance Group PUCCH Physical Uplink Control Channel PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location
RACH Random Access Channel
RAT Radio Access Technology
RLM Radio Link Monitoring
RLM-RS Reference Signal for RLM

RMSI Remaining Minimum System Information

RRC Radio Resource Control
RRM Radio Resource Management
RSSI Received Signal Strength Indicator
RSTD Reference Signal Time Difference
SA Standalone operation mode
SCC Secondary Component Carrier

SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SCS_{SSB} SSB subcarrier spacing
SDL Supplementary Downlink
SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information
SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SS-RSRP Synchronization Signal based Reference Signal Received Power SS-RSRQ Synchronization Signal based Reference Signal Received Quality SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels,

measured at the UE antenna connector.

SSS Secondary Synchronization Signal sTAG Secondary Timing Advance Group

SULSupplementary UplinkTATiming AdvanceTAGTiming Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex
TTI Transmission Time Interval

UE User Equipment

UL Uplink

3.4 Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. The test specification 38.533 [5] defines the test tolerances.

3.5 Frequency bands grouping

3.5.1 Introduction

The intention with the frequency band grouping below is to increase the readability of the specification.

The frequency bands grouping is derived based on UE REFSENS requirements specified in [18, 19, 20] and assuming 0.5 dB step between the neighbour groups. The groups are defined in the order of increasing REFSENS, i.e., the group A has the smallest REFSENS among the groups. For the same SCS and a given bandwidth, the bands within the same group have the same Io conditions in a corresponding requirement in this specification, provided the bands support this SCS. For different SCSs supported by a frequency band and the same bandwidth, different Io conditions may apply for the frequency band in the requirements, while the band group is the same, based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported SCSs for this bandwidth. For the same SCS but different supported bandwidths, the group for a band is determined based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported bandwidths.

3.5.2 NR operating bands in FR1

NR frequency bands grouping for FR1 is specified in Table 3.5.2-1.

Table 3.5.2-1: NR frequency band groups for FR1

Group	NR FDD		NR TDD		NR SDL	
	Band group notation	Operating bands	Band group notation	Operating bands	Band group notation	Operating bands
Α	NR_FDD_FR1_A	n1, n70, n74 ⁴	NR_TDD_FR1_A	n34, n38, n39, n40, n50, n51	NR_SDL_FR1_A	n75, n76
В	NR_FDD_FR1_B	n66, n74 ³	NR_TDD_FR1_B	-	NR_SDL_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77 ¹ , n78, n79	NR_SDL_FR1_C	-
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77 ²	NR_SDL_FR1_D	-
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41	NR_SDL_FR1_E	-
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-	NR_SDL_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20, n71	NR_TDD_FR1_G	-	NR_SDL_FR1_G	-
Н	NR_FDD_FR1_H	n25	NR_TDD_FR1_H	-	NR_SDL_FR1_H	-

NOTE 1: Except 3.8 GHz to 4.2 GHz.

NOTE 2: Only 3.8 GHz to 4.2 GHz.

NOTE 3: Except 1475.9 MHz to 1510.9 MHz.

NOTE 4: Only when the band is confined in 1475.9 MHz to 1510.9 MHz.

NOTE 5: These bands are used only in NR carrier aggregation with other NR bands according to NR CA band combinations specified in TS 38.101-1 [18] and TS 38.101-3 [20].

3.5.3 NR operating bands in FR2

NR frequency bands grouping for FR2 is specified in Table 3.5.3-1.

Group Band group notation Operating bands NR_TDD_FR2_A n257¹, n258¹, n261¹ В n2574, n2584, n2614 NR_TDD_FR2_B NR_TDD_FR2_C С D NR_TDD_FR2_D Ε NR_TDD_FR2 NR_TDD_FR2_F n260⁴ F G NR_TDD_FR2_G n2601 NR_TDD_FR2_H Н NR_TDD_FR2 NR_TDD_FR2_J .1 NR TDD_FR2_K K NR TDD FR2 L n257², n258², n261² Μ NR TDD FR2 M Ν NR_TDD_FR2_N 0 NR_TDD_FR2_O NR_TDD_FR2_P Р Q NR_TDD_FR2_Q NR_TDD_FR2_R R NR_TDD_FR2_S S NR_TDD_FR2 n2573, n2583, n2613 U NR_TDD_FR2_U NR_TDD_FR2_V V NR_TDD_FR2_W W NR_TDD_FR2 X NR_TDD_FR2_Y n260³ NOTE 1: UE power class 1. NOTE 2: UE power class 2. NOTE 3: UE power class 3. NOTE 4: UE power class 4.

Table 3.5.3-1: NR frequency band groups for FR2

3.6 Applicability of requirements in this specification version

In this specification,

- 'cell', 'PCell', 'PSCell' and 'SCell' refer to NR cell, NR PCell, NR PSCell, and NR SCell,
- E-UTRA cells are referred to as 'E-UTRA cell', 'E-UTRA PCell', 'E-UTRA PSCell', and 'E-UTRA SCell',
- E-UTRA-NR dual connectivity where E-UTRA is the master is referred to as 'E-UTRA-NR dual connectivity'
 or 'EN-DC'.
- NR-NR dual connectivity which involves two gNB acting as Master gNB and Secondary gNB is referred to as "NR-NR dual connectivity" or "NR-DC". NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.
- 'active serving cell' refers to PCell, PSCell and activated SCells

For UE configured with supplementary UL, the requirements in clause 7.1 and 7.3 shall also apply to uplink transmissions on supplementary UL.

3.6.1 RRC connected state requirements in DRX

For the requirements in RRC connected state specified in this version of the specification, the UE shall assume that no DRX is used provided the following conditions are met:

- DRX parameters are not configured or
- DRX parameters are configured and
 - drx-InactivityTimer is running or

- drx-RetransmissionTimerDL is running or
- drx-RetransmissionTimerUL is running or
- ra-ContentionResolutionTimer is running or
- a Scheduling Request sent on PUCCH is pending or
 - a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the preamble not selected by the MAC entity

Otherwise the UE shall assume that DRX is used.

3.6.2 Number of serving carriers

3.6.2.1 Number of serving carriers for SA

Requirements for standalone NR with NR PCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 8 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 1 UL (or 2 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

3.6.2.2 Number of serving carriers for EN-DC

Requirements for EN-DC operation of E-UTRA and NR with E-UTRA PCell and NR PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PSCell and up to 1 UL (or 2 UL if SUL is configured) in SCell in different FR with PSCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for EN-DC in the MCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.3 Number of serving carriers for NE-DC

Requirements for NE-DC operation of NR and E-UTRA with NR PCell and E-UTRA PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 1 UL (or 2 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for NE-DC in the SCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.4 Number of serving carriers for NR-DC

Requirements for NR-DC are applicable for the UE configured with the following number of serving NR CCs:

- up to 2 NR DL CCs in total in FR1, up to 8 NR DL CCs in total in FR2, with 1 UL in PCell, 1 UL in PSCell, and up to 1 UL in each SCell.

3.6.3 Applicability for intra-band FR2

For the requirements in RRC connected state specified in this version of the specification, UE shall assume that the transmitted signals from the serving cells should have the same downlink spatial domain transmission filter on one OFDM symbol in the same band in FR2. Otherwise, the UE is not supposed to satisfy any requirements for SCell.

3.6.4 Applicability for FR2 UE power classes

For the requirements of each FR2 power class specified in this version of the specification, certain UE types with specific device architectures are assumed. The UE types can be found in TS 38.101-2 [19].

3.6.5 Applicability for SDL bands

The measurements accuracy requirements for SDL bands in this version of specification in clause 10.1 shall apply for NR intra-frequency measurements on SCC (SS-RSRP, SS-RSRQ, SS-SINR, and L1-RSRP) and inter-frequency measurements (SS-RSRP, SS-RSRQ, and SS-SINR).

3.6.6 Applicability of requirements for NGEN-DC operation

All the requirements in this specification applicable for EN-DC are also applicable for NGEN-DC.

3.6.7 Applicability of QCL

For the requirements specified in this version of the specification, a reference signal is considered to be QCLed to another reference signal if it is in the same TCI chain as the other reference signal, provided that the number of Reference Signals in the chain is no more than 4. It is assumed there is single QCL type per TCI chain.

A TCI chain consists of an SSB, and one or more CSI-RS resources, and the TCI state of each Reference Signal includes another Reference Signal in the same TCI chain.

DMRS of PDCCH or PDSCH is QCLed with the reference signal in its active TCI state and any other reference signal that is QCLed, based on above criteria, with the reference signal in the active TCI state.

4 SA: RRC_IDLE state mobility

4.1 Cell Selection

After a UE has switched on and a PLMN has been selected, the cell selection process takes place, as described in TS 38.304 [1]. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process, the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

4.2 Cell Re-selection

4.2.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS 38.304 [1], allowing the UE to limit its measurement activity.

In the requirements of clause 4.2, the exceptions for side conditions apply as follows:

- for the UE capable of CA, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1, B.3.2.3, or B.3.2.5 for UE supporting CA in FR1, CA in FR2 and CA between FR1 and FR2, respectively;
- for the UE capable of SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1.

4.2.2 Requirements

4.2.2.1 UE measurement capability

For idle mode cell re-selection purposes, the UE shall be capable of monitoring at least:

- Intra-frequency carrier, and
- Depending on UE capability, 7 NR inter-frequency carriers, and
- Depending on UE capability, 7 FDD E-UTRA inter-RAT carriers, and
- Depending on UE capability, 7 TDD E-UTRA inter-RAT carriers.

In addition to the requirements defined above, a UE supporting E-UTRA measurements in RRC_IDLE state shall be capable of monitoring a total of at least 14 carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD and NR layers.

4.2.2.2 Measurement and evaluation of serving cell

The UE shall measure the SS-RSRP and SS-RSRQ level of the serving cell and evaluate the cell selection criterion S defined in TS 38.304 [1] for the serving cell at least once every M1*N1 DRX cycle; where:

M1=2 if SMTC periodicity (T_{SMTC}) > 20 ms and DRX cycle ≤ 0.64 second,

otherwise M1=1.

The UE shall filter the SS-RSRP and SS-RSRQ measurements of the serving cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE has evaluated according to Table 4.2.2.2-1 in N_{serv} consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information for 10 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1].

 DRX cycle length [s]
 Scaling Factor (N1) FR1
 Nserv [number of DRX cycles]

 0.32
 8
 M1*N1*4

 0.64
 5
 M1*N1*4

 1.28
 4
 N1*2

Table 4.2.2.2-1: N_{serv}

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.

3

N1*2

4.2.2.3 Measurements of intra-frequency NR cells

2.56

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP and SS-RSRQ measurements of the identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS38.304[1] within $T_{\text{detect},NR_Intra}$ when that Treselection= 0. An intra frequency cell is considered to be detectable according to the conditions defined in Annex B.1.2 for a corresponding Band.

The UE shall measure SS-RSRP and SS-RSRQ at least every $T_{measure,NR_Intra}$ (see table 4.2.2.3-1) for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NR\ Intra}/2$.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined in TS38.304 [1] within $T_{\text{evaluate.NR}}$ Intra when $T_{\text{reselection}} = 0$ as specified in table 4.2.2.3-1 provided that:

when rangeToBestCell is not configured:

- the cell is at least 3 dB better ranked in FR1 or 4.5 dB better ranked in FR2.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them.
 - the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2 if the current serving cell is among them.

When evaluating cells for reselection, the SSB side conditions apply to both serving and non-serving intra-frequency cells.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is satisfied with the reselection criteria which are defined in TS38.304 [1], the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

Table 4.2.2.3-1: T_{detect,NR_Intra} , $T_{measure,NR_Intra}$ and $T_{evaluate,NR_Intra}$

DRX cycle	Scaling Factor (N1)		T _{detect,NR_Intra} [s] (number of DRX	T _{measure,NR_Intra} [s] (number of DRX	Tevaluate,NR_Intra
length [s]	FR1	FR2 ^{Note1}	cycles)	cycles)	[s] (number of DRX cycles)
0.32		8	11.52 x N1 x M2 (36 x	1.28 x N1 x M2 (4 x N1	5.12 x N1 x M2 (16 x
			N1 x M2)	x M2)	N1 x M2)
0.64	1	5	17.92 x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.

Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1.

4.2.2.4 Measurements of inter-frequency NR cells

The UE shall be able to identify new inter-frequency cells and perform SS-RSRP or SS-RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided.

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.7.

If $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below in this clause.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS38.304 [1] within $K_{carrier} * T_{detect,NR_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 5 dB in FR1 or 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP

reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities. The parameter $K_{carrier}$ is the number of NR inter-frequency carriers indicated by the serving cell. An inter-frequency cell is considered to be detectable according to the conditions defined in Annex B.1.3 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every T_{measure,NR_Inter}. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure SS-RSRP or SS-RSRQ at least every $K_{carrier} * T_{measure,NR_Inter}$ (see table 4.2.2.4-1) for identified lower or equal priority inter-frequency cells. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter SS-RSRP or SS-RSRQ measurements of each measured higher, lower and equal priority interfrequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NR_Inter}/2$.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 38.304 [1] within $K_{carrier} * T_{evaluate,NR_Inter}$ when $T_{reselection} = 0$ as specified in table 4.2.2.4-1 provided that the reselection criteria is met by

- the condition when performing equal priority reselection and

when rangeToBestCell is not configured:

- the cell is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 or.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them
 - the cell is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 if the current serving cell is among them. Or
- 6dB in FR1 or 7.5dB in FR2 for SS-RSRP reselections based on absolute priorities or
- 4dB in FR1 or 4dB in FR2 for SS-RSRQ reselections based on absolute priorities.

When evaluating cells for reselection, the SSB side conditions apply to both serving and inter-frequency cells.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is satisfied with the reselection criteria, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

The UE is not expected to meet the measurement requirements for an inter-frequency carrier under DRX cycle=320 ms defined in Table 4.2.2.4-1 under the following conditions:

- $T_{SMTC_intra} = T_{SMTC_inter} = 160$ ms; where T_{SMTC_intra} and T_{SMTC_inter} are periodicities of the SMTC occasions configured for the intra-frequency carrier and the inter-frequency carrier respectively, and
- SMTC occasions configured for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the SMTC occasions configured for the intra-frequency carrier, and

- SMTC occasions configured for the intra-frequency carrier and for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the paging occasion in TS38.304 [1].

DRX cycle	Scaling Factor (N1)		T _{detect,NR_Inter} [S]	Tmeasure,NR_Inter [S]	Tevaluate,NR_Inter [S]
length [s]	FR1	FR2 ^{Note1}	(number of DRX cycles)	(number of DRX cycles)	(number of DRX cycles)
0.32		8	11.52 x N1 x 1.5 (36 x	1.28 x N1 x 1.5 (4 x N1	5.12 x N1 x 1.5 (16 x
			N1 x 1.5)	x 1.5)	N1 x 1.5)
0.64	1	5	17.92x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)

Table 4.2.2.4-1: T_{detect,NR_Inter}, T_{measure,NR_Inter} and T_{evaluate,NR_Inter}

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.

4.2.2.5 Measurements of inter-RAT E-UTRAN cells

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-RAT E-UTRAN layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2

If $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-RAT E-UTRAN layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT E-UTRAN layers shall be the same as that defined below for lower priority RATs.

The requirements in this clause apply for inter-RAT E-UTRAN FDD measurements and E-UTRA TDD measurements. When the measurement rules indicate that inter-RAT E-UTRAN cells are to be measured, the UE shall measure RSRP and RSRQ of detected E-UTRA cells in the neighbour frequency list at the minimum measurement rate specified in this clause. The parameter $N_{\text{EUTRA_carrier}}$ is the total number of configured E-UTRA carriers in the neighbour frequency list. The UE shall filter RSRP and RSRQ measurements of each measured E-UTRA cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{\text{measure},\text{EUTRAN}/2}$.

An inter-RAT E-UTRA cell is considered to be detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band.
- SCH conditions specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band

The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [1] within ($N_{EUTRA_carrier}$) * $T_{detect,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchP}$ when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

Cells which have been detected shall be measured at least every ($N_{EUTRA_carrier}$) * $T_{measure,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{\text{measure}, \text{EUTRAN}}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE detects on an inter-RAT E-UTRAN carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall not consider an inter-RAT E-UTRA cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304 [1] within ($N_{EUTRA_carrier}$) * $T_{evaluate,EUTRAN}$ when $T_{reselection} = 0$ as speficied in table 4.2.2.5-1 provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-RAT E-UTRA cell is satisfied with the reselection criteria which are defined in TS 38.304 [1], the UE shall evaluate this E-UTRA cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

DRX T_{detect,EUTRAN} [s] Tmeasure, EUTRAN [S] Tevaluate, EUTRAN [s] (number of DRX cycle (number of (number of DRX DRX cycles) length cycles) cycles) [s] 11.52 (36) 1.28 (4) 5.12 (16) 0.32 17.92 (28) 1.28 (2) 5.12 (8) 0.64 32(25) 1.28 (1) 6.4 (5) 1.28 2.56 58.88 (23) 2.56(1)7.68 (3)

Table 4.2.2.5-1: T_{detect,EUTRAN}, T_{measure,EUTRAN}, and T_{evaluate,EUTRAN}

4.2.2.6 Maximum interruption in paging reception

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI-NR} + 2*T_{target\ cell\ SMTC\ period\ ms}$.

At inter-RAT cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels for paging reception of the target inter-RAT cell. For NR to E-UTRAN cell re-selection the interruption time must not exceed $T_{SI-EUTRA} + 55$ ms.

 T_{SI-NR} is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for an NR cell.

 $T_{SI\text{-}EUTRA}$ is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [16] for an E-UTRAN cell.

These requirements assume sufficient radio conditions, so that decoding of system information can be made without errors and does not take into account cell re-selection failure.

4.2.2.7 General requirements

The UE shall search every layer of higher priority at least every $T_{higher_priority_search} = (60 * N_{layers})$ seconds, where N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information.

5 SA: RRC_INACTIVE state mobility

5.1 Cell Re-selection

5.1.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in *Camped Normally* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS38.304 [1], allowing the UE to limit its measurement activity.

5.1.2 Requirements

5.1.2.1 UE measurement capability

The requirements in sub-clause 4.2.2.1 shall apply.

5.1.2.2 Measurement and evaluation of serving cell

The requirements in sub-clause 4.2.2.2 shall apply.

5.1.2.3 Measurements of intra-frequency NR cells

The requirements in sub-clause 4.2.2.3 shall apply.

5.1.2.4 Measurements of inter-frequency NR cells

The requirements in sub-clause 4.2.2.4 shall apply.

5.1.2.5 Measurements of inter-RAT E-UTRAN cells

The requirements in sub-clause 4.2.2.5 shall apply.

5.1.2.6 Maximum interruption in paging reception

The requirements in sub-clause 4.2.2.6 shall apply.

5.1.2.7 General requirements

The requirements in sub-clause 4.2.2.7 shall apply.

5.2 Void

6 RRC_CONNECTED state mobility

6.1 Handover

6.1.1 NR Handover

6.1.1.1 Introduction

The purpose of NR handover is to change the NR PCell to another NR cell. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.1.2 NR FR1 - NR FR1 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR1 cell to NR FR1 cell.

6.1.1.2.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

6.1.1.2.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{\text{interrupt}}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} \ + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = T_{rs}$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

T_{processing} is time for UE processing. T_{processing} can be up to 20ms.

 T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cellin the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the

same SSB frequency and subcarrier spacing. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.3 NR FR2- NR FR1 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR2 cell to NR FR1 cell.

6.1.1.3.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.3.2.

6.1.1.3.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When inter-frequency handover is commanded, the interruption time shall be less than Tinterrupt

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geq -2 dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$.

T_{processing} is time for UE processing. T_{processing} can be up to 40ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise T_{rs} is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.4 NR FR2- NR FR2 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR2 cell to NR FR2 cell.

6.1.1.4.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.4.2.

6.1.1.4.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell $Es/Iot \ge -2$ dB, then $T_{search} = 8*T_{rs}$ ms. If the target cell is an unknown inter-frequency cell and the target cell $Es/Iot \ge -2$ dB, then $T_{search} = 8*3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

T_{processing} is time for UE processing. T_{processing} can be up to 20ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:
 - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.1.5 NR FR1- NR FR2 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR1 cell to NR FR2 cell.

6.1.1.5.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.5.2.

6.1.1.5.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When inter-frequency handover is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. . If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geq -2 dB, then $T_{search} = 8*3* T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 $T_{processing}$ is time for UE processing. $T_{processing}$ can be up 40ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:
 - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.2 NR Handover to other RATs

6.1.2.1 NR – E-UTRAN Handover

6.1.2.1.1 Introduction

The purpose of inter-RAT handover from NR to E-UTRAN is to change the radio access mode of PCell from NR to E-UTRAN. The handover procedure is initiated from NR with a RRC message that implies a handover as described in TS 38.331 [2]. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.2.1.2 Handover delay

When the UE receives a RRC message implying handover to E-UTRAN the UE shall be ready to start the transmission of the uplink PRACH channel in E-UTRA within $D_{handover}$ ms from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interrupt}$$

Where:

T_{RRC_procedure_delay}: it is the RRC procedure delay, which is 50ms

 $T_{interrupt}$: it is the time between end of the last TTI containing the RRC command on the NR PDSCH and the time the UE starts transmission of the PRACH in E-UTRAN, excluding $T_{RRC_procedure_delay}$. $T_{interrupt}$ is defined in clause 6.1.2.1.3.

6.1.2.1.3 Interruption time

When the inter-RAT handover to E-UTRAN is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + 20 ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search} = 80$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to 30 ms.

NOTE: The actual value of T_{IU} shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant E-UTRAN cell identification requirements are described in clause 9.4.1.

6.2 RRC Connection Mobility Control

6.2.1 SA: RRC Re-establishment

6.2.1.1 Introduction

This clause contains requirements on the UE regarding RRC connection re-establishment procedure. RRC connection re-establishment is initiated when a UE in RRC_CONNECTED state loses RRC connection due to any of failure cases, including radio link failure, handover failure, and RRC connection reconfiguration failure. The RRC connection re-establishment procedure is specified in clause 5.3.7 of TS 38.331 [2].

The requirements in this clause are applicable for RRC connection re-establishment to NR cell.

6.2.1.2 Requirements

In RRC_CONNECTED state the UE shall be capable of sending RRCReestablishmentRequest message within $T_{re-establish_delay}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re-establish_delay}$) shall be less than:

$$T_{re-establish delay} = T_{UE re-establish delay} + T_{UL grant}$$

 T_{UL_grant} : It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit RRCReestablishmentRequest message.

The UE re-establishment delay (T_{UE_re-establish_delay}) is specified in clause 6.2.1.2.1.

6.2.1.2.1 UE Re-establishment delay requirement

The UE re-establishment delay ($T_{UE_re-establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the target PCell. The UE re-establishment delay ($T_{UE_re-establish_delay}$) requirement shall be less than:

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{N_{freq}-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

The intra-frequency target NR cell shall be considered detectable if each relevant SSB can satisfy that:

- SS-RSRP related side conditions given in clause 10.1.2 and 10.1.3 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR Band are fulfilled.

The inter-frequency target NR cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clause 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding NR Band are fulfilled.

 $T_{identify_intra_NR}$: It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. If the UE is not configured with intra-frequency NR carrier for RRC re-establishment then $T_{identify_intra_NR}$ =0; otherwise $T_{identify_intra_NR}$ shall not exceed the values defined in Table 6.2.1.2.1-1.

 $T_{identify_inter_NR,i}$: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. $T_{identify_inter_NR,i}$ shall not exceed the values defined in Table 6.2.1.2.1-2.

 T_{SMTC} : It is the periodicity of the SMTC occasion configured for the intra-frequency carrier. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*, T_{smtc} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

 $T_{SMTC,i}$: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*. If it is not configured, the UE may assume that the target SSB periodicity is no larger than 20 ms.

T_{SI-NR}: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for the target NR cell.

 T_{PRACH} : It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{PRACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 N_{freq} : It is the total number of NR frequencies to be monitored for RRC re-establishment; $N_{\text{freq}} = 1$ if the target intra-frequency NR cell is known, else $N_{\text{freq}} = 2$ and $T_{\text{identify_intra_NR}} = 0$ if the target inter-frequency NR cell is known.

There is no requirement if the target cell does not contain the UE context.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

Table 6.2.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intrafrequency cell

Serving cell	FR of target NR	Tidenti	ify_intra_NR [ms]			
SSB Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 5 x T _{SMTC})	MAX (800 ms, 10 x T _{SMTC})			
≥ -8	FR2	N/A	MAX (1000 ms, 80 x T _{SMTC}))			
< -8	FR1	N/A	800 ^{Note1}			
< -8	FR2	N/A	3520 ^{Note1}			
Note 1: The UE is not required to successfully identify a cell on any NR frequency layer when T _{SMTC} > 20 ms and						
serving cell SSB Ês/lot < -8 dB.						

Table 6.2.1.2.1-2: Time to identify target NR cell for RRC connection re-establishment to NR interfrequency cell

Serving cell SSB	FR of target NR	T _{identify}	/_inter_NR, i [ms]			
Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 6 x T _{SMTC, i})	MAX (800 ms, 13 x Т _{SMTC, і})			
≥ -8	FR2	N/A	MAX (1000 ms, 104 x T _{SMTC, i}))			
< -8	FR1	N/A	800 ^{Note1}			
< -8	FR2	N/A	4000 ^{Note1}			
	100					

6.2.2 Random access

6.2.2.1 Introduction

This clause contains requirements on the UE regarding random access procedure. The random access procedure is initiated to establish uplink time synchronization for a UE which either has not acquired or has lost its uplink synchronization, or to convey UE's request Other SI, or for beam failure recovery. The random access is specified in clause 8 of TS 38.213 [3] and the control of the RACH transmission is specified in clause 5.1 of TS 38.321 [7].

6.2.2.2 Requirements

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula defined in TS 38.213 [3] and apply this power level at the first preamble or additional preambles. The absolute power applied to the first preamble shall have an accuracy as specified in Table 6.3.4.2-1 of TS 38.101-1 [18] for FR1 and in Table 6.3.4.2-1 of TS 38.101-2 [19] for FR2. The relative power applied to additional preambles shall have an accuracy as specified in Table 6.3.4.3-1 of TS 38.101-1 [18] for FR1 and clause 6.3.4.3 of TS38.101-2 [19] for FR2.

The UE shall indicate a random access problem to upper layers if the maximum number of preamble transmission counter has been reached for the random access procedure on PCell or PSCell as specified in clause 5.1.4 in TS 38.321 [7].

The requirements in this clause apply for UE in SA operation mode or any MR-DC operation mode.

6.2.2.2.1 Contention based random access

6.2.2.2.1.1 Correct behaviour when transmitting Random Access Preamble

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB if the association between Random Access Preambles and SSB is configured, as specified in clause 5.1.2 in TS 38.321 [7].

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, if the association between PRACH occasions and SSBs is configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.1.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.1.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.1.4 Correct behaviour when receiving an UL grant for msg3 retransmission

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

6.2.2.2.1.5 SA: Correct behaviour when receiving a message over Temporary C-RNTI

The UE shall send ACK if the Contention Resolution is successful.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

6.2.2.2.1.6 Correct behaviour when contention Resolution timer expires

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

6.2.2.2.2 Non-Contention based random access

6.2.2.2.2.1 Correct behaviour when transmitting Random Access Preamble

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs is configured, with the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the associated CSI-RSs, UE shall have the capability to select the Random Access Preamble corresponding to the selected CSI-RS, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the random access procedure is initialized for beam failure recovery and if the contention-free Random Access Resources and the contention-free PRACH occasions for beam failure recovery request associated with any of the SSBs and/or CSI-RSs is configured, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs or the selected CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the associated CSI-RSs, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, or from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB assocated PRACH occasions or the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.2.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s), if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble, unless the random access procedure is initialized for Other SI request from UE.

The UE may stop monitoring for Random Access Response(s) and shall monitor the Other SI transmission if the Random Access Response only contains a Random Access Preamble identifier which is corresponding to the transmitted Random Access Preamble and the random access procedure is initialized for SI request from UE, as specified in clause 5.1.4 in TS 38.321 [7].

The UE may stop monitoring for Random Access Response(s), if the contention-free Random Access Preamble for beam failure recovery request was transmitted and if the PDCCH addressed to UE's C-RNTI is received, as specified in clause 5.1.4 in TS 38.321 [7].

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.2.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power, if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon* or if no PDCCH addressed to UE's C-RNTI is received within the RA Response window configured in *BeamFailureRecoveryConfig*, as defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.3 UE behaviour when configured with supplementary UL

In addition to the requirements defined in clause 6.2.2.2.1 and 6.2.2.2.2, a UE configured with supplementary UL carrier shall use RACH configuration for the supplementary UL carrier contained in RMSI and RRC dedicated signalling. If the cell for the random access procedure is configured with supplementary UL, the UE shall transmit or retransmit PRACH preamble on the supplementary UL carrier if the SS-RSRP measured by the UE on the DL carrier is lower than the *rsrp-ThresholdSSB-SUL* as defined in TS 38.331 [2].

6.2.3 SA: RRC Connection Release with Redirection

6.2.3.1 Introduction

This clause contains requirements on the UE regarding RRC connection release with redirection procedure. RRC connection release with redirection is initiated by the *RRCRelease* message with redirection to E-UTRAN or NR from NR specified in TS 38.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 of TS 38.331 [2].

6.2.3.2 Requirements

6.2.3.2.1 RRC connection release with redirection to NR

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell within $T_{\text{connection release redirect NR}}$.

The time delay ($T_{connection_release_redirect_NR}$) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the NR PDSCH and the time the UE starts to send random access to the target NR cell. The time delay ($T_{connection_release_redirect_NR}$) shall be less than:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH}$$

The target NR cell shall be considered detetable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB_RP and SSB Es/Iot according to Annex B.2.5 for a corresponding NR Band are fulfilled.

 $T_{RRC_procedure_delay}$: It is the RRC procedure delay for processing the received message "RRCRelease" as defined in clause 6.2.2 of TS 38.331 [2].

 $T_{identify-NR}$: It is the time to identify the target NR cell and depends on the FR of the target NR cell. It is defined in Table 6.2.3.2.1-1. Note that $T_{identify-NR} = T_{PSS/SSS-sync} + T_{meas}$, in which $T_{PSS/SSS-sync}$ is the cell search time and T_{meas} is the measurement time due to cell selection criteria evaluation.

 T_{SI-NR} : It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

T_{RACH}: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{RACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise T_{rs} is the SMTC periodicity configured in the measObjectNR having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with $T_{rs} = 20$ ms if the SSB transmission periodicity is not larger than 20 ms; otherwise,
- there is no requirement if the SSB transmission periodicity is larger than 20ms.

Table 6.2.3.2.1-1: Time to identify target NR cell for RRC connection release with redirection to NR

	FR of target NR cell	Tidentify-NR
FR1		MAX (680 ms, 11 x T _{rs})
FR2		MAX (880 ms, 8x11 x T _{rs})
Note:	If the UE has been provided with h	nigher layer signaling of smtc2 specified in TS 38.331 [2] prior to the
	redirection command, Trs follows	smtc1 or smtc2 according to the physical cell ID of the target cell.

6.2.3.2.2 RRC connection release with redirection to E-UTRAN

The UE shall be capable of performing the RRC connection release with redirection to the target E-UTRAN cell within $T_{connection_release_redirect_E-UTRAN}$.

The time delay (T_{connection_release_redirect_E-UTRA}) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the PDSCH and the time the UE starts to send random access to the target E-UTRA cell. The time delay (T_{connection_release_redirect_E-UTRA}) shall be less than:

$$T_{connection_release_redirect_E_UTRA} = T_{RRC_procedure_delay} + T_{identify_E_UTRA} + T_{SI_E_UTRA} + T_{RACH}$$

The target E-UTRA FDD or TDD cell shall be considered detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- SCH conditions specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band.

T_{RRC_procedure_delay}: It is the RRC procedure delay for processing the received message "*RRCRelease*" as defined in clause 6.2.2 of TS 38.331 [2].

 $T_{identify-E-UTRA}$: It is the time to identify the target E-UTRA cell. It shall be less than 320 ms.

 $T_{SI\text{-}E\text{-}UTRA}$: It is the time required for acquiring all the relevant system information of the target E-UTRA cell. This time depends upon whether the UE is provided with the relevant system information (SI) of the target E-UTRA cell or not by the old NR cell before the RRC connection is released.

 T_{RACH} : It is the delay caused due to the random access procedure when sending random access to the target E-UTRA cell.

7 Timing

7.1 UE transmit timing

7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the reference cell in connected state. The uplink frame transmission takes place $(N_{TA} + N_{TA} \text{ offset}) \times T_c$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. For serving cell(s) in pTAG, UE shall use the SpCell as the reference cell for deriving the UE transmit timing for cells in the pTAG. For serving cell(s) in sTAG, UE shall use any of the activated SCells as the reference cell for deriving the UE transmit timing for the cells in the sTAG. UE initial transmit timing accuracy and gradual timing adjustment requirements are defined in the following requirements.

7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value T_e is specified in Table 7.1.2-1. This requirement applies:

- when it is the first transmission in a DRX cycle for PUCCH, PUSCH and SRS or it is the PRACH transmission.

The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus $(N_{\rm TA} + N_{\rm TA~offset}) \times T_{\rm c}$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the reference cell. $N_{\rm TA}$ for PRACH is defined as 0.

 $(N_{\rm TA} + N_{\rm TA~offset}) \times T_{\rm c}$ (in T_c units) for other channels is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in clause 7.3 was applied. $N_{\rm TA}$ for other channels is not changed until next timing advance is received. The value of $N_{\rm TA~offset}$ depends on the duplex mode of the cell in which the uplink transmission takes place and the frequency range (FR). $N_{\rm TA~offset}$ is defined in Table 7.1.2-2.

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals (kHz)	Te	
		15	12*64*T _c	
	15	30	10*64*T _c	
1	ĺ	60	10*64*T _c	
1	30	15	8*64*T _c	
		30	8*64*T _c	
		60	7*64*T _c	
	120	60	3.5*64*T _c	
2	120	120	3.5*64*T _c	
2	240	60	3*64*T _c	
		120	3*64*T _c	
Note 1: T _c is the basic timing unit defined in TS 38.211 [6]				

Table 7.1.2-1: Te Timing Error Limit

Table 7.1.2-2: The Value of $N_{\mathrm{TA~offset}}$

Freque	ncy range and band of cell used for uplink transmission	N _{TA offset} (Unit: T _C)			
	band without LTE-NR coexistence case or	25600 (Note 1)			
	band without LTE-NR coexistence case				
FR1 FDD	band with LTE-NR coexistence case	0 (Note 1)			
FR1 TDD	band with LTE-NR coexistence case	39936 (Note 1)			
FR2		13792			
Note 1:	The UE identifies $N_{ m TA~offset}$ based on the infor	mation n-			
	TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of $N_{\mathrm{TA~offset}}$				
is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] and the value 39936 of N_{TAoffset} can also be provided for a FDD serving cell.					
Note 2:	Void	ded for a 1 DD serving cell.			
11010 2.	VOIG				

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell except when the timing advance in clause 7.3 is applied.

Table 7.1.2-3: void

7.1.2.1 Gradual timing adjustment

When the transmission timing error between the UE and the reference timing exceeds $\pm T_e$ then the UE is required to adjust its timing to within $\pm T_e$. The reference timing shall be $(N_{TA} + N_{TA \text{ offset}}) \times T_c$ before the downlink timing of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be T_{q} .

- 2) The minimum aggregate adjustment rate shall be T_p per second.
- 3) The maximum aggregate adjustment rate shall be T_q per 200 ms.

where the maximum autonomous time adjustment step T_q and the aggregate adjustment rate T_p are specified in Table 7.1.2.1-1.

Table 7.1.2.1-1: T_q Maximum Autonomous Time Adjustment Step and T_p Minimum Aggregate Adjustment rate

Frequency Range	SCS of uplink signals (kHz)	Tq	Тр	
	15	5.5*64*T _c	5.5*64*T _c	
1	30	5.5*64*T _c	5.5*64*T _c	
	60	5.5*64*T _c	5.5*64*T _c	
2	60	2.5*64*T _c	2.5*64*T _c	
2	120	2.5*64*T _c	2.5*64*T _c	
NOTE: T _c is the basic timing unit defined in TS 38.211 [6]				

7.1.2.2 Void

Table 7.1.2.2-1: Void

7.2 UE timer accuracy

7.2.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

7.2.2 Requirements

For UE timers specified in TS 38.331 [2], the UE shall comply with the timer accuracies according to Table 7.2.2-1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. slot alignment when UE sends messages at timer expiry).

Table 7.2.2-1

Timer value [s]	Accuracy
timer value < 4	± 0.1s
timer value ≥ 4	± 2.5%

7.3 Timing advance

7.3.1 Introduction

The timing advance is initiated from gNB to UE in EN-DC, NR-DC, NE-DC and NR SA operation modes, with MAC message that implies the adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [7].

7.3.2 Requirements

7.3.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot n+k+1 for a timing advance command received in time slot n, and the value of k is defined in clause 4.2 in TS 38.213 [3]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

7.3.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to the UE Timing Advance adjustment accuracy requirement in Table 7.3.2.2-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS 38.213 [3].

Table 7.3.2.2-1: UE Timing Advance adjustment accuracy

UL Sub Carrier Spacing(kHz)	15	30	60	120
UE Timing Advance adjustment accuracy	±256 T _c	±256 T _c	±128 T _c	±32 T _c

7.4 Cell phase synchronization accuracy

7.4.1 Definition

Cell phase synchronization accuracy for TDD is defined as the maximum absolute deviation in frame start timing between any pair of cells on the same frequency that have overlapping coverage areas.

7.4.2 Minimum requirements

The cell phase synchronization accuracy measured at BS antenna connectors shall be better than 3 µs.

7.5 Maximum Transmission Timing Difference

7.5.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundary of E-UTRA PCell and the closest slot timing boundary of PSCell to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative transmission timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundary of PCell and subframe timing boundary of E-UTRA PSCell to be aggregated for NE-DC operation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundaries of PCell and the closest slot timing boundary of PSCell to be aggregated in NR DC operation.

7.5.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1.

Table 7.5.2-1 Maximum uplink transmission timing difference requirement for asynchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)			
15	15	500			
15	30	250			
15	60	125			
15	120 ^{Note1}	62.5			
NOTE 1: For E-UTRA	NOTE 1: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the				

NOTE 1: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.5.3 and this Table 7.5.2-1 is also applicable, the scenario with 120kHz PSCell does not exist.

Table 7.5.2-2 Void

7.5.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell for inter-band synchronous EN-DC as shown in Table 7.5.2.1-1 1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.5.2.1-1 Maximum uplink transmission timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing in E- UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	35.21
15	30	35.21
15	60	35.21
15	120	35.21

7.5.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.3-1 for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.5.3-1: Maximum uplink transmission timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	5.21 ^{Note1,Note 2}
15	30	5.21 ^{Note 2}
15	60	5.21 Note 2
NOTE 1: This is not applicable for a UE which indicates the capability of only supporting single UL timing (<i>ul-TimingAlignmentEUTRA-NR</i> is signalled). Single UL timing for E-UTRA and NR cell is assumed for		

NOTE 2: If the transmission timing difference exceeds the cyclic prefix length of the UL Sub-carrier spacing for data in PSCell, NR UE Tx EVM degradation is expected for the symbol that is overlapping the LTE

subframe boundary

7.5.4 Minimum Requirements for NR Carrier Aggregation

The UE shall be capable of handling at least a relative transmission timing difference between slot timing of all pairs of TAGs as shown in Table 7.5.4-1, provided that the UE is:

- configured with the pTAG and the sTAG for inter-band NR carrier aggregation in SA or NR-DC mode, or
- configured with more than one sTAG for inter-band NR carrier aggregation in EN-DC or NE-DC mode.

Table 7.5.4-1: Maximum uplink transmission timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of TAGs	Maximum uplink transmission timing difference (µs)
FR1	34.6
FR2	8.5
Between FR1 and FR2	26.1

7.5.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell as shown in Table 7.5.5-1 for inter-band asynchronous NE-DC.

Table 7.5.5-1: Maximum uplink transmission timing difference requirement for inter-band asynchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: Void		

Table 7.5.5-2: Void

7.5.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell for inter-band synchronous NE-DC as shown in Table 7.5.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.5.5.1-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (μs)
15	15	35.21
30	15	35.21
60	15	35.21
120	15	35.21

7.5.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell as shown in Table 7.5.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.5.6-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum uplink transmission
PCell	PSCell	timing difference (µs)
FR1	FR2	34.1

7.6 Maximum Receive Timing Difference

7.6.1 Introduction

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the MCG and the closest slot timing boundary of a cell belonging to SCG to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the SCG to be aggregated for NE-DC operation and the closest slot timing boundary of a cell belonging to MCG.

A UE shall be capable of handling a relative receive timing difference between slot timing boundary of a cell belonging to MCG and the closest slot timing boundary of a cell belonging to the SCG to be aggregated for NR DC operation. A UE shall be capable of handling a relative receive timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

7.6.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver as shown in Table 7.6.2-1.

Table 7.6.2-1: Maximum receive timing difference requirement for asynchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note 1)	Maximum receive timing difference (μs)
15	15	500
15	30	250
15	60	125
15	120 ^{Note2}	62.5
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		
NOTE 2: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the		
requirement is defined in clause 7.6.3 and this Table 7.6.2-1 is also applicable, the scenario with 120 kHz does not exit.		

Table 7.6.2-2: Void

Table 7.6.2-3 Void

7.6.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from an E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver for inter-band synchronous EN-DC as shown in Table 7.6.2.1-1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.6.2.1-1: Maximum receive timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note1)	Maximum receive timing difference (µs)
15	15	
15	30	33
15	60	33
15	120	
Note 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}.		

7.6.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.3-1 for E-UTRA FDD-NR FDD and E-UTRA TDD-NR TDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.6.3-1 Maximum receive timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) ^{Note1}	Maximum receive timing difference (μs)
15	15	3
15	30	3
15	60	3
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		

Table 7.6.3-2 Void

7.6.4 Minimum Requirements for NR Carrier Aggregation

For intra-band CA, only co-located deployment is applied. For intra-band non-contiguous NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of different carriers to be aggregated at the UE receiver as shown in Table 7.6.4-1 below.

Table 7.6.4-1: Maximum receive timing difference requirement for intra-band non-contiguous NR carrier aggregation

Frequ	iency Range	Maximum receive timing difference (µs)
	FR1	3 ¹
	FR2	0.26
Note 1:	receive time differength of that SC	fferent SCS on different CCs, if the erence exceeds the cyclic prefix CS, demodulation performance xpected for the first symbol of the

For inter-band NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of all pairs of carriers to be aggregated at the UE receiver as shown in Table 7.6.4-2 below.

Table 7.6.4-2: Maximum receive timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of carriers	Maximum receive timing difference (µs)
FR1	33
FR2	8
Between FR1 and FR2	25

7.6.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from an E-UTRA cell belonging to the SCG at the UE receiver for asynchronous NE-DC as shown in Table 7.6.5-1.

Table 7.6.5-1: Maximum receive timing difference requirement for asynchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note 1)	Maximum receive timing difference (µs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }. NOTE 2: Void		

Table 7.6.5-2: Void

7.6.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.6.5.1-1: Maximum receive timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note1)	Maximum receive timing difference (µs)
15	15	
30	15	33
60	15	
120	15	

7.6.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG at the UE receiver as shown in Table 7.6.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.6.6-1: Maximum receive timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum receive timing
Cell in	Cell in	difference (µs)
MCG	SCG	
FR1	FR2	33

7.7 *deriveSSB-IndexFromCell* tolerance

7.7.1 Minimum requirements

When *deriveSSB-IndexFromCell* is enabled, the UE assumes frame boundary alignment (including half frame, subframe and slot boundary alignment) across cells on the same frequency carrier is within a tolerance not worse than min(2 SSB symbols, 1 PDSCH symbol) and the SFNs of all cells on the same frequency carrier are the same.

7.8 Void

8 Signalling characteristics

8.1 Radio Link Monitoring

8.1.1 Introduction

The requirements in clause 8.1 apply for radio link monitoring on:

- PCell in SA NR, NR-DC and NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The UE shall monitor the downlink radio link quality based on the reference signal configured as RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [3]. The configured RLM-RS resources can be all SSBs, or all CSI-RSs, or a mix of SSBs and CSI-RSs. UE is not required to perform RLM outside the active DL BWP.

On each RLM-RS resource, the UE shall estimate the downlink radio link quality and compare it to the thresholds Q_{out} and Q_{in} for the purpose of monitoring downlink radio link quality of the cell.

The threshold Q_{out} is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLER_{out}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{out_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-1. For CSI-RS based radio link monitoring, Q_{out_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-1.

The threshold Q_{in} is defined as the level at which the downlink radio link quality can be received with significantly higher reliability than at Q_{out} and shall correspond to the in-sync block error rate (BLER_{in}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{in_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-2. For CSI-RS based radio link monitoring, Q_{in_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-2.

The out-of-sync block error rate (BLER_{out}) and in-sync block error rate (BLER_{in}) are determined from the network configuration via parameter *rlmInSyncOutOfSyncThreshold* signalled by higher layers. When UE is not configured with *rlmInSyncOutOfSyncThreshold* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 8.1.1-1 by default. All requirements in clause 8.1 are applicable for BLER Configuration #0 in Table 8.1.1-1.

Table 8.1.1-1: Out-of-sync and in-sync block error rates

Configuration	BLERout	BLERin
0	10%	2%

UE shall be able to monitor up to N_{RLM} RLM-RS resources of the same or different types in each corresponding carrier frequency range, depending on a maximum number L_{max} of SSBs per half frame according to TS 38.213 [3], where N_{RLM} is specified in Table 8.1.1-2 according TS 38.213 [3], and meet the requirements as specified in clause 8.1. UE is not required to meet the requirements in clause 8.1 if RLM-RS is not configured and no TCI state for PDCCH is activated.

Table 8.1.1-2: Maximum number of RLM-RS resources N_{RLM}

Carrier frequency range of PCell/PSCell	$L_{ m max}$	Maximum number of RLM-RS resources, N _{RLM}
FR1, ≤ 3 GHz ^{Note}	4	2
FR1, > 3 GHz ^{Note}	8	4
FR2	64	8
NOTE: For unpaired spectrum operation with Case C - 30 kHz SCS, 3GHz is replaced by 1.88GHz, as specified in clause 4.1 in TS 38.213 [3].		

8.1.2 Requirements for SSB based radio link monitoring

8.1.2.1 Introduction

The requirements in this clause apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.2.2.

Table 8.1.2.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (PRBs)	24
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

Table 8.1.2.1-2: PDCCH transmission parameters for in-sync evaluation

Attribute	Value for BLER Configuration #0
DCI payload size	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	4
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	0dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	0dB
Bandwidth (PRBs)	24
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.1.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_out_SSB}}$ ms period becomes worse than the threshold $Q_{\text{out_SSB}}$ within $T_{\text{Evaluate_out_SSB}}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_SSB}}$ ms period becomes better than the threshold $Q_{\text{in_SSB}}$ within $T_{\text{Evaluate_in_SSB}}$ [ms] evaluation period.

T_{Evaluate out SSB} and T_{Evaluate in SSB} are defined in Table 8.1.2.2-1 for FR1.

T_{Evaluate out SSB} and T_{Evaluate in SSB} are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8.

For FR1.

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the SSB; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{sharing factor}$, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP,T_{SMTCperiod})}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1, if the RLM-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

Table 8.1.2.2-1: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR1

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_} SSB (ms)
no DRX	Max(200, Ceil(10 \times P) \times T _{SSB})	Max(100, Ceil(5 \times P) \times T _{SSB})
DRX cycle≤320ms	Max(200, Ceil(15 \times P) \times	$Max(100, Ceil(7.5 \times P) \times Max(T_{DRX}, T_{SSB}))$
	$Max(T_{DRX},T_{SSB}))$	
DRX cycle>320ms	$Ceil(10 \times P) \times T_{DRX}$	$Ceil(5 \times P) \times T_{DRX}$
NOTE: T _{SSB} is the periodicity of the SSB configured for RLM. T _{DRX} is the DRX cycle length.		

Table 8.1.2.2-2: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR2

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_} SSB (ms)
no DRX	Max(200, Ceil($10 \times P \times N$) $\times T_{SSB}$)	Max(100, Ceil($5 \times P \times N$) $\times T_{SSB}$)
DRX cycle≤320ms	Max(200, Ceil(15 \times P \times N) \times	Max(100, Ceil(7.5 \times P \times N) \times Max(T _{DRX} ,T _{SSB}))
	Max(T _{DRX} ,T _{SSB}))	
DRX cycle>320ms	Ceil($10 \times P \times N$) $\times T_{DRX}$	Ceil(5 \times P \times N) \times T _{DRX}
NOTE: T _{SSB} is the periodicity of the SSB configured for RLM. T _{DRX} is the DRX cycle length.		

8.1.2.3 Measurement restrictions for SSB based RLM

The UE is required to be capable of measuring SSB for RLM without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for RLM is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for RLM without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for RLM without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

For FR2, when the SSB for RLM measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

8.1.3 Requirements for CSI-RS based radio link monitoring

8.1.3.1 Introduction

The requirements in this clause apply for each CSI-RS based RLM-RS resource configured for PCell or PSCell, provided that the CSI-RS configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.3.2. UE is not expected to perform radio link monitoring measurements on the CSI-RS configured as RLM-RS if the CSI-RS is not in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.1.3.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	4dB
Bandwidth (PRBs)	48
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

Table 8.1.3.1-2: PDCCH transmission parameters for in-sync evaluation

Attribute	Value for BLER Configuration #0
DCI payload size	1-0
Number of control OFDM	2
symbols	-
Aggregation level (CCE)	4
Ratio of hypothetical PDCCH	
RE energy to average CSI-RS	0dB
RE energy	
Ratio of hypothetical PDCCH	
DMRS energy to average	0dB
CSI-RS RE energy	
Bandwidth (PRBs)	48
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.1.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_out_CSI-RS}}$ ms period becomes worse than the threshold $Q_{\text{out_CSI-RS}}$ within $T_{\text{Evaluate_out_CSI-RS}}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_CSI-RS}}$ ms period becomes better than the threshold $Q_{\text{in_CSI-RS}}$ within $T_{\text{Evaluate_in_CSI-RS}}$ [ms] evaluation period.

- $T_{Evaluate_out_CSI-RS}$ and $T_{Evaluate_in_CSI-RS}$ are defined in Table 8.1.3.2-1 for FR1.

- Tevaluate_out_CSI-RS and Tevaluate_in_CSI-RS are defined in Table 8.1.3.2-2 for FR2 with scaling factor N=1.

The requirements of T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} apply provided that the CSI-RS for RLM is not in a resource set configured with repetition ON. The requirements do not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for RLM and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the CSI-RS; and
- P = 1, when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the RLM-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing \ factor}$, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\,factor}}{1 \frac{T_{CSI-RS}}{MGRP}}, \text{ when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MGRP,T_{SMTCperiod})}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{\text{CSI-RS}} = T_{\text{SMTCperiod}}$) and SMTC occasion is partially overlapped with measurement gap ($T_{\text{SMTCperiod}} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the RLM-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

The values of M_{out} and M_{in} used in Table 8.1.3.2-1 and Table 8.1.3.2-2 are defined as:

- $M_{out} = 20$ and $M_{in} = 10$, if the CSI-RS resource configured for RLM is transmitted with higher layer CSI-RS parameter *density* [6, clause 7.4.1] set to 3 and over the bandwidth ≥ 24 PRBs.

Table 8.1.3.2-1: Evaluation period Tevaluate out CSI-RS and Tevaluate in CSI-RS for FR1

Configuration	T _{Evaluate_out_} CSI-RS (ms)	TEvaluate_in_CSI-RS (ms)		
no DRX	Max(200, Ceil(Mout×P)×Tcsi-Rs)	$Max(100, Ceil(M_{in} \times P) \times T_{CSI-RS})$		
DRX ≤ 320ms	Max(200, Ceil(1.5×Mout×P)×	Max(100, Ceil(1.5×Min×P)× Max(TDRX, TCSI-		
	Max(T _{DRX} , T _{CSI-RS}))	RS))		
DRX > 320ms	$Ceil(M_{out} \times P) \times T_{DRX}$	$Ceil(M_{in} \times P) \times T_{DRX}$		
NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table				
apply for T _{CSI-R}	$_{\rm S}$ equal to 5 ms, 10ms, 20 ms or 40 ms. $T_{\rm DR}$	x is the DRX cycle length.		

Table 8.1.3.2-2: Evaluation period T_{Evaluate out CSI-RS} and T_{Evaluate in CSI-RS} for FR2

	Configuration	T _{Evaluate_out_CSI-RS} (ms)	T _{Evaluate_in_CSI-RS} (ms)		
	no DRX	Max(200, Ceil(Mout×PxN)xTcsi-Rs)	Max(100, Ceil(M _{in} ×P×N) × T _{CSI-RS})		
	DRX ≤ 320ms	Max(200, Ceil(1.5×Mout×P×N)×	Max(100, Ceil(1.5×M _{in} ×P×N)×		
		Max(T _{DRX} , T _{CSI-RS}))	Max(T _{DRX} , T _{CSI-RS}))		
	DRX > 320ms	$Ceil(M_{out} \times P \times N) \times T_{DRX}$	$Ceil(M_{in} \times P \times N) \times T_{DRX}$		
NOTE:	NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table apply for				
-	T_{CSI-RS} equal to 5 ms, 10 ms, 20 r	ms or 40 ms. T_{DRX} is the DRX cycle len	gth.		

8.1.3.3 Measurement restrictions for CSI-RS based RLM

The UE is required to be capable of measuring CSI-RS for RLM without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for RLM is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for RLM in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD, or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

 If the UE supports simultaneousRxDataSSB-DiffNumerology the UE shall be able to perform CSI-RS for RLM measurement without restrictions. - If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR1, when the CSI-RS for RLM is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for RLM without any restriction.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for RLM and the other CSI-RS. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.
 - The CSI-RS for RLM or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for RLM without any restriction.

8.1.4 Minimum requirement at transitions

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each RLM-RS resource, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation period corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode for each RLM-RS resource. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of RLM resources to a second configuration of RLM resources that is different from the first configuration, for each RLM resource present in the second configuration, for a duration of time equal to the evaluation period corresponding to the second configuration after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first configuration and the second configuration. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second configuration for each RLM resource present in the second configuration. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for RLM present in the second configuration, the UE shall use an evaluation period corresponding to the second configuration from the time of transition. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

8.1.5 Minimum requirement for UE turning off the transmitter

The transmitter power of the UE in the monitored cell shall be turned off within 40ms after expiry of T310 timer as specified in TS 38.331 [2].

8.1.6 Minimum requirement for L1 indication

When the downlink radio link quality on all the configured RLM-RS resources is worse than Q_{out}, layer 1 of the UE shall send an out-of-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the out-of-sync indications as specified in TS 38.331 [2].

When the downlink radio link quality on at least one of the configured RLM-RS resources is better than Q_{in} , layer 1 of the UE shall send an in-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the in-sync indications as specified in TS 38.331 [2].

The out-of-sync and in-sync evaluations for the configured RLM-RS resources shall be performed as specified in clause 5 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication\ interval}$.

When DRX is not used $T_{Indication_interval}$ is max(10ms, $T_{RLM-RS,M}$), where $T_{RLM,M}$ is the shortest periodicity of all configured RLM-RS resources for the monitored cell, which corresponds to T_{SSB} specified in clause 8.1.2 if the RLM-RS resource is SSB, or T_{CSI-RS} specified in clause 8.1.3 if the RLM-RS resource is CSI-RS.

In case DRX is used, $T_{Indication_interval}$ is Max(10ms, $1.5 \times DRX_cycle_length$, $1.5 \times T_{RLM-RS,M}$) if DRX cycle_length is less than or equal to 320ms, and $T_{Indication_interval}$ is DRX_cycle_length if DRX cycle_length is greater than 320ms. Upon start of T310 timer as specified in TS 38.331 [2], the UE shall monitor the configured RLM-RS resources for recovery using the evaluation period and layer 1 indication interval corresponding to the no DRX mode until the expiry or stop of T310 timer.

8.1.7 Scheduling availability of UE during radio link monitoring

When the reference signal to be measured for RLM has different subcarrier spacing than PDSCH/PDCCH or is on frequency range 2, there are restrictions on the scheduling availability as described in the following clauses.

8.1.7.1 Scheduling availability of UE performing radio link monitoring with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to radio link monitoring performed with a same subcarrier spacing as PDSCH/PDCCH on FR1.

8.1.7.2 Scheduling availability of UE performing radio link monitoring with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to radio link monitoring based on SSB as RLM -RS.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR1 is performed, the scheduling restrictions on FR1 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is performed, there are no scheduling restrictions on FR1 serving cell(s) in the bands due to radio link monitoring performed on FR1 serving PCell or PSCell in different bands.

8.1.7.3 Scheduling availability of UE performing radio link monitoring on FR2

The following scheduling restriction applies due to radio link monitoring on an FR2 serving PCell and/or PSCell.

- If the RLM-RS is CSI-RS which is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON,
 - There are no scheduling restrictions due to radio link monitoring based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on RLM-RS symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for RLM; and

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for RLM.

8.1.7.4 Scheduling availability of UE performing radio link monitoring on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to radio link monitoring performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to radio link monitoring performed on FR1 serving PCell and/or PSCell.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.2 Interruption

8.2.1 EN-DC Interruption

8.2.1.1 Introduction

This clause contains the requirements related to the interruptions on PSCell, and SCell, when

E-UTRA PCell transitions between active and non-active during DRX, or

E-UTRA PCell transitions from non-DRX to DRX, or

E-UTRA SCell in MCG or SCell in SCG is added or released, or

E-UTRA SCell in MCG or SCell in SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA MCG or NR SCG, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

UL/DL BWP is switched on PSCell or SCell in SCG.

The requirements shall apply for E-UTRA-NR DC with an E-UTRA PCell.

This clause contains interruptions where victim cell is PSCell or SCell belonging to SCG. Requirements for interruptions requirements when the victim cell is E-UTRA PCell or E-UTRA SCell belonging to MCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.1.2 Requirements

8.2.1.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions between active and non-active druing DRX when PSCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.1.2.1-1.

Table 8.2.1.2.1-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption le	ength X (slots
μ.	length (ms)	Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25	3	3
3	0.125	5	

When both E-UTRA PCell and PSCell are in DRX, no interruption is allowed.

8.2.1.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions from non-DRX to DRX when PSCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.1.2.1-1.

When PSCell and the activated SCell are in DRX, no interruption due to E-UTRA PCell transitions from non-DRX to DRX is allowed.

8.2.1.2.3 Interruptions at SCell addition/release

The requirements in this clause shall apply for the UE configured with PSCell.

When one E-UTRA SCell in MCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
- of up to X1 slot, if the active serving cell is not in the same band as any of the E-UTRA SCells being added or released, or
- of up to $max\{Y1 \ slot + T_{SMTC_duration}, 5ms\}$ if the active serving cells are in the same band as any of the E-UTRA SCells being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being added or released are available in the same slot, where $T_{SMTC_duration}$ is the longest SMTC duration among all above active serving cells in SCG;

Where X1 and Y1 are specified in Table 8.2.1.2.3-1.

When one SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to Y1 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being added when one SCell is added;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.1.2.3-2.

Table 8.2.1.2.3-1: Interruption length X1 and Y1 at E-UTRA SCell addition/Release

μ	NR Slot length		n length X1 ots)	Interruption le	ngth Y1 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3
2	0.25		5	4	5
3	0.125		9	N/A	N/A

Table 8.2.1.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and 4 victim cell are on FR2		4
		Either aggressor cell or victim cell is on FR1		
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.1.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with PSCell and one SCell.

When one E-UTRA SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the E-UTRA SCells being activated or deactivated, or
 - of up to max{Y2 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being activated or deactivated are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in SCG.

Where X2 and Y2 are specified in Table 8.2.1.2.4-1.

When one SCell in SCG is activated or deactivated:

- an interruption on any serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to Y2 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being activated when one SCell is activated;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.1.2.4-2.

Table 8.2.1.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

μ	NR Slot length	•	n length X2 ots)	Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125	;	5	N/A	N/A

Table 8.2.1.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption length X2 (slots)		Interruption length Y2 (slots)
0	1	1		1
1	0.5	1		1
2	0.25	Both aggressor cell and victim 2 cell are on FR2		2
		Either aggressor cell or victim 3 cell is on FR1		
3	0.125	Aggressor cell is on FR2	4	4
		Aggressor cell is on FR1	5	

8.2.1.2.5 Interruptions during measurements on SCC

8.2.1.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PSCell and other activated NR SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3, where the term PCell in clause 8.2.2.2.3 shall be deemed to be replaced with PSCell.

8.2.1.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in MCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slot, if the PSCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slot + SMTC duration, if the PSCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PSCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Table 8.2.1.2.5.2-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length	•	on length X3 ots)	Interruption len	gth Y3 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125		5	N/A	N/A

8.2.1.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR non-standalone operation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to X4 slot, is allowed during the RRC reconfiguration procedure [2] on E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the configured or de-configured UL.

μ	NR Slot length (ms)	Interruption length X4 (slots)	
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25		5
3	0.125		9

Table 8.2.1.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

8.2.1.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\text{BWPswitchDelay}}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay T_{BWPswitchDelay} as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.1.2.7-1: interruption length X

μ	NR Slot length (ms)	Interruption length X (slots)
0	1	1
1	0.5	1
2	0.25	3
3	0.125	5
Note1:	void	

Table 8.2.1.2.7-2: Parameters which cause interruption other than SCS

Parameters	Comment	
locationAndBandwidth	From TS 29 224 [2]	
nrofSRS-Ports	From TS 38.331 [2]	

8.2.2 SA: Interruptions with Standalone NR Carrier Aggregation

8.2.2.1 Introduction

This clause contains the requirements related to the interruptions on PCell and activated SCell if configured, when

up to 7 SCells are configured, de-configured, activated or deactivated, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell or SCell.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command.

This clause additionally contains requirements related to interruptions at inter-frequency SFTD between PCell in FR1 and neighbour cell in FR2.

For a UE which does not support per-FR measurement gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports per-FR gap, interruptions to PCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.2.2 Requirements

8.2.2.2.1 Interruptions at SCell addition/release

When any number of SCells between one and 7 is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any active serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.1-1, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to the duration shown in table 8.2.2.2.1-2, if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot.

Table 8.2.2.2.1-1: Interruption duration for SCell addition/release for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)		
0	1	1		
1	0.5	2		
2	0.25	Both aggressor cell and victim cell are on FR2	4	
		Either aggressor cell or 5 victim cell is on FR1		
3	0.125	Aggressor cell is on FR2 8		
		Aggressor cell is on FR1	9	

Table 8.2.2.2.1-2: Interruption duration for SCell addition/release for intra-band CA

μ	NR Slot length (ms)	Interruption length (slot)		
0	1	1 + T _{SMTC_duration} * $N_{ m slot}^{ m subframe}$, μ		
1	0.5	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$		
2	0.25	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$		
3	0.125	8 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$		
NOTE	NOTE 1: T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above active serving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.			
NOTE	2: N _{slot}	$N_{\rm slot}^{\rm subframe}$ is as defined in TS 38.211 [6].		

8.2.2.2.2 Interruptions at SCell activation/deactivation

When an intra-band SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.2-1, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to the duration shown in table 8.2.2.2.2-2, if the active serving cells are in the same band as any of the SCells being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot.

Table 8.2.2.2.1: Interruption duration for SCell activation/deactivation for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)			
0	1		1		
1	0.5		1		
2	0.25	Both aggressor cell and victim cell are on FR2	2		
		Either aggressor cell or victim cell is on FR1	3		
3	0.125	Aggressor cell is on FR2	4		
		Aggressor cell is on FR1	5		

Table 8.2.2.2.2: Interruption duration for SCell activation/deactivation for intra-band CA

μ	NR Slot	Interruption length (slots)			
μ	length (ms)				
0	1	1 + $T_{SMTC_duration} * N_{slot}^{subframe,\mu}$			
1	0.5	1 + T _{SMTC_duration} $*N_{ m slot}^{ m subframe}$, μ			
2	0.25	2 + T _{SMTC_duration} $*N_{ m slot}^{ m subframe}$, μ			
3	0.125	4 + $T_{SMTC_duration} * N_{slot}^{subframe,\mu}$			
NOTE 1:	T _{SMTC_duration} meas	sured in subframes is			
	- the longest SMT	C duration among all above active			
	serving cells and t	the SCell being activated when			
	one SCell is activa	ated;			
	 the longest SMTC duration among all active 				
	serving cells in the same band when one SCell is				
	deactivated.				
NOTE 2.	$N_{\rm slot}^{\rm subframe,\mu}$ is as defined in TS 38.211 [6].				
NOTE 2:	$N_{\rm slot}$ is as defined in 15 38.211 [6].				

8.2.2.2.3 Interruptions during measurements on deactivated SCC

Interruptions on PCell or activated SCell(s) due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer.

- If the PCell or activated SCell(s) is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on PCell or activated SCell(s) immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.2-1.
- If the PCell or activated SCell(s) is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell or activated SCell(s) no earlier than X slots before T_{SMTC_duration} and no later than X slots after T_{SMTC_duration}, provided the cell specific reference signals from the active serving cells and the deactivated SCell are available in the same slot, where X and T_{SMTC_duration} are given by Table 8.2.2.2.3-1. The interruption shall not exceed requirements in Table 8.2.2.2.3-1.

Table 8.2.2.2.3-1: Interruption duration for measurement on deactivated SCell for intra-band CA

μ	NR Slot length (ms)	X (slots)	Interruption length (slots)		
0	1	1	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$		
1	0.5	1	2 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$		
2	0.25	2	$4 + T_{SMTC_duration} * N_{slot}^{subframe, \mu}$		
3	0.125	4	8 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$		
NOTE 1: Touto duration measured in subframes is the longest SMTC duration among					

NOTE 1: T_{SMTC_duration} measured in subframes is the longest SMTC duration among all above active serving cells and the deactivated SCell to be measured;

NOTE 2: N_{slot}^{subframe, μ} is as defined in TS 38.211 [6].

8.2.2.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR standalone carrier aggregation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.2.2.4-1, is allowed during the RRC reconfiguration procedure [2] on PCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell and all the activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.2.2.4-1: Interruption duration for UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.2.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\text{BWPswitchDelay}}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay T_{BWPswitchDelay} as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.2.2.5-1: Interruption length X

μ	NR Slot length (ms)	Interruption length X (slots)
0	1	1
1	0.5	1
2	0.25	3
3	0.125	5
Note1:	void	

Table 8.2.2.2.5-2: Parameters which cause interruption other than SCS

Parameters	Comment	
locationAndBandwidth	From TS 38.331 [2]	
nrofSRS-Ports		

8.2.2.2.6 Interruptions at inter-frequency SFTD measurement

The requirements in this clause concern interruptions on PCell, as well as on activated SCells in MCG, when the UE is performing SFTD measurements on inter-frequency neighbour cell(s). The following requirements apply when no PSCell is configured.

For a UE with per-FR gap capability:

- for neighbour cell in FR1:
 - the percentage of interrupted slots on uplink and downlink on FR1 serving cells during the SFTD measurement period $T_{measure_SFTD1}$ specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR2 serving cells.
 - the length of each interruption on FR1 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.
- for neighbour cell in FR2:
 - the percentage of interrupted slots on uplink and downlink on FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR1 serving cells.
 - the length of each interruption on FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

For a UE with per-UE gap capability:

- for neighbour cell in FR1 or FR2:
 - the percentage of interrupted slots on uplink and downlink on FR1 and FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1.
 - the length of each interruption on FR1 and FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

Table 8.2.2.2.6-1: Requirements on maximum percentage of interrupted slots in serving cell in interfrequency SFTD

SFTD	Serving	Neighbour cell SMTC periodicity					
configuration	cell µ	5ms	10ms	20ms	40ms	80ms	160ms
With RSRP	0						
report	1	8.4%	6.3%	8.4%	6.3%	5.3%	4.7%
	2	0.4%	0.5%	0.470	0.3%	5.5%	4.770
	3						
Without RSRP	0						
report	1	11.4%	8.6%	7.9%	6.8%	6.3%	6.0%
	2	11.470	0.0%	1.9%	0.0%	0.3%	0.0%
	3						

Table 8.2.2.2.6-2: Interruption duration for FR1 serving cell in inter-frequency SFTD with neighbour cell in FR1

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

Table 8.2.2.2.6-3: Void

Table 8.2.2.2.6-4: Void

8.2.3 NE-DC Interruptions

8.2.3.1 Introduction

This clause contains the requirements related to the interruptions on PCell and SCell, when

E-UTRA PSCell transitions between active and non-active during DRX, or

E-UTRA PSCell transitions from non-DRX to DRX, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is added or released, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA SCG or NR MCG or

PUSCH/PUCCH carrier configuration and deconfiguration in NR MCG, or

UL/DL BWP is switched on PCell or SCell in MCG.

The requirements shall apply for NE-DC with an NR PCell.

This clause contains interruptions where victim cell is PCell or SCell belonging to MCG. Requirements for interruptions requirements when the victim cell is E-UTRA PSCell or E-UTRA SCell belonging to SCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gap, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gap, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.3.2 Requirements

8.2.3.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions between active and non-active druing DRX when PCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.3.2.1-1.

Table 8.2.3.2.1-1: Interruption length X at transition between active and non-active during DRX

μ	NR slot length (ms)	Interruption length X (slots)		
		Sync	Async	
0	1	1	2	
1	0.5	1 2		
2	0.25	3		
3	0.125	5		

When both PCell and E-UTRA PSCell are in DRX, no interruption is allowed.

8.2.3.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions from non-DRX to DRX when PCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.3.2.1-1.

8.2.3.2.3 Interruptions at PSCell/SCell addition/release

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell.

When one E-UTRA PSCell/SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X1 slots, if the active serving cell is not in the same band as any of the E-UTRA PSCell/SCells being added or released, or
 - of up to max{Y1 slots+ T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA PSCell/SCells being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA PSCell/SCells being added or released are available in the same slot, where T_{SMTC duration} is the longest SMTC duration among all above activated serving cells in MCG;

Where X1 and Y1 are specified in Table 8.2.3.2.3-1.

When one SCell in MCG is added or released:

- the UE is allowed an interruption on any activated serving cell in MCG:
 - of up to X1 slots, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to Y1 slots + T_{SMTC_duration} if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot, where, T_{SMTC duration} is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being added when one SCell is added;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.3.2.3-2.

Table 8.2.3.2.3-1: Interruption length X1 and Y1 at E-UTRA PSCell/SCell addition/release

μ	NR Slot length	Interruption length X1 (slots)		Interruption len	nterruption length Y1 (slots)	
	(ms)	Sync	Async	Sync	Async	
0	1	1	2	1	2	
1	0.5	2	3	2	3	
2	0.25		5	4	5	
3	0.125		9	N/A	N/A	

Table 8.2.3.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)	Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and 4 victim cell are on FR2		4
		Either aggressor cell or 5 victim cell is on FR1		
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.3.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell and one SCell.

When one E-UTRA SCell in SCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X2 slots, if the active serving cell is not in the same band as any of the E-UTRA SCells being activated or deactivated, or
 - of up to max{Y2 slots + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as any of the E-UTRA SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCells being activated or deactivated are available in the same slot, where T_{SMTC duration} is the longest SMTC duration among all above active serving cells in MCG.

Where X2 and Y2 are specified in Table 8.2.3.2.4-1.

When one SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any serving cell in MCG:
 - of up to X2 slots, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to Y2 slots + T_{SMTC_duration} if the active serving cells are in the same band as any of the SCells being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot, where, T_{SMTC duration} is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being activated when one SCell is activated;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.3.2.4-2.

Table 8.2.3.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

μ	NR Slot length	Interruption length X2 (slots)		Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125		5	N/A	N/A

Table 8.2.3.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption length X2 (slots)		Interruption length Y2 (slots)
0	1	1		1
1	0.5	1		1
2	0.25	Both aggressor cell and victim cell are on FR2	2	2
		Either aggressor cell or victim cell is on FR1	3	
3	0.125	Aggressor cell is on FR2	4	4
		Aggressor cell is on FR1	5	

8.2.3.2.5 Interruptions during measurements on SCC

8.2.3.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PCell and other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3.

8.2.3.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in SCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slots, if the PCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slots + SMTC duration, if the PCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Where X3 and Y3 are specified in Table 8.2.3.2.5-1

Table 8.2.3.2.5-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length	Interruption length X3 (slots)		Interruption le	ength Y3 (slot)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	3		2	3
3	0.125		5	N/A	N/A

8.2.3.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NE-DC.

When an UL carrier or supplementary UL carrier is configured or deconfigured, an interruption of up to X4 slot as specified in Table 8.2.3.2.6-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [2] on PCell, all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell, all activated E-UTRA SCells, E-UTRA PSCell and all activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.3.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

μ	NR Slot length (ms)		n length X4 ots)
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25		5
3	0.125		9

8.2.3.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed an interruption on PCell and any activated SCells as defined in clause 8.2.2.2.5.

8.2.4 NR-DC: Interruptions

8.2.4.1 Introduction

This clause contains the requirements related to the interruptions on PCell, PSCell and activated SCell if configured, when

SCells are configured, de-configured, activated or deactivated or,

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell, PSCell or SCell.transitions between active and non-active during DRX, or transitions from non-DRX to DRX.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command. How to specify this is FFS.

The requirements shall apply for NR-DC with an NR PCell, PSCell or SCell.

For a UE which does not support per-FR measurement gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports per-FR gaps, interruptions to PCell, PSCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.4.2 Requirements

8.2.4.2.1 Interruptions at PSCell/SCell addition/release

When PSCell or one or more SCells is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any activated serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.1-1, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to the duration shown in table 8.2.4.2.1-2, if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot.

Table 8.2.4.2.1-1: Interruption duration for PSCell/SCell addition/release for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruptio	on length (slots)
0	1	1	
1	0.5	2	
2	0.25	Both aggressor cell and victim cell are on FR2	4
		Either aggressor cell or victim cell is on FR1	5
3	0.125	Aggressor cell is on FR2	8
		Aggressor cell is on FR1	9

Table 8.2.4.2.1-2: Interruption duration for SCell addition/release for intra-band DC/CA

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + T _{SMTC_duration} * $N_{ m slot}^{ m subframe}$, μ
1	0.5	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$
2	0.25	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$
3	0.125	8 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$
NOTE 1: T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above activeserving cells and the SCell being added when one SCell is added; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.		
NOTE 2: $N_{ m slot}^{ m subframe,}$		^µ is as defined in TS 38.211 [6].

8.2.4.2.2 Interruptions at SCell activation/deactivation

When a SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.2-1, if the active serving cell is not in the same band as any of the SCells being activated or deactivated, or
 - of up to the duration shown in table 8.2.4.2.2-2, if the active serving cells are in the same band as any of the SCells being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCells being activated or deactivated are available in the same slot.

Table 8.2.4.2.2-1: Interruption duration for SCell activation/deactivation for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)	
0	1	1	
1	0.5	1	
2	0.25	Both aggressor cell and victim cell are on FR2	2
		Either aggressor cell or victim cell is on FR1	3
3	0.125	Aggressor cell is on FR2	4
		Aggressor cell is on FR1	5

Table 8.2.4.2.2-2: Interruption duration for SCell activation/deactivation for intra-band DC/CA

μ	NR Slot length (ms)	Interruption length (slots)	
0	1	1 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$	
1	0.5	1 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$	
2	0.25	2 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$	
3	0.125	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$	
NOTE 1:	T _{SMTC_duration} measured in subframes is - the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated; - the longest SMTC duration among all active serving cells in the same band when one SCell is deactivated.		
NOTE 2:	NOTE 2: $N_{\text{slot}}^{\text{subframe},\mu}$ is as defined in TS 38.211 [6].		

8.2.4.2.3 Interruptions during measurements on SCC

Interruption on PCell, PSCell and other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3, where the term PCell in clause 8.2.2.2.3 shall be deemed to be replaced with SpCell.

8.2.4.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR-DC as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.4.2.4-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [2] on all the other activated serving cells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of all the other serving cells within the same FR as the configured or de-configured UL.

Table 8.2.4.2.4-1: Interruption duration for UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.4.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer bwp-InactivityTimer defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed to cause an interruption on any other serving cells as defined in clause 8.2.2.2.5.

8.2.4.2.6 Interruptions at transitions between active and non-active during DRX

When PCell is in non-DRX and PSCell is in DRX, interruptions on PCell and the activated SCell in MCG if configured due to transitions from active to non-active and from non-active to active during PSCell DRX are allowed with up to 1% probability of missed ACK/NACK when the configured PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PSCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

When PSCell is in non-DRX and PCell is in DRX, interruptions on PSCell on the activated SCell in SCG if configured due to transitions from active to non-active and from non-active to active during PCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

Table 8.2.4.2.6-1: Interruption length X at transition between active and non-active during DRX

μ	NR Slot length (ms)		on length X ots)
		Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25	(3
3	0.125	į.	5

When both PCell and PSCell are in DRX, no interruption is allowed.

8.2.4.2.7 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell in MCG if configured due to PSCell transitions from non-DRX to DRX when PCell is in non-DRX shall not exceed X slots as defined in table 8.2.4.2.6-1.

Interruption on PSCell and the activated SCell in SCG if configured due to PCell transitions from non-DRX to DRX when PSCell is in non-DRX shall not exceed X slots as defined in table 8.2.4.2.6-1.

8.3 SCell Activation and Deactivation Delay

8.3.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to activate a deactivated SCell and deactivate an activated SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

The requirements shall apply for EN-DC, standalone NR carrier aggregation, NE-DC, and NR-DC.

8.3.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation or in NE-DC or in NR-DC and when one SCell is being activated.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in slot n, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot n + $T_{HARQ} + T_{activation_time} + T_{CSI_Reporting}$, where:

NR slot length

T_{HARO} (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

Tactivation time is the SCell activation delay in millisecond.

If the SCell is known and belongs to FR1, Tactivation_time is:

- T_{FirstSSB}+ 5ms, if the measurement period of the SCell being activated is equal to or smaller than [2400ms].
- $T_{FirstSSB\ MAX} + T_{rs} + 5ms$, if the measurement period of the SCell being activated is larger than

If the SCell being activated belongs to FR1 and if there is at least one active serving cell contiguous to the SCell on that FR1 band, if the UE is not provided with SSB configuration (absoluteFrequencySSB) nor SMTC configuration for the target SCell, Tactivation_time is 3 ms, provided

- The RTD between the target SCell and the contiguous active serving cell is within within ±260ns, and
- The difference of the reception power with the contiguous active serving cell is <= 6dB, and
- The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) of the SCell being activated is (are) further QCL-TypeC with SSB(s) of any active serving cell that is contiguous to the SCell being activated on that FR1 band.

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then T_{activation_time} is T_{FirstSSB}+ 5ms provided:

- $T_{FirstSSB_MAX} + T_{SMTC_MAX} + 2*T_{rs} + 5ms$

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then $T_{activation_time}$ is $T_{FirstSSB}$ + 5ms provided:

- The UE is provided with SMTC for the target SCell, and
- The SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in clause 3.6.3.
- The parameter *ssb-PositionsInBurst* is same for the serving cell(s) and the SCell.
- SSB is in the same half-frame on the SCell and the contiguous FR2 active serving cell

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE supporting *scellWithoutSSB* is not provided with any SMTC for the target SCell, T_{activation_time} is 3 ms, provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2 band.

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation time is:

- 3ms + max(Tuncertainty_MAC + TFineTiming + 2ms, Tuncertainty_SP), where Tuncertainty_MAC=0 and Tuncertainty_SP=0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation_time is:

- $max(T_{uncertainty_MAC} + 5ms + T_{FineTiming}, T_{uncertainty_RRC} + T_{RRC_delay} - T_{HARQ})$, where $T_{uncertainty_MAC} = 0$ if UE receives the SCell activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition \hat{E} s/Iot \geq -2dB is fulfilled, then $T_{activation_time}$ is:

 $-6ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + T_{HARQ} + \\ max(T_{uncertainty_MAC} + T_{FineTiming} + 2ms, T_{uncertainty_SP}).$

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition $\hat{E}s/Iot \ge -2dB$ is fulfilled, then $T_{activation time}$ is:

 $-3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + max \left\{ (T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty_RRC} + T_{RRC_delay}) \right\}.$

where,

 T_{SMTC_MAX} :

In FR1, in case of intra-band SCell activation, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, T_{SMTC_MAX} is the SMTC periodicity of SCell being activated.

- In FR2, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided that in Rel-15 only support FR2 intra-band CA.
- T_{SMTC MAX} is bounded to a minimum value of 10ms.

 T_{rs} is the SMTC periodicity of the SCell being activated if the UE has been provided with an SMTC configuration for the SCell in SCell addition message, otherwise T_{rs} is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement which involves T_{rs} is applied with T_{rs} = 5ms assuming the SSB transmission periodicity is 5ms. There are no requirements if the SSB transmission periodicity is not 5ms.

 $T_{FirstSSB}$: is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$.

 $T_{FirstSSB_MAX}$: Is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, leng \, th}$, further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCell being activated is transmitting SSB burst.
- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

T_{FineTiming} is the time period between UE finish processing the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and the timing of first complete available SSB corresponding to the TCI state.

 $T_{L1\text{-RSRP, measure}}$ is L1-RSRP measurement delay $T_{L1\text{-RSRP_Measurement_Period_SSB}}$ ms or $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}}$ based on applicability as defined in clause 9.5 assuming M=1.

T_{L1-RSRP, report} is delay of acquiring CSI reporting resources.

 $T_{uncertainty_MAC}$ is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable) relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

 $T_{uncertainty_SP}$ is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

 $T_{uncertainty_RRC}$ is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

 T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

When absoluteFrequencySSB is not configured in DownlinkConfigCommon for target SCell but SMTC for target SCell is configured, no requirement would be applied.

T_{CSI_reporting} is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2].

SCell in FR1 is known if it has been meeting the following conditions:

- During the period equal to max(5*measCycleSCell, 5*DRX cycles) for FR1 before the reception of the SCell activation command:
 - the UE has sent a valid measurement report for the SCell being activated and
 - the SSB measured remains detectable according to the cell identification conditions specified in clause 9.2 and 9.3.
- the SSB measured during the period equal to max(5*measCycleSCell, 5*DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

The requirements for FR1 unknown SCell activation specified in this clause apply when one of the following conditions is met

- 'ssb-PositionInBurst' indicates only one SSB is being actually transmitted, or
- 'ssb-PositionInBurst' indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation.

For the first SCell activation in FR2 bands, the SCell is known if it has been meeting the following conditions:

- During the period equal to 4s for UE supporting power class 1 and 3s for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):
 - the UE has sent a valid L3-RSRP measurement report with SSB index
 - SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation
- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

Otherwise, the first SCell in FR2 band is unknown. The requirement for unknown SCell applies provided that the activation commands for PDCCH TCI, PDSCH TCI (when applicable), semi-persistent CSI-RS for CQI reporting (when applicable), and configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) are based on the latest valid L1-RSRP reporting.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the activation command, T_{SMTC_Scell} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. T_{SMTC_MAX} follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.331 [2] for a SCell at the first opportunities for the corresponding actions once the SCell is activated.

The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot $n+1+\frac{T_{HARQ}}{NR\ slot\ length}$ and not occur after slot $n+1+\frac{T_{HARQ}+3ms+T_X}{NR\ slot\ length}$, where NR slot length is with respect to the numerology used in the SCell being activated, and T_X is:

- T_{FirstSSB}, for any scenario where T_{activation_time} includes T_{FirstSSB};
- T_{FirstSSB_MAX}, for any scenario where T_{activation_time} includes T_{FirstSSB_MAX};
- $T_{uncertainty_MAC} + T_{FineTiming}, \ for \ any \ scenario \ where \ T_{activation_time} \ includes \ T_{FineTiming}.$

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

The requirements in this clause and requriements on interruption due to SCell activation in clause 8.2 apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

8.3.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

Upon receiving SCell deactivation command in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot $n+1+\frac{T_{HARQ}}{NR \, slot \, length}$ and not occur after slot $n+1+\frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, where NR slot length is with respect to the numerology used in the SCell being deactivated.

Upon expiry of the *sCellDeactivationTimer* in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot $n + \frac{3ms}{NR \, slot \, length}$. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1 and not occur after slot n+1+ $\frac{3ms}{NR \, slot \, length}$, where NR slot length is with respect to the numerology used in the SCell being deactivated.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

8.4 UE UL carrier RRC reconfiguration delay

8.4.1 Introduction

The requirements in this clause apply for a UE being configured or deconfigured with a supplementary UL carrier or NR UL carrier.

8.4.2 UE UL carrier configuration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within $T_{UL_carrier_config}$ from the end of the slot n..

Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T_{UL_carrier_config} equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it equals the maximum RRC procedure delay defined in clause 12 in TS 38.331 [2].

8.4.3 UE UL carrier deconfiguration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier deconfiguration RRC signalling, the UE shall stop UL signalling on the deconfigured UL carrier within $T_{UL_carrier_deconfig}$ from the end of the slot n.

Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T_{UL_carrier_deconfig} equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it equals the maximum RRC procedure delay defined in clause 12 in TS 38.331 [2].

8.5 Link Recovery Procedures

8.5.1 Introduction

The UE shall assess the downlink radio link quality of a serving cell based on the reference signal in the set Q_0 as specified in TS 38.213 [3] in order to detect beam failure on:

- PCell in SA, NR-DC, or NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The RS resource configurations in the set \overline{q}_0 can be periodic CSI-RS resources and/or SSBs. UE is not required to perform beam failure detection outside the active DL BWP. UE is not required to meet the requirements in clause 8.5.2 and 8.5.3 if UE does not have set \overline{q}_0 .

On each RS resource configuration in the set Q_0 , the UE shall estimate the radio link quality and compare it to the threshold $Q_{\text{out_LR}}$ for the purpose of accessing downlink radio link quality of the serving cell beams.

The threshold Q_{out_LR} is defined as the level at which the downlink radio level link of a given resource configuration on set \overline{Q}_0 cannot be reliably received and shall correspond to the BLER_{out} = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection, $Q_{out_LR_SSB}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.2.1-1. For CSI-RS based beam failure detection, $Q_{out_LR_CSI-RS}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.3.1-1.

Upon request the UE shall deliver configuration indexes from the set \textit{Q}_{l} as specified in TS 38.213 [3], to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Q_{in_LR} , which is indicated by higher layer parameter rsrp-ThresholdSSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained from an SSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer

parameter powerControlOffsetSS. The RS resource configurations in the set Q_1 can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS resources. UE is not required to perform candidate beam detection outside the active DL BWP.

8.5.2 Requirements for SSB based beam failure detection

8.5.2.1 Introduction

The requirements in this clause apply for each SSB resource in the set \overline{q}_0 configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2.

Value for BLER Attribute DCI format 1-0 Number of control OFDM 2 symbols Aggregation level (CCE) 8 Ratio of hypothetical PDCCH RE energy to average SSS 0dB RE energy Ratio of hypothetical PDCCH DMRS energy to average 0dB SSS RE energy Bandwidth (PRBs) 24 Same as the SCS of RMSI CORESET Sub-carrier spacing (kHz) DMRS precoder granularity REG bundle size REG bundle size 6 CP length Normal Mapping from REG to CCE Distributed

Table 8.5.2.1-1: PDCCH transmission parameters for beam failure instance

8.5.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set Q_0 estimated over the last $T_{\text{Evaluate_BFD_SSB}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_SSB}}$ within $T_{\text{Evaluate_BFD_SSB}}$ ms period.

The value of T_{Evaluate BFD SSB} is defined in Table 8.5.2.2-1 for FR1.

The value of $T_{\text{Evaluate_BFD_SSB}}$ is defined in Table 8.5.2.2-2 for FR2 with scaling factor N=8

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB.
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- $P = P_{sharing factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the

BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 * T_{SMTCperiod}$

 $P = \frac{1}{1 - \frac{T_{SSB}}{Min(MGRP, T_{SMTCperiod})}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap } (T_{SSB})$

<MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.

- $P = \frac{P_{sharing\ factor}}{1 - \frac{T_{SSB}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)

P_{sharing factor} = 1, if the BFD-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, given the SMTC offset of all CCs in FR2 provided the same offset.

Longer evaluation period would be expected if the combination of BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 8.5.2.2-1: Evaluation period T_{Evaluate BFD SSB} for FR1

Table 8.5.2.2-2: Evaluation period T_{Evaluate_BFD_SSB} for FR2

Configuration	T _{Evaluate_BFD_SSB} (ms)	
no DRX	Max(50, Ceil(5 \times P \times N) \times T _{SSB})	
DRX cycle ≤ 320ms	$Max(50, Ceil(7.5 \times P \times N) \times Max(T_{DRX}, T_{SSB}))$	
DRX cycle > 320ms	Ceil($5 \times P \times N$) $\times T_{DRX}$	
Note: T _{SSB} is the periodicity of SSB in the set \overline{q}_0 . T _{DRX} is the DRX cycle length.		

8.5.2.3 Measurement restriction for SSB based beam failure detection

The UE is required to be capable of measuring SSB for BFD without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for BFD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for BFD measurement without any restriction;

- If SSB and CSI-RS have different SCS,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for BFD measurement without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

For FR2, when the SSB for BFD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

8.5.3 Requirements for CSI-RS based beam failure detection

8.5.3.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \overline{q}_0 of resource configurations for a serving cell, provided that the CSI-RS resource(s) in set \overline{q}_0 for beam failure detection are actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.3.2. UE is not expected to perform beam failure detection measurements on the CSI-RS configured for BFD if the CSI-RS is not QCL-ed, with QCL-TypeD when applicable, with the RS in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.5.3.1-1: PDCCH transmission parameters for beam failure instance

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM	2
symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH	
RE energy to average CSI-RS	0dB
RE energy	
Ratio of hypothetical PDCCH	
DMRS energy to average	0dB
CSI-RS RE energy	
Bandwidth (PRBs)	48
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.5.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in set q_0 estimated over the last $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_CSI-RS}}$ within $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period.

The value of T_{Evaluate BFD CSI-RS} is defined in Table 8.5.3.2-1 for FR1.

The value of $T_{Evaluate_BFD_CSI-RS}$ is defined in Table 8.5.3.2-2 for FR2 with N=1. The requirements of $T_{Evaluate_BFD_CSI-RS}$ apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS.
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the BFD-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing \ factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap and the}$

BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MGRP}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$$
- $-P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MGRP, T_{SMTCperiod})}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap } (T_{CSI-RS} < 1.01)$

MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the BFD-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and;
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,
- $P_{\text{sharing factor}} = 3$, otherwise.

where.

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1.

T_{SMTCperiod} is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for BFD and SMTC means that CSI-RS for BFD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

The values of M_{BFD} used in Table 8.5.3.2-1 and Table 8.5.3.2-2 are defined as

- $M_{BFD} = 10$, if the CSI-RS resource(s) in set \overline{q}_0 used for BFD is transmitted with Density = 3 and over the bandwidth ≥ 24 PRBs.

Table 8.5.3.2-1: Evaluation period T_{Evaluate_BFD_CSI-RS} for FR1

Configuration	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	$Max(50, Ceil(M_{BFD} \times P) \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	$Max(50, Ceil(1.5 \times M_{BFD} \times P) \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P) \times T_{DRX}$	
Note: T_{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_0 . T_{DRX} is the		
DRX cycle length.		

Table 8.5.3.2-2: Evaluation period T_{Evaluate_BFD_CSI-RS} for FR2

Configuration	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	Max(50, Ceil(M _{BFD} \times P \times N) \times T _{CSI-RS})	
DRX cycle ≤ 320ms	$Max(50, Ceil(1.5 \times M_{BFD} \times P \times N) \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P \times N) \times T_{DRX}$	
Note: T_{CSI-RS} is the periodicity of CSI-RS resource in the set $\overline{q}_0^{}$. T_{DRX} is the		
DRX cycle length.		

8.5.3.3 Measurement restrictions for CSI-RS beam failure detection

The UE is required to be capable of measuring CSI-RS for BFD without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to

measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the
 other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no
 requirements are defined.
 - The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in set \overline{q}_1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the RS resources in set \overline{q}_0 is worse than $Q_{\text{out_LR}}$, layer 1 of the UE shall send a beam failure instance indication to the higher layers.

The beam failure instance evaluation for the RS resources in set \bar{q}_0 shall be performed as specified in clause 6 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication_interval_BFD}$.

When DRX is not used, $T_{Indication_interval_BFD}$ is max(2ms, $T_{SSB-RS,M}$) or max(2ms, $T_{CSI-RS,M}$), where $T_{SSB-RS,M}$ and $T_{CSI-RS,M}$ is the shortest periodicity of all RS resources in set \overline{q}_0 for the accessed cell, corresponding to either the shortest periodicity of the SSB in the set \overline{q}_0 or CSI-RS resource in the set \overline{q}_0 .

When DRX is used, for SSB based link quality measurement,

- $T_{Indication\ interval\ BFD} = Max(1.5 \times DRX_cycle_length, 1.5 \times T_{SSB-RS,M})$, if DRX_cycle_length $\leq 320ms$,
- T_{Indication_interval_BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

When DRX is used, for CSI-RS based link quality measurement,

- T_{Indication interval BFD} = Max(1.5 × DRX_cycle_length, 1.5 × T_{CSI-RS,M}), if DRX_cycle_length ≤ 320ms,
- T_{Indication_interval_BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

8.5.5 Requirements for SSB based candidate beam detection

8.5.5.1 Introduction

The requirements in this clause apply for each SSB resource in the set \bar{q}_1 configured for a serving cell, provided that the SSBs configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.5.2.

8.5.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_SSB}}$ ms period becomes better than the threshold $Q_{\text{in_LR}}$ provided SSB_RP and SSB \hat{E} s/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle \leq 320ms.

The value of T_{Evaluate_CBD_SSB} is defined in Table 8.5.5.2-1 for FR1.

The value of T_{Evaluate CBD SSB} is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8.

where,

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB,
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate
 - beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is P_{sharing factor}, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period (T_{SSB} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}},$ when candidate beam detection RS is partially overlapped with measurement gap and

candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $-P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP, T_{SMTCperiod})}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$

and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{sharing \, factor}}{1 \frac{T_{SSB}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{sharing factor} = 1$, if the candidate beam detection RS outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
 carrier, and;
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured
- P_{sharing factor} = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 8.5.5.2-1: Evaluation period T_{Evaluate_CBD_SSB} for FR1

Cor	figuration	T _{Evaluate_CBD_SSB} (ms)
	RX, DRX cycle	$Max(25, Ceil(3 \times P) \times T_{SSB})$
\$	≨ 320ms	
DRX c	ycle > 320ms	$Ceil(3 \times P) \times T_{DRX}$
Note:	T _{SSB} is the periodicity of SSB in the set $\ \overline{q}_{\rm l}$. T _{DRX} is the DRX cycle	
	length.	

Table 8.5.5.2-2: Evaluation period T_{Evaluate CBD SSB} for FR2

Con	figuration	T _{Evaluate_CBD_SSB} (ms)
non-DR	XX, DRX cycle	Max(25, Ceil($3 \times P \times N$) $\times T_{SSB}$)
\$	320ms	
DRX c	ycle > 320ms	$Ceil(3 \times P \times N) \times T_{DRX}$
Note:	T_{SSB} is the periodicity of SSB in the set $\ \overline{q}_{l}$. T_{DRX} is the DRX cycle	
	length.	

8.5.5.3 Measurement restriction for SSB based candidate beam detection

For FR1, when the SSB for CBD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement.

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for CBD measurement without any restrictions;
- If SSB and CSI-RS have different SCS-es,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for CBD measurement without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

For FR2, when the SSB for CBD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

8.5.6 Requirements for CSI-RS based candidate beam detection

8.5.6.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \bar{q}_1 configured for a serving cell, provided that the CSI-RS resources configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.6.2.

8.5.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period becomes better than the threshold $Q_{\text{in_LR}}$ within $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period provided CSI-RS $\hat{\text{Es}}$ /Iot is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

The value of T_{Evaluate CBD CSI-RS} is defined in Table 8.5.6.2-1 for FR1.

The value of T_{Evaluate_CBD_CSI-RS} is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when candidate beam detection RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing factor}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC

- $T_{SMTCperiod} \neq MGRP$ or

- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$

occasion is not overlapped with measurement gap and

- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{\text{CSI-RS}}}{MGRP}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{\text{CSI-RS}} < T_{\text{SMTCperiod}}$) and SMTC occasion is not overlapped with measurement gap and $T_{\text{SMTCperiod}} = MGRP$ and $T_{\text{CSI-RS}} = 0.5 \times T_{\text{SMTCperiod}}$$
- $P = \frac{1}{1 \frac{T_{\text{CSI-RS}}}{Min(MGRP,T_{SMTCperiod})}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$ and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{\text{CSI-RS}} < T_{\text{SMTCperiod}}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1, if the candidate beam detection RS outside measurement gap is

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and;
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for CBD and SMTC means that CSI-RS for CBD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Longer evaluation period would be expected if the CSI-RS is on the same OFDM symbols with RLM, BFD, BM-RS, or other CBD-RS, according to the measurement restrictions defined in clause 8.5.6.3.

The values of M_{CBD} used in Table 8.5.6.2-1 and Table 8.5.6.2-2 are defined as

- $M_{CBD} = 3$, if the CSI-RS resource configured in the set \overline{q}_1 is transmitted with Density = 3 and over the bandwidth ≥ 24 PRBs.

Table 8.5.6.2-1: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR1

Con	figuration	T _{EvaluateC_CBD_CSI-RS} (ms)
non-DRX, DRX cycle		$Max(25, Ceil(M_{CBD} \times P) \times T_{CSI-RS})$
\$	≨ 320ms	
DRX c	ycle > 320ms	$Ceil(M_{CBD} \times P) \times T_{DRX}$
Note: T_{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_1 . T_{DRX} is		
	DRX cycle ler	ngth.

Table 8.5.6.2-2: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR2

Conf	figuration	T _{Evaluate_CBD_CSI-RS} (ms)	
non-DRX, DRX cycle		Max(25, Ceil(M _{CBD} \times P \times N) \times T _{CSI-RS})	
≤ 320ms			
DRX cycle > 320ms		$Ceil(M_{CBD} \times P \times N) \times T_{DRX}$	
Note:	T _{CSI-RS} is the periodicity of CSI-RS resource in the set $\ \overline{q}_{\mathrm{l}}$. T _{DRX} is the		
DRX cycle length.			

8.5.6.3 Measurement restriction for CSI-RS based candidate beam detection

For both FR1 and FR2, when the CSI-RS for CBD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for CBD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS based CBD measurement for without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer measurement period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for CBD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for CBD measurement without any restriction.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and the other CSI-RS. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

8.5.7 Scheduling availability of UE during beam failure detection

Scheduling availability restrictions when the UE is performing beam failure detection are described in the following clauses.

8.5.7.1 Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to beam failure detection performed on SSB and CSI-RS configured for BFD with the same SCS as PDSCH or PDCCH in FR1.

8.5.7.2 Scheduling availability of UE performing beam failure detection with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to beam failure detection when SSB is configured as BFD. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to beam failure detection when SSB is configured as BFD.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on FR1 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which PCell or PSCell is configured.

8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON
 - There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.

- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for BFD measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for BFD measurement.

8.5.7.4 Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR DC

There are no scheduling restrictions on FR1 serving cell(s) due to beam failure detection performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to beam failure detection performed on FR1 serving PCell and/or PSCell.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.5.8 Scheduling availability of UE during candidate beam detection

Scheduling availability restrictions when the UE is performing L1-RSRP measurement for candidate beam detection are described in the following clauses.

8.5.8.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as link recovery detection resource with the same SCS as PDSCH or PDCCH in FR1.

8.5.8.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as link recovery detection resource. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as link recovery detection resource.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, TRS, CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for L1-RSRP.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on one serving cell apply to all other serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands.

8.5.8.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to candidate beam detection

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, CSI-RS for tracking or CSI-RS for CQI on reference symbols to be measured for candidate beam detection.

When intra-band carrier aggregation in FR2 is configured, the scheduling restrictions on to one serving cell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots.

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for CBD measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for CBD measurement.

8.5.8.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.5.9 Minimum requirement at transitions for beam failure detection

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each BFD-RS resource, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation period corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode for each BFD-RS resource.

When the UE transitions from a first configuration of BFD resources to a second configuration of BFD resources that is different from the first configuration, for each BFD resource present in the second configuration, for a duration of time equal to the evaluation period corresponding to the second configuration after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first configuration and the second configuration. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second configuration for each BFD resource present in the second configuration.

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for BFD present in the second configuration, the UE shall use an evaluation period corresponding to the second configuration from the time of transition.

8.6 Active BWP switch delay

8.6.1 Introduction

The requirements in this clause apply for a UE configured PCell or any activated SCell in standalone NR or NE-DC, PCell, PSCell or any activated SCell in MCG or SCG in NR-DC, or PSCell or any activated SCell in SCG in EN-DC. UE shall complete the switch of active DL and/or UL BWP within the delay defined in this clause.

8.6.2 DCI and timer based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with more than one BWP configurations configured.

For DCI based BWP switch, if the serving cell where UE receives DCI for BWP switch request is different from the serving cell on which BWP switch occurs, the UE is not required to follow the requirements specified in this clause.

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals until the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n except DCI triggering BWP switch on the cell where DCI-based BWP switch occurs. The UE is not required to follow the requirements defined in this clause when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where slot n is the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer bwp-InactivityTimer [2] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals during time duration T_{BWPswitchDelay} after bwp-InactivityTimer [2] expires on the cell where timer-based BWP switch occurs.

Depending on UE capability bwp-Switching Delay [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

BWP switch delay TBWPswitchDelay (slots) **NR Slot** μ length

Type 2Note 1 Type 1^{Note 1} (ms) 0 1 0.5 2 5 2 0.25 3 9 3 0.125 6 18

Table 8.6.2-1: BWP switch delay

Note 1: Depends on UE capability.

If the BWP switch involves changing of SCS, the BWP Note 2: switch delay is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch.

Provided the UE does not have the required TCI-state information to receive PDCCH and PDSCH in the new BWP, the UE shall use old TCI-states before the BWP switch until a new MAC CE updating the required TCI-state information for PDCCH and PDSCH is received after the BWP switch.

If UE has the information on the required TCI-state information to receive PDCCH and PDSCH in the new BWP,

UE shall be able to receive PDCCH and PDSCH with old TCI-states before the delay as specified in Clause 8.10 in the new BWP.

- UE shall be able to receive PDCCH and PDSCH with new TCI-states after the delay as specified in Clause 8.10 in the new BWP

8.6.3 RRC based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured, with

- Active BWP switch or parameter change of its active BWPs for SpCell
- Parameter change of its active BWPs except parameter firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id for SCell

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after a time duration of $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot \ length}$ slots which begins from the beginning of DL slot n, where

DL slot n is the last slot overlapping with the PDSCH containing the RRC command, and

NR Slot length is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch if the BWP switch involves changing of SCS.

 $T_{RRCprocessing\,Delay}$ is the length of the RRC procedure delay in ms as defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the length of the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [2], and

 $T_{BWPswitchDelayRRC} = 6ms$ is the time used by the UE to perform BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ on the cell where RRC-based BWP switch occurs. When $T_{HARQ} > T_{RRCprocessingDelay}$ a longer switching delay is allowed. Where T_{HARQ} is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

8.7 Void

8.8 NE-DC: E-UTRAN PSCell Addition and Release Delay

8.8.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an E-UTRAN PSCell in NR - E-UTRA dual connectivity. The requirements are applicable to an NR - E-UTRA dual connectivity capable UE.

8.8.2 E-UTRAN PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE, which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving E-UTRAN PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards E-UTRAN PSCell no later than in subframe $n + T_{\text{config_EUTRAN-PSCell}}$:

Where:

```
T_{config~EUTRAN-PSCell} = T_{RRC~delay} + T_{activation~time} + 50ms + T_{E-UTRAN-PSCell~DU}
```

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

 $T_{activation_time}$ is the E-UTRAN PSCell activation delay. If the E-UTRAN PSCell is known, then $T_{activation_time}$ is 20ms. If the E-UTRAN PSCell is unknown, then $T_{activation_time}$ is 30ms provided the E-UTRAN PSCell can be successfully detected on the first attempt.

 $T_{\text{E-UTRAN-PSCell_DU}}$ is the delay uncertainty in acquiring the first available PRACH occasion in the E-UTRAN PSCell. $T_{\text{E-UTRAN-PSCell_DU}}$ is up to 30ms.

E-UTRAN PSCell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the E-UTRAN PSCell configuration command:
 - the UE has sent a valid measurement report for the E-UTRAN PSCell being configured and
 - the E-UTRAN PSCell being configured remains detectable according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15],
- E-UTRAN PSCell being configured also remains detectable during the E-UTRAN PSCell configuration delay T_{config_EUTRAN-PSCell} according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15].

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.8.3 E-UTRAN PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and E-UTRAN PSCell and may also be configured with one or more SCells and/or E-UTRAN SCells.

Upon receiving E-UTRAN PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe n+ T_{RRC_delay} :

Where

T_{RRC delay} is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9 NR-DC: PSCell Addition and Release Delay

8.9.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an PSCell in NR dual connectivity. The requirements are applicable to an NR dual connectivity capable UE.

8.9.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in slot $n + \frac{T_{config_PSCell}}{NR \, slot \, length}$.

where:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2 \text{ ms}$$

T_{RRC delay} is the RRC procedure delay as specified in TS 38.331 [2].

 $T_{processing}$ is the SW processing time needed by UE, including RF warm up period. $T_{processing} = 40$ ms.

 T_{search} is the time for AGC settling and PSS/SSS detection. If the target cell is known, $T_{search} = 0$ ms. If the target cell is unknown and the target cell $\hat{E}_s/Iot \ge -2dB$, $T_{search} = 24*$ Trs ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta}=1*Trs$ ms for a known or unknown PSCell.

 T_{PSCell_DU} is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. T_{PSCell_DU} is up to the summation of SSB to PRACH occasion associated period and 10 ms. SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

In FR1 and FR2, the PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the PSCell configuration command:

- the UE has sent a valid measurement report for the PSCell being configured and
- One of the SSBs measured from the PSCell being configured remains detectable according to the cell identification conditions specified in clause 9.3.
- One of the SSBs measured from PSCell being configured also remains detectable during the PSCell
 configuration delay T_{config_PSCell} according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9.3 PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and one PSCell.

Upon receiving PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in slot n + $\frac{T_{RRC_delay}}{NR \ slot \ length}$:

where

T_{RRC delay} is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.10 Active TCI state switching delay

8.10.1 Introduction

The requirements in this clause apply for a UE configured with one or more TCI state configurations on serving cell in MR-DC or standalone NR. UE shall complete the switch of active TCI state within the delay defined in this clause.

8.10.2 Known conditions for TCI state

The TCI state is known if the following conditions are met:

- During the period from the last transmission of the RS resource used for the L1-RSRP measurement reporting
 for the target TCI state to the completion of active TCI state switch, where the RS resource for L1-RSRP
 measurement is the RS in target TCI state or QCLed to the target TCI state
 - TCI state switch command is received within 1280 ms upon the last transmission of the RS resource for beam reporting or measurement
 - The UE has sent at least 1 L1-RSRP report for the target TCI state before the TCI state switch command

- The TCI state remain detectable during the TCI state switching period
- The SSB associated with the TCI state remain detectable during the TCI switching period
 - SNR of the TCI state > -3dB

Otherwise, the TCI state is unknown.

8.10.3 MAC-CE based TCI state switch delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ T_{HARQ} + $3N_{slot}^{subframe,\mu}$ + $TO_k*(T_{first-SSB} + T_{SSB-proc})$ / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+ T_{HARQ} + $3N_{slot}^{subframe,\mu}$.

Where T_{HARQ} is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3];

T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE;

$$T_{SSB-proc} = 2 \text{ ms};$$

 $TO_k = 1$ if target TCI state is not in the active TCI state list for PDSCH, 0 otherwise.

If the target TCI state is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ T_{HARQ} +3 $N_{slot}^{subframe,\mu}$ + $T_{L1\text{-RSRP}}$ +TO_{uk}*($T_{first\text{-SSB}}$ + $T_{SSB\text{-proc}}$) / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+ T_{HARQ} + 3 $N_{slot}^{subframe,\mu}$.

Where

T_{L1-RSRP} = 0 in FR1 or when the TCI state switching not involving QCL-TypeD in FR2. Otherwise,

T_{L1-RSRP} is the time for Rx beam refinement in FR2, defined as

- T_{L1-RSRP_Measurement_Period_SSB} for SSB as specified in clause 9.5.4.1,
 - with the assumption of M=1
 - with $T_{Report} = 0$
- T_{L1-RSRP_Measurement_Period_CSI-RS} for CSI-RS as specified in clause 9.5.4.2
 - configured with higher layer parameter repetition set to ON
 - with the assumption of M=1 for periodic CSI-RS
 - for aperiodic CSI-RS if number of resources in resource set at least equal to MaxNumberRxBeam
 - with $T_{Report} = 0$
- TO_{uk} = 1 for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement when TCI state switching involves QCL-TypeD
- $TO_{uk} = 1$ when TCI state switching involves other QCL types only
- T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE for other QCL types;
 - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

8.10.4 DCI based TCI state switch delay

If the target TCI state is known, when a UE is configured with the higher layer parameter *tci-PresentInDCI* which is set as 'enabled' for the CORESET scheduling PDSCH at slot n, UE shall be able to receive PDSCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+*timeDurationForQCL*, where, *timeDurationForQCL* is the time required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [26], the value of *timeDurationForQCL* is defined in TS 38.331 [2].

The known condition for TCI state defined in clause 8.10.2 is applied.

8.10.5 RRC based TCI state switch delay

If the target TCI state is known, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot $n+(T_{RRC_processing}+TO_k*(T_{first-SSB}+T_{SSB-proc})) / NR slot length,$ The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T_{RRC_processing} is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T_{first-SSB} is time to first SSB transmission after RRC processing by the UE; The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state.
- $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3.

If the target TCI state is unknown, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot $n+(T_{RRC_processing} + T_{L1-RSRP} + TO_{uk}*(T_{first-SSB} + T_{SSB-proc})) / NR slot length, The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.$

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T_{RRC_processing} is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- Tfirst-SSB is time to first SSB transmission after RRC processing time at the UE for other QCL types;
 - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state $\,$
- T_{L1-RSRP}, TO_{uk} and T_{SSB-proc} are defined in clause 8.10.3.

The requirements for RRC based TCI state switch delay apply when only 1 TCI state is configured in RRC TCI state list. When $T_{HARQ} > T_{RRC_processing}$ a longer switching delay is allowed. Where T_{HARQ} is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

8.10.6 Active TCI state list update delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE active TCI state list update at slot n, UE shall be able to receive PDCCH to schedule PDSCH with the new target TCI state at the first slot that is after n+ T_{HARQ} +3 $N_{slot}^{subframe,\mu}$ +TO_k*($T_{first-SSB}$ + $T_{SSB-proc}$) / NR slot length. Where T_{HARQ} , $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3.

8.11 PSCell Change

This clause defines requirements for the delay within which the UE shall be able to change PSCell to other cell in ENDC or NR-DC. The requirements in this clause are applicable to EN-DC and NR-DC.

The UE shall be capable of transmitting PRACH preamble towards the target PSCell no later than specified in clause 8.9.2 for the case of NR-DC and in TS 36.133 clause 7.31.2 for the case of EN-DC,, where the following values for slot n, $T_{processing}$ and $T_{RRC\ delay}$ shall override the existing ones:

- Slot n is the last slot overlapping with the PDSCH containing PSCell change,
- T_{processing} = 20 ms when source and target cells are in the same FR,
- $T_{processing} = 40$ ms when source and target cells are in different FRs.
- T_{RRC_delay} is the RRC procedure delay as specified in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC procedure delay as specified in TS 38.331 [2].

If the SMTC periodicity of the target cell is not provided within the PSCell change message, and measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation.

The target PSCell is known if it has been meeting the conditions in clause 8.9.2 for the case of NR-DC and in TS36.133 clause 7.31.2 for the case of EN-DC.

The interruption on PCell and other serving cells specified in TS36.133 clause 7.32.2.1 for EN-DC and in TS38.133 clause 8.2.4.2.1 for NR-DC is allowed only during the RRC reconfiguration procedure [2].

9 Measurement Procedure

9.1 General measurement requirement

9.1.1 Introduction

This clause contains general requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are split in intra-frequency, inter-frequency, inter-RAT E-UTRAN FDD, inter-RAT E-UTRAN TDD, and L1-RSRP measurements requirements. These measurements may be used by the NG-RAN. The measurement quantities are defined in TS38.215 [4], the measurement model is defined in TS38.300 [10], TS37.340 [17] and measurement accuracies are specified in clause 10. Control of measurement reporting is specified in TS 38.331 [2].

In the requirements of clause 9, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2, respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency

ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers.

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide either per-FR measurement gap patterns for frequency range where UE requires per-FR measurement gap for concurrent monitoring of all frequency layers of each frequency range independently, or a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers of all frequency ranges.

During the per-UE measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

During the per-FR measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells in the corresponding frequency range for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells in the corresponding frequency range for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

Table 9.1.2-1: Gap Pattern Configurations

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)
0	6	40
1	6	80
2	3	40
3	3	80
4	6	20
5	6	160
6	4	20
7	4	40
8	4	80
9	4	160
10	3	20
11	3	160
12	5.5	20
13	5.5	40
14	5.5	80
15	5.5	160
16	3.5	20
17	3.5	40
18	3.5	80
19	3.5	160
20	1.5	20
21	1.5	40
22	1.5	80
23	1.5	160

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
	E-UTRA + FR1, or	non-NR RAT Note1,2	0,1,2,3
Per-UE	E-UTRA + FR2, or	FR1 and/or FR2	0-11
measurement	E-UTRA + FR1 +	non-NR RAT ^{Note1,2}	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2	and FR1 and/or FR2	
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2	0,1,2,3
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR2 only	No gap
	FR2 if configured		12-23
Per-FR measurement	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23

Note: In E-UTRA-NR dual connectivity mode, if GSM or UTRA TDD or UTRA FDD inter-RAT frequency layer is configured to be monitored, only measurement gap pattern #0 and #1 can be used for per-FR gap in E-UTRA and FR1 if configured, or for per-UE gap.

NOTE 1: In E-UTRA-NR dual connectivity mode, non-NR RAT includes E-UTRA, UTRA and/or GSM. In NR-E-UTRA dual connectivity mode, non-NR RAT means E-UTRA.

NOTE 2: Void

NOTE 3: When E-UTRA inter-frequency RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.

In E-UTRA-NR dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

In NR-E-UTRA dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR2.

In NR-NR dual connectivity mode,

- If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest SCG subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

T_{MG} is the MG timing advance value provided in *mgta* according to TS38.331 [2].

In determining the measurement gap starting point, UE shall use the DL timing of the latest E-UTRA or NR subframe occurring immediately before the configured measurement gap among E-UTRA or NR serving cells.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE configured with E-UTRA-NR dual connectivity or NR-E-UTRA dual connectivity, when serving cells are in E-UTRA and FR1, measurement objects are in both E-UTRA/FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;
- If MN indicates UE that the measurement gap from MN applies to only LTE/FR1 serving cell(s),
 - UE fulfils the measurement requirements for FR1/LTE measurement objects based on the configured measurement gap pattern;
 - UE fulfils the requirements for FR2 measurement objects based on effective MGRP=20ms;

For per-FR measurement gap capable configured with E-UTRA-NR dual connectivity, NR-E-UTRA dual connectivity or NR-NR dual connectivity, when serving cells are in E-UTRA, FR1 and FR2, or in E-UTRA and FR2, or in FR1 and FR2, measurement objects are in both E-UTRA /FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN.

Table 9.1.2-3: Applicability for Gap Pattern Configurations supported by the UE with NR standalone operation (with single carrier, NR CA and NR-DC configuration)

Measurement gap pattern configuration	Serving cell	Measurement Purpose NOTE 2	Applicable Gap Pattern Id
Comigaration		E-UTRA only ^{NOTE3}	0,1,2,3
	FR1 NOTE5, or	FR1 and/or FR2	0-11
55	FR1 + FR2	E-UTRAN and FR1 and/or FR2 NOTE3	0, 1, 2, 3, 4, 6, 7, 8,10
Per-UE		E-UTRA only NOTE3	0,1,2,3
measurement		FR1 only	0-11
gap		FR1 and FR2	0-11
	FR2 ^{NOTE5}	E-UTRAN and FR1 and/or FR2 NOTE3	0, 1, 2, 3, 4, 6, 7, 8,10
		FR2 only	12-23
	FR1 if configured	E-UTRA only NOTE3	0,1,2,3
	FR2 if configured		No gap
	FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	FR1 if configured	FR2 only	No gap
Per-FR	FR2 if configured		12-23
measurement	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured	NOTE3	No gap
9-4	FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	FR1 if configured	E-UTRA and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	NOTE3	12-23
	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	and FR2 NOTE3	12-23

NOTE 1: When E-UTRA inter-RAT RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.

NOTE 2: Measurement purpose which includes E-UTRA measurements includes also inter-RAT E-UTRA RSRP and RSRQ measurements for E-CID

NOTE 3: Void

NOTE4: If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among all serving cells subframes. If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR1.

If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR2.

 T_{MG} is the MG timing advance value provided in *mgta* according to [2]. In determining the measurement gap starting point, UE shall use the DL timing of the latest subframe occurring immediately before the configured measurement gap among serving cells.

NOTE 5: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), for per-FR gap based measurement, when there is no serving cell in a particular FR, where measurement objects are configured, regardless if explicit per-FR measurement gap is configured in this FR, the effective MGRP in this FR is used to determine requirements;

- 20 ms for FR2 NR measurements
- 40 ms for FR1 NR measurements
- 40 ms for LTE measurements
- 40 ms for FR1+LTE measurements

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), when serving cells are in FR1 or FR2, measurement objects are in both E-UTRA /FR1 and FR2,

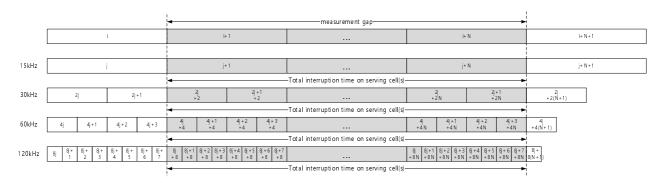
- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;

If measurement gap is configured in one FR but measurement object is not configured in the FR, the scheduling opportunity in the FR depends on the configured measurement gap pattern.

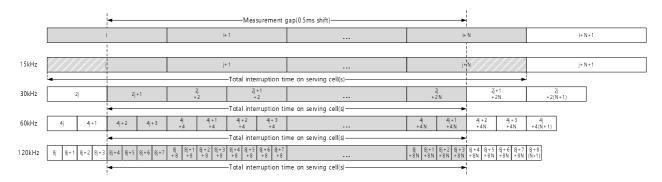
For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in SCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.

For NR standalone operation (with single carrier, NR CA and NR-DC configuration), if UE is not capable of per-FR-gap, total interruption time on a serving cell during MGL is defined when MGL(N) = 6ms, 5.5ms, 4ms, 3.5ms, 3ms, and 1.5ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.

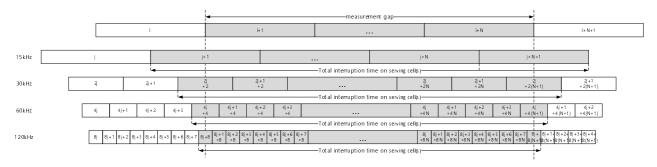
For NR-E-UTRA dual connectivity, if UE is not capable of per-FR-gap, total interruption time on MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in MCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.



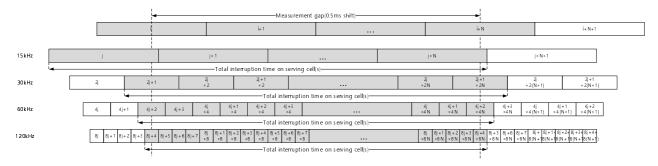
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(c) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for asynchronous EN-DC and asynchronous NE-DC



(d) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for asynchronous EN-DC and asynchronous NE-DC

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC

The corresponding total number of interrupted slots on serving cells is listed in Table 9.1.2-4 for synchronous EN-DC, NR standalone and NE-DC, and in Table 9.1.2-4a for asynchronous EN-DC respectively.

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms
	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms
15	6	4	3	7 ^{Note3}	5 ^{Note3}	4 ^{Note3}
30	12	8	6	12	8	6
60	24	16	12	24	16	12
120	48	32	24	48	32	24

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

NOTE 3: Non-overlapped half-slots occur before and after the measurement gap.
Whether a Rel-15 UE can receive and/or transmit in those half-slots is up to
UE implementation.

Table 9.1.2-4a: Total number of interrupted slots on serving cells during MGL for Asynchronous EN-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms
(KI IZ)	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms
4-	-	-	WOL-JIII3	-	-	14101-31113
15	/	5	4	/	5	4
30	13	9	7	13	9	7
60	25	17	13	25	17	13
120	49	33	25	49	33	25

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

In case that UE capable of per-FR measurement gap is configured with per-FR measurement gap for FR2 serving cells, total number of interrupted slots on FR2 serving cells during MGL is listed in Table 9.1.2-4b.

Table 9.1.2-4b: Total number of interrupted slots on FR2 serving cells during MGL for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR2

NR	Total number of interrupted slots on FR2 serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG ti	ming advance applied	of 0.25ms is
	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms
60	22	14	6	22	14	6
120	44	28	12	44	28	12

NOTE 1: The total number of interrupted slots is based on that SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter *refServCellIndicator* is an FR2 serving cell.

NOTE 2: Slot occurs before or after the measurement gap may be interrupted additionally if SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter refServCellIndicator is an FR1 serving cell.

It is up to UE implementation whether or not the UE is able to conduct transmission in the following slot(s),

- when MGTA is not applied, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap

- when MGTA is applied and the SCS of the UL carrier is other than 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap
- when MGTA is applied and the SCS of the UL carrier is 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after the slot partially overlapped with measurement gap

where UL slot denotes that all the symbols in the slot are uplink symbols, and L=1 if $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$ for the UL transmission is less than the length of one slot; L=2 otherwise.

Note: Network is supposed to take into account the possible difference between the estimated TA at network and actual TA at UE when scheduling UE in the above slot(s).

Table 9.1.2-5: (Void)

9.1.2.1 EN-DC: Measurement Gap Sharing

For E-UTRA-NR dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers and inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2][16]and the value of X is defined as in Table 9.1.2.1-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100$,

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.1.

Table 9.1.2.1-1: Value of parameter X for EN-DC measurement gap sharing

measGa	pSharingScheme	Value of X (%)	
	'00'	Equal splitting	
	'01'	25	
	'10'	50	
	'11'	75	
Note:	Note: It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1a SA: Measurement Gap Sharing

For NR standalone UE without NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2] and the value of X is defined as in Table 9.1.2.1a-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.2.

Table 9.1.2.1a-1: Value of parameter X for NR standalone measurement gap sharing

measGa	apSharingScheme	Value of X (%)
'00'		Equal splitting
	'01'	25
	'10'	50
'11'		75
Note:	which measurements the table to be app	Scheme is absent and

9.1.2.1b NE-DC: Measurement Gap Sharing

For NR-E-UTRA dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter measGapSharingConfig [2][16] and the value of X is defined as in Table 9.1.2.1b-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.3.

Table 9.1.2.1b-1: Value of parameter X for NE-DC measurement gap sharing

measGapSharingScheme		Value of X (%)	
	'00'	Equal splitting	
	'01'	25	
	'10'	50	
'11'		75	
	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1c NR-DC: Measurement Gap Sharing

For UE with NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2] and the value of X is defined as in Table 9.1.2.1c-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.4.

Table 9.1.2.1c-1: Value of parameter X for NR-DC measurement gap sharing

measGa	apSharingConfig	Value of X (%)	
	'00'	Equal splitting	
	'01'	25	
	'10'	50	
'11'		75	
Note:	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.3 UE Measurement capability

9.1.3.1 EN-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the EN-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN, inter-RAT NR, GSM, UTRA FDD and UTRA TDD carriers as configured by E-UTRA PCell, and inter-frequency NR carriers as configured by PSCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, etc.) of detected cells on all the layers.

For UE configured with the EN-DC operation, the effective total number of frequencies excluding the frequencies of the PSCell, SCells, E-UTRA PCell, and E-UTRA SCells being monitored is N_{freq, EN-DC}, which is defined as:

$$N_{\rm freq,\,EN-DC} = N_{\rm freq,\,EN-DC,\,NR} + N_{\rm freq,\,EN-DC,\,E-UTRA} + N_{\rm freq,\,EN-DC,\,UTRA} + M_{\rm EN-DC,\,GSM},$$

where

 $N_{\text{freq, EN-DC, E-UTRA}}$ is the number of E-UTRA inter-frequency carriers being monitored (FDD and TDD) as configured by E-UTRA PCell or via LPP [22],

 $N_{\rm freq,\;EN\text{-}DC,\;NR} \leqslant N_{\rm freq,\;EN\text{-}DC,\;NR,\;inter\text{-}RAT} + N_{\rm freq,\;EN\text{-}DC,\;NR,\;inter\text{-}freq}$

where

 $N_{\text{freq, EN-DC, NR, inter-RAT}}$ is the number of NR inter-RAT carriers excluding NR serving carrier(s) being monitored as configured by E-UTRA PCell [15],

 $N_{\text{freq, EN-DC, NR, inter-freq}}$ is the number of NR inter-frequency carriers being monitored as configured by PSCell,

 $N_{\text{freq, EN-DC, UTRA}}$ is the number of UTRA inter-RAT carriers being monitored as configured by E-UTRA PCell (FDD and TDD).

 $M_{EN\text{-DC, GSM}}$ is an integer which is a function of the number of GSM inter-RAT carriers as configured by E-UTRA PCell on which measurements are being performed. $M_{EN\text{-DC, GSM}}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{EN\text{-DC, GSM}}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{EN\text{-DC, GSM}}$ is equal to ceil($N_{carriers,GSM}/20$) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

9.1.3.1a SA: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with SA NR operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured by PCell, the UE shall be capable of performing one measurement of the configured

measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR SA operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{freq. SA}$, which is defined as:

$$N_{\text{freq, SA}} = N_{\text{freq, SA, NR}} + N_{\text{freq, SA, E-UTRA}}$$

where

N_{freq, SA, E-UTRA} is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22],

 $N_{\text{freq, SA, NR}}$ is the number of NR inter-frequency carriers being monitored as configured by PCell.

9.1.3.1b NE-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by E-UTRA PSCell, inter-RAT E-UTRAN carriers as configured by PCell, and inter-frequency NR carriers as configured by PCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, and E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NE-DC operation, the effective total number of frequencies excluding the frequencies of the PCell, SCells, E-UTRA PSCell, and E-UTRA SCells being monitored is N_{freq, NE-DC}, which is defined as:

 $N_{\text{freq, NE-DC}} = N_{\text{freq, NE-DC, NR}} + N_{\text{freq, NE-DC, E-UTRA}}$

where

N_{freg, NE-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell,

 $N_{\text{freq, NE-DC, E-UTRA}} \leq N_{\text{freq, NE-DC, E-UTRA, inter-RAT}} + N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$

where

N_{freq, NE-DC, E-UTRA, inter-RAT} is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by PCell or via LPP [22],

 $N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$ is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by E-UTRA PSCell [15] or via LPP [22].

9.1.3.1c NR-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with NR-DC operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) as configured by PCell, and inter-frequency NR carriers as configured by PSCell is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR-DC operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{\text{freq, NR-DC}}$, which is defined as:

 $N_{\text{freq, NR-DC}} = N_{\text{freq, NR-DC, NR}} + N_{\text{freq, NR-DC, E-UTRA}}$

where

 $N_{\text{freq, NR-DC, E-UTRA}}$ is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22].

N_{freq, NR-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell and PSCell.

9.1.3.2 EN-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with EN-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD and GSM (one GSM layer corresponds to 32 carriers) layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), comprising of any above defined combination of NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell and NR inter-frequency carriers configured by PSCell.

When the E-UTRA PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in synchronous intra-band EN-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundaries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

Note 1: The E-UTRA-NR dual connectivity capable UE configured with PSCell shall fulfil the requirements defined in only one of clause 9.1.3.2 and clause 8.1.2.1.1b.1 of TS 36.133 [15].

9.1.3.2a SA: Maximum allowed layers for multiple monitoring

If a UE is configured with SA NR operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers.

9.1.3.2b NE-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NE-DC operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA FDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 6 effective E-UTRA carrier frequency layers, excluding E-UTRA serving carrier(s), comprising of any above defined combination of E-UTRA inter-RAT carriers excluding E-UTRA serving carrier(s) configured by PCell and E-UTRA inter-frequency carriers configured by E-UTRA PSCell.

9.1.3.2c NR-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NR-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), which are configured by PCell and PSCell.

When PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in NR-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundaries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

9.1.4 Capabilities for Support of Event Triggering and Reporting Criteria

9.1.4.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 9.1.4.2, the UE shall meet all other performance requirements defined in clause 9 and clause 10.

The UE can be requested to make measurements under different measurement identities defined in TS 38.331 [2]. Each measurement identity corresponds to either event-based reporting, periodic reporting, or no reporting. In case of event-based reporting, each measurement identity is associated with an event triggering criterion. In case of periodic reporting, a measurement identity is associated with one periodic reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event triggering, periodic, and no reporting criteria the UE may be requested to track in parallel.

9.1.4.2 Requirements

In this clause a reporting criterion corresponds to either one event (in the case of event-based reporting), or one periodic reporting criterion (in case of periodic reporting), or one no reporting criterion (in case of no reporting). For event-based reporting, each instance of event, with the same or different event identities, is counted as separate reporting criterion in Table 9.1.4.2-1.

The UE shall be able to support in parallel per category up to E_{cat} reporting criteria according to Table 9.1.4.2-1. For the measurement categories belonging to intra-frequency, inter-frequency, and inter-RAT measurements (i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the total number of reporting criteria as follows:

- For UE configured with EN-DC: $E_{cat,EN-DC,NR} + E_{cat,EN-DC,E-UTRA}$, where

 $E_{cat,EN-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria configured by PSCell (NR intra- and inter-frequency reporting criteria) and by E-UTRA PCell on NR serving frequencies (NR intra-frequency reporting criteria) applicable for UE configured with EN-DC according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PSCell and SCells carrier frequencies,

 $E_{cat,EN-DC,E-UTRA}$ is the total number of reporting criteria configured by E-UTRA PCell except PSCell and SCells carrier frequencies, as specified in TS 36.133 [15] for UE configured with EN-DC.

- For UE configured with NE-DC: $E_{cat,NE-DC,NR} + E_{cat,NE-DC,E-UTRA}$, where

 $E_{cat,NE-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

$$E_{cat,NE-DC,E-UTRA} = E_{cat,NE-DC,E-UTRA,inter-RAT} + E_{cat,NE-DC,E-UTRA,intra-RAT}$$
, where

 $E_{cat,NE-DC,E-UTRA,inter-RAT}$ is the total number of inter-RAT E-UTRA reporting criteria configured by PCell except E-UTRA PSCell and E-UTRA SCells carrier frequencies, according to Table 9.1.4.2-1,

 $E_{cat,NE-DC,E-UTRA,intra-RAT}$ is the total number of E-UTRA reporting criteria including E-UTRA PSCell and E-UTRA SCells carrier frequencies as specified in TS 36.133 [15] for UE configured with NE-DC.

- For UE configured with SA operation mode: $E_{cat,SA,NR} + E_{cat,SA,E-UTRA}$, where

 $E_{cat,SA,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

 $E_{cat,SA,E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

For UE configured with NR-DC: $E_{cat.NR-DC.NR} + E_{cat.NR-DC.E-UTRA}$, where

 $E_{cat,NR-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, PSCell and SCells carrier frequencies,

 $E_{cat.NR-DC.E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

Table 9.1.4.2-1: Requirements for reporting criteria per measurement category

Measurement category	E _{cat}	Note
Intra-frequency Note 1,2,3,4,5	9	Events for any one or a combination of intra- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN intra-frequency cells
Inter-frequency Note 2,3,4,5	10	Events for any one or a combination of inter- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN inter-frequency cells
Inter-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5	10	Only applicable for UE with this (inter-RAT) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSTD Note 2,4,5	1	Inter-RAT RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 inter-RAT cell measurements. Only applicable for UE with this (inter-RAT RSTD via LPP [22]) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSRP and RSRQ measurements for E-CID Note 2,4,5	1	Inter-RAT RSRP and RSRQ measurements for E-CID reported to E-SMLC via LPP [22]. One report capable of at least in total 10 inter-RAT RSRP and RSRQ measurements. Applicable to UE capable of reporting inter-RAT RSRP and RSRQ to E-SMLC via LPP. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.

NOTE 1: When the UE is configured with PSCell and SCell carrier frequencies, E_{cat} for Intra-frequency is applied per corresponding NR serving frequency.

NOTE 2: Applicable for UE configured with SA NR operation mode.

NOTE 3: Applicable for UE configured with EN-DC operation mode.

NOTE 4: Applicable for UE configured with NE-DC operation mode.

NOTE 5: Applicable for UE configured with NR-DC operation mode.

9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.3 and 9.4 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSF_{outside_gap,i} and CSSF_{within_gap,i}, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

9.1.5.1 Monitoring of multiple layers outside gaps

The carrier-specific scaling factor $CSSF_{outside_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement with no measurement gap in clause 9.2.5, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with no measurement gap in clause 9.2.5, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- For a UE in E-UTRA-NR dual connectivity operation, NR inter-RAT measurement object configured by the E-UTRAN PCell on an NR serving carrier

- the SSB is completely contained in the active BWP of the UE, and
- none or part of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

UE is expected to conduct the measurement of this measurement object i only outside the measurement gaps.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{outside_gap,i} and requirements derived from CSSF_{outside_gap,i} are not specified.

The UE cell identification and measurement periods derived based on $CSSF_{outside_gap,i}$ in clauses 9.2.5.1, 9.2.5.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{measure_SFTD1}$ specified in clause 9.3.8 when no measurement gaps are provided.

The requirements in this clause apply provided that

- There are only SCCs in FR2, or
- The SMTC on all CCs in FR2 have the same offset, and one of following conditions is met
 - If *smtc*2 is configured on any FR2 CC,
 - All CCs have the same configuration for *smtc1*, and
 - All CCs configured with *smtc2* have the same configuration for *smtc2*
- If *smtc2* is not configured on any FR2 CC,
 - The total number of different SMTC periodicities on all serving CCs does not exceed 4

Note: Longer delays for cell identification and measurement periods derived based on CSSF_{outside_gap,i} in clauses 9.2.5.1, 9.2.5.2, can be expected, if the UE is configured with more than 4 different SMTC periodicities on FR2 serving carriers. The longer delay applies for the FR2 intra-frequency measurement objects with the longest SMTC periodicity/periodicities.

9.1.5.1.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with the E-UTRA-NR dual connectivity operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.1-1.

Table 9.1.5.1.1-1: CSSF_{outside_qap,i} scaling factor for EN-DC mode

Scenario	CSSF _{outside_ga} p,i for FR1 PSCC	CSSF _{outside_gap} , i for FR1 SCC	CSSF _{outside_gap,} i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required ^{Note 2}	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
EN-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
EN-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCells
EN-DC with FR1 +FR2 CA (FR1 PSCell) Note	1	2x(Number of configured SCell(s)-1)	N/A	2 ^{Note 5}	2×(Number of configured SCell(s)-1)
EN-DC with FR1 +FR2 CA (FR2 PSCell) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

- Note 1: Only one NR FR1 operating band and one NR FR2 operating band are included for FR1+FR2 inter-band EN-DC.
- Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.
- Note 3: Void
- Note 4: Void
- Note 5: $CSSF_{outside_gap,i} = 1$ if only one SCell is configured.
- Note 6: If a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2], otherwise they are counted separately as two measurement objects.

9.1.5.1.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE in SA operation mode, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.2-1, which shall also be applied for a UE configured with NE-DC operation.

Table 9.1.5.1.2-1: CSSF_{outside_gap,i} scaling factor for SA mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} , i for FR1 SCC	CSSF _{outside_ga} _{p,i} for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2 Note 5	2×(Number of configured SCell(s)-1)

- Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA.
- Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.
- Note 3: Void
- Note 4: Void
- Note 5: CSSF_{outside_gap,i} =1 if only one SCell is configured

9.1.5.1.3 NR-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NR-DC operation, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.3-1.

Table 9.1.5.1.3-1: CSSF_{outside_gap,i} scaling factor for NR-DC mode

Scenario	CSSF _{outside_gap} ,i for FR1 PCC	CSSF _{outside_gap,i} for FR1 SCC	CSSFoutside_gap,i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required	
FR1 + FR2 NR- DC (FR1 PCell and FR2 PScell)	1	2×(Number of configured SCell(s))	2 Note 3	2×(Number of configured SCell(s))	
Note 1: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG					

in FR2.

Void

Note 2: Note 3: CSSF_{outside_gap,i} =1 if no SCell is configured.

9.1.5.1.4 NE-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NE-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSBbased measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.4-1.

Table 9.1.5.1.4-1: CSSF_{outside_gap,i} scaling factor for NE-DC mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} , i for FR1 SCC	CSSF _{outside_ga} p,i for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
NE-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
NE-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
NE-DC with FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2 Note 3	2x(Number of configured SCell(s)-1)

Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA. Note 1:

Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2. Note 2:

CSSF_{outside_gap,i} =1 if only one SCell is configured. Note 3:

9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor $CSSF_{within\ gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement object with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement object with measurement gap in clause 9.2.6.
- Inter-frequency measurement object in clause 9.3.
- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.
- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.
- For a UE in E-UTRA-NR dual connectivity operation, NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR serving carrier
 - the SSB is not completely contained in the active BWP of the UE, or
 - all of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

- NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR non-serving carrier.
- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).
- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).
- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).
- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{within_gap,i} and requirements derived from CSSF_{outside_gap,i} are not specified.

9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

The scaling value $CSSF_{within_gap,i}$ below has been derived without considering GSM inter-RAT carriers.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this clause.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same carrier, they shall be counted as one measurement object in M_{tot,i,j}, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*
- An inter-RAT UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- M_{intra,i,j}: Number of intra-frequency measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M_{intra,i,j} equals 0.
- M_{inter,i,j}: Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M_{inter,i,j} equals 0.

- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,i}}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object *i* is an intra-frequency measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{intra,i,j}$) in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1

Where R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 1280ms period.

Note: In this release of specification, longer delays for cell identification and measurement periods derived based on CSSF_{within_gap,i} can be expected, if the UE is configured with inter-RAT MO on NR serving CC by E-UTRAN PCell in EN-DC mode.

9.1.5.2.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, $CSSF_{within_gap,i}$ =1. Otherwise, the the $CSSF_{within_gap,i}$ for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the $CSSF_{within_gap,i}$ are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object, if to be measured with measurement gaps, is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- M_{intra,i,j}: Number of intra-frequency measurement objects which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M_{intra,i,j} equals 0.

- $M_{\text{inter,i,j}}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{inter,i,j}}$ equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within gap,i} is given by:

- If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= max(ceil(R_i×M_{tot,i,j})), where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
 - measurement object *i* is an intra-frequency measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{intra,i,j})$ in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
 - measurement object *i* is an inter-frequency or inter-RAT measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{inter,i,j})$ in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1
- Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

 $CSSF_{within_gap,k}=1$ during $T_{Detect,\ E-UTRAN\ FDD}$ specified in clause 9.4.4.1.2.2 and $T_{Detect,\ E-UTRAN\ TDD}$ specified in clause 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on $CSSF_{within_gap,i}$ in clauses 9.2.5.1, 9.2.5.2, 9.2.6.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{Detect,\ E-UTRAN\ FDD}$ and $T_{Detect,\ E-UTRAN\ TDD}$.

9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, $CSSF_{within_gap,i}$ =1. Otherwise, the $CSSF_{within_gap,i}$ for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.

- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- If the number of configured inter-frequency and inter-RAT measurement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:
 - FR1 and FR2 intra-frequency measurement objects belong to group A
 - Inter-frequency and inter-RAT measurement objects belong to group B
 - M_{groupA,i,j}: Sum of the number of FR1 intra-frequency measurement objects M_{intra-FR1,i,j} and the number of FR2 intra-frequency measurement objects M_{intra-FR2,i,j} which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M_{groupA,i,j} equals 0.
 - $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.
- If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:
 - FR1 intra-frequency measurement objects belong to group A
 - FR2 intra-frequency measurement objects belong to group B
 - $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.
 - $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.
- $M_{\text{tot},i,j} = M_{\text{groupA},i,j} + M_{\text{groupB},i,j}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot},i,j}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

- The carrier specific scaling factor CSSF_{within_gap,i} is given by:
- If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$, where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
 - measurement object i is a group A measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1
 - measurement object i is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1
- Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF $_{within_gap,i}$ =1. Otherwise, the CSSF $_{within_gap,i}$ for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF $_{within_gap,i}$ are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and inter-frequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

If the number of configured inter-frequency and inter-RAT measuerement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intra-frequency measurement objects belong to group A

Inter-frequency and inter-RAT measurement objects belong to group B

 $M_{groupA,i,j}$: Sum of the number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intra-frequency measurement objects belong to group A

FR2 intra-frequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, $CSSF_{within_gap,i} = max(ceil(R_i \times M_{tot,i,j}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is a group A measurement object, CSSF_{within gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1

- measurement object i is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{inter} \times M_{groupBi,j}$) in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1

R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.6 Minimum requirement at transitions

When the measurement on one intra-frequency measurement object transitions from measurements performed outside gaps to measurements performed within gaps or vice versa during one measurement period, the cell identification and measurement period requirements with the longer delay apply.

The carrier-specific scaling factor specified in clause 9.1.5 that applies to the other impacted measurement objects will also apply based on the longer measurement or cell identification delay before or after the transition.

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, the cell identification and measurement period requirements apply based on the longer delay before or after the transition.

Subsequent to this measurement period, the cell identification and measurement period requirements on each measurement object are corresponding to the second mode after transition.

9.2 NR intra-frequency measurements

9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified intra-frequency cells if carrier frequency information is provided by PCell or the PSCell, even if no explicit neighbour list with physical layer cell identities is provided.

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE, or
- the active downlink BWP is initial BWP[3].

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB which start earlier than the gap starting time + switching time, nor detect SSB which end later than the gap end – switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

9.2.2 Requirements applicability

The requirements in clause 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

9.2.3 Number of cells and number of SSB

9.2.3.1 Requirements for FR1

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 8 identified cells, and
- 14 SSBs with different SSB index and/or PCI on the intra-frequency layer, where the number of SSBs in the serving cell (except for the SCell) is not smaller than the number of configured RLM-RS SSB resources.

9.2.3.2 Requirements for FR2

For one single intra-frequency layer in a band, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 6 identified cells, and
- 24 SSBs with different SSB index and/or PCI,

where this single intra-frequency layer shall be:

- PCC when UE is configured with SA NR operation mode with PCC in the band; or
- PSCC when UE is configured with EN-DC with PSCC in the band; or
- PSCC when UE is configured with NR-DC with PSCC in the band; or
- One of the SCCs on which UE is configured to report SSB based measurements when neither PCC nor PSCC is in the same band, so that the selected SCC shall be an SCC where the UE is configured with SS-RSRP measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other intra-frequency layer(s) in the same band.

9.2.4 Measurement Reporting Requirements

9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

9.2.4.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.2.4.3.

9.2.4.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The UE shall not send any event triggered measurement reports as long as no reporting criteria is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{identify\ intra\ with\ index}$ or T $_{identify\ intra\ without\ index}$ defined in clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSBs measured from the Cell being configured remains detectable during the time period T $_{identify_intra_with_index}$ or T $_{identify_intra_with_index}$ as defined in clause 9.2.5.1 or clause 9.2.6.2. If a cell which has been detectable at least for the time period T $_{identify_intra_without_index}$ or T $_{identify_intra_with_index}$ defined in clause 9.2.5.1 or clause 9.2.6.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and triggers an event, the event triggered measurement reporting delay shall be less than TSSB_measurement_period_intra provided the timing to that cell has not changed more than \pm 3200/2 $^{\mu}$ Tc while the measurement gap has not been available and L3 filtering has not been used, where μ is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used, an additional delay can be expected.

9.2.5 Intrafrequency measurements without measurement gaps

9.2.5.1 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within Tidentify_intra_without_index if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (deriveSSB-IndexFromCell is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within Tidentify_intra_with_index. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within Tidentify_intra_without_index. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra}) \ ms$$

$$T_{identify_intra_with_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}) \ ms$$

Where:

T_{PSS/SSS_sync_intra}: it is the time period used in PSS/SSS detection given in table 9.2.5.1-1, 9.2.5.1-2, 9.2.5.1-4 (deactivated SCell) or 9.2.5.1-5 (deactivated SCell)

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.5.1-3 or 9.2.5.1-6 (deactivated SCell)

 $T_{SSB_measurement_period_intra}$: equal to a measurement period of SSB based measurement given in table 9.2.5.2-1, table 9.2.5.2-2 table 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell)

CSSF_{intra}: it is a carrier specific scaling factor and is determined

according to $CSSF_{outside_gap,i}$ in clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intra-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to

CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intra-frequency SMTC is fully overlapping with measurement gaps.

if the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss_sync_w/o_gaps}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_w/o_gaps}$ =40. For a UE supporting power class 2, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_w/o_gaps}$ =24. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_w/o_gaps}$ =24.

 $M_{meas_period_w/o_gaps}$: For a UE supporting power class 1, $M_{meas_period_w/o_gaps}$ =40. For a UE supporting FR2 power class 2, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_w/o_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_w/o_gaps}$ =24.

When intra-frequency SMTC is fully non overlapping with measurement gaps or intra-frequency SMTC is fully overlapping with MGs, Kp=1

When intra-frequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1-(SMTC period /MGRP)), where SMTC period < MGRP. For calculation of Kp, if the high layer signalling (TS 38.331 [2]) of *smtc2* is configured, for cells indicated in the *pci-List* parameter in *smtc2*, the SMTC periodicity corresponds to the value of higher layer parameter *smtc2*; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter *smtc1*.

If the higher layer signaling in TS38.331 [2] signalling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$

For FR2.

K_{layer1 measurement}=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that SSB-ToMeasure and SS-RSSI-Measurement are configured, where SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged and RSSI symbols are indicated by SS-RSSI-Measurement;

 $K_{layer1_measurement} = 1.5$, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max(600ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x
	CSSFintra
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5 x K _p) x max(SMTC
•	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	ceil(5] x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

DRX cycle	Tpss/sss_sync_intra
No DRX	max(600ms, ceil(M _{pss/sss_sync_w/o_gaps} x K _p x
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5 x M _{pss/sss_sync_w/o_gaps} x K _p x
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x
	CSSF _{intra}
DRX cycle>320ms	ceil(M _{pss/sss_sync_w/o_gaps} x K _p x K _{layer1_measurement}) x DRX
	cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identified	

Table 9.2.5.1-3: Time period for time index detection (FR1)

DRX cycle	Tssb_time_index_intra
No DRX	max(120ms, ceil(3 x K _p) x SMTC period) ^{Note 1} x
	CSSFintra
DRX cycle≤ 320ms	max(120ms, ceil (1.5 x 3 x K _p) x max(SMTC
•	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	Ceil(3 x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.1-4: Time period for PSS/SSS detection, deactivated SCell (FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	Ceil(5 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	Ceil(5 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(5 x K _p) x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x measCycleSCell x
	CSSF _{intra}
DRX cycle≤ 320ms	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x max(measCycleSCell,
.,	1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x max(measCycleSCell,
-	DRX cycle) x CSSF _{intra}

Table 9.2.5.1-6: Time period for time index detection, deactivated SCell (FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	Ceil(3 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle ≤ 320ms	Ceil(3 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(3 x K _p)x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for T_{SSB_measurement_period_intra}

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

For FR2, a longer measurement period is allowed, if aperiodic CSI-RS resource is measured for L1-RSRP measurement on any FR2 serving frequency in the same band, and the CSI-RS resource is outside measurement gap and overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols. If SSB-ToMeasure or SS-RSSI-Measurement is configured, the SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same band which can be merged and the RSSI symbols are indicated by SS-RSSI-Measurement.

Table 9.2.5.2-1: Measurement period for intrafrequency measurements without gaps(FR1)

DRX cycle	T _{SSB_measurement_period_intra}
No DRX	max(200ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x
	CSSF _{intra}
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5 x K _p) x max(SMTC period,DRX
·	cycle)) x CSSF _{intra}
DRX cycle>320ms	ceil(5 x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.2-2: Measurement period for intra-frequency measurements without gaps(FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, ceil(M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}
DRX cycle≤ 320ms	max(400ms, ceil(1.5x M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x
	CSSFintra
DRX cycle>320ms	ceil(M _{meas_period_w/o_gaps} xK _p x K _{layer1_measurement}) x DRX
	cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.2-3: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	Ceil(5 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	Ceil(5 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(5 x K _p)x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.2-4: Measurement period for intra-frequency measurements without gaps (deactivated SCell) FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	Ceil(M _{meas_period_w/o_gaps} x K _p) x measCycleSCell x
	CSSFintra
DRX cycle≤ 320ms	Ceil(M _{meas_period_w/o_gaps} x K _p) x max(measCycleSCell,
·	1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(Mmeas_period_w/o_gaps x Kp) x max(measCycleSCell,
	DRX cycle) x CSSF _{intra}

9.2.5.3 Scheduling availability of UE during intra-frequency measurements

UE are required to be capable of measuring without measurement gaps when the SSB is completely contained in the active bandwidth part of the UE. When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols to be measured in the following clauses are the SSB symbols indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same serving carrier which can be merged [2], if it is configured; otherwise, all *L* SSB symbols within SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the SMTC periodicity follows *smtc1*.

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRQ measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.2 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If *deriveSSB_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each

consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

- If *deriveSSB_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling *deriveSSB_IndexFromCell* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

The following scheduling restriction applies to SS-RSRQ measurement on an FR2 intra-frequency cell

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB_IndexFromCellc* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

If following conditions are met:

- The UE has been notified about system information update through paging,
- The gap between the UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots.

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, the UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, the UE is expected to receive PDSCH that corresponds to the PDCCH that the UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured.

9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer.

9.2.5.4 SFTD Measurements between PCell and PSCell

9.2.5.4.1 Introduction

This clause contains SFTD measurement requirements for UE which supports NR-DC and is configured with a PSCell in RRC_CONNECTED state. The UE shall perform SFTD measurement between PCell and PSCell, and report the SFTD result with/without SS-RSRP after the network requests with *reportType* for the associated *reportConfig* set to *reportSFTD*. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2], and SFTD measurement reporting delay in clause 9.2.5.4.3.

9.2.5.4.2 SFTD Measurement delay

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(200, 5 \text{ x SMTC period})$ ms, where the SMTC period refers to the maximum between the configured SMTC period in PCell and PSCell.

When DRX is used in either of the PCell or the PSCell, or in both PCell and PSCell, the physical layer measurement period (T_{measure_SFTD1}) of the SFTD measurement shall be as specified in Table 9.2.5.4.2-1.

Table 9.2.5.4.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) Note 3	T _{measure_} SFTD1 (s)
≤0.04	max(0.2, 5 x SMTC period) (Note2)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
configured SMTC period in Note 2: Number of DRX cycles depo Note 3: DRX cycle length in this tab configured for PCell or PSC	ends upon the DRX cycle in use le refers to the DRX cycle length ell. When DRX is used in both PCell and this table refers to the longer of the DRX

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NRDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period ($T_{measure_SFTD2}$), and

T_{PSCell_change_NRDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 10.1.21.

9.2.5.4.3 SFTD Measurement Reporting Delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes any delay caused by no UL resources available for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than measurement period defined in clause 9.2.5.4.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.2.6 Intra-frequency measurements with measurement gaps

9.2.6.1 Void

9.2.6.2 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRsIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_with_index}. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T_{identify_intra_without_index}. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} \ ms$$

$$T_{identify_intra_with_index} = T_{PSS/SSS_sync_ntra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}$$

Where:

T_{PSS/SSS sync intra}: it is the time period used in PSS/SSS detection given in table 9.2.6.2-1 or 9.2.6.2-2.

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.6.2-3.

 $T_{SSB_measurement_period_intra}$: equal to a measurement period of SSB based measurement given in table 9.2.6.3-1 or 9.2.6.3-2.

 $CSSF_{intra}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_with_gaps}$: For a UE supporting FR2 power class 1, $M_{pss/sss_sync_with_gaps}$ =40. For a UE supporting FR2 power class 2, $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_with_gaps}$ =24. For a UE supporting power class 4, $M_{pss/sss_sync_with_gaps}$ =24.

 $M_{meas_period_with_gaps}$: For a UE supporting power class 1, $M_{meas_period_with_gaps}$ =40. For a UE supporting power class 2, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_with_gaps}$ =24.

If the higher layer signaling in TS 38.331 [2] of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_without_index}$ or $T_{identify_intra_with}$ interaction with index.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.2-1: Time period for PSS/SSS detection (FR1)

DRX cycle	T _{PSS} /SSS_sync_intra
No DRX	max(600ms, 5 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5) x max(MGRP, SMTC
,	period,DRX cycle)) x CSSF _{intra}
DRX cvcle>320ms	5 x max(MGRP, DRX cycle) x CSSFintra

Table 9.2.6.2-2: Time period for PSS/SSS detection (FR2)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max(600ms, M _{pss/sss_sync_with_gaps} x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x M _{pss/sss_sync_with_gaps}) x
·	max(MGRP, SMTC period, DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
·	CSSF _{intra}

Table 9.2.6.2-3: Time period for time index detection (FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	max(120ms, 3 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(120ms, ceil(1.5x 3) x max(MGRP, SMTC
	period,DRX cycle) x CSSF _{intra})
DRX cycle>320ms	3 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

9.2.6.3 Intra-frequency Measurement Period

The measurement period for FR1 intra-frequency measurements with gaps is as shown in table 9.2.6.3-1.

The measurement period for FR2 intra-frequency measurements with gaps is as shown in table 9.2.6.3-2.

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.3-1: Measurement period for intra-frequency measurements with gaps(FR1)

DRX cycle	T SSB_measurement_period_intra	
No DRX	max(200ms, 5 x max(MGRP, SMTC period)) x	
	CSSF _{intra}	
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5) x max(MGRP, SMTC	
,	period,DRX cycle)) x CSSF _{intra}	
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}	

Table 9.2.6.3-2: Measurement period for intra-frequency measurements with gaps(FR2)

DRX cycle	T SSB_measurement_period_intra	
No DRX	max(400ms, M _{meas_period with_gaps} x max(MGRP, SMTC	
	period)) x CSSF _{intra}	
DRX cycle≤ 320ms	max(400ms, ceil(1.5 x M _{meas_period with_gaps}) x max(MGRP, SMTC period, DRX cycle)) Note 1 x CSSF _{intra}	
DRX cycle>320ms	M _{meas_period with_gaps} x max(MGRP, DRX cycle) x CSSF _{intra}	

9.3 NR inter-frequency measurements

9.3.1 Introduction

A measurement is defined as an SSB based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.2.

The UE shall be able to identify new inter-frequency cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-frequency cells if carrier frequency information is provided by PCell or PSCell, even if no explicit neighbour list with physical layer cell identities is provided.

SSB based measurements are configured along with a measurement timing configuration (SMTC) per carrier, which provides periodicity, duration and offset information on a window of up to 5ms where the measurements on the configured inter-frequency carrier are to be performed. For inter-frequency connected mode measurements, one measurement window periodicity may be configured per inter-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB on an inter-frequency measurement object which starts earlier than the gap starting time + switching time, nor detect SSB which ends later than the gap end – switching time. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

9.3.2 Requirements applicability

The requirements in clause 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.
- 9.3.2.1 Void
- 9.3.2.2 Void

9.3.3 Number of cells and number of SSB

9.3.3.1 Requirements for FR1

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 7 SSBs with different SSB index and/or PCI on the inter-frequency layer.

9.3.3.2 Requirements for FR2

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 10 SSBs with different SSB index and/or PCI on the inter-frequency layer, and
- 1 SSB per identified cell.

9.3.4 Inter-frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within $T_{identify_inter_without_index}$.

$$T_{identify_inter_without_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter}) \ ms$$

$$T_{identify_inter_with_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter} + T_{SSB_time_index_inter})$$
 ms

Where:

T_{PSS/SSS_sync_inter}: it is the time period used in PSS/SSS detection given in table 9.3.4-1 and table 9.3.4-2.

 $T_{SSB_time_index_inter}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3.4-3 and table 9.3.4-4.

 $T_{SSB_measurement_period_inter}$: equal to a measurement period of SSB based measurement given in table 9.3.5-1 and table 9.3.5-2.

 M_{pss/sss_sync_inter} : For a UE supporting FR2 power class 1, $M_{pss/sss_sync_inter} = 64$ samples. For a UE supporting FR2 power class 2, $M_{pss/sss_sync_inter} = 40$ samples. For a UE supporting FR2 power class 3, $M_{pss/sss_sync_inter} = 40$ samples. For a UE supporting FR2 power class 4, $M_{pss/sss_sync_inter} = 40$ samples.

 $M_{SSB_index_inter}$: For a UE supporting FR2 power class 1, $M_{SSB_index_inter} = 40$ samples. For a UE supporting FR2 power class 2, $M_{SSB_index_inter} = 24$ samples. For a UE supporting FR2 power class 3, $M_{SSB_index_inter} = 24$ samples. For a UE supporting FR2 power class 4, $M_{SSB_index_inter} = 24$ samples.

 $M_{meas_period_inter}$: For a UE supporting FR2 power class 1, $M_{meas_period_inter}$ =64 samples. For a UE supporting FR2 power class 2, $M_{meas_period_inter}$ =40 samples. For a UE supporting FR2 power class 3, $M_{meas_period_inter}$ =40 samples. For a UE supporting FR2 power class 4, $M_{meas_period_inter}$ =40 samples.

 $CSSF_{inter}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	Tpss/sss_sync_inter		
No DRX	$Max(600ms, 8 \times Max(MGRP, SMTC period)) \times CSSF_{inter}$		
DRX cycle ≤ 320ms	Max(600ms, Ceil(8*1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF _{inter}		
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}		

NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

Condition NOTE1,2	TPSS/SSS_sync_inter		
No DRX	Max(600ms, Mpss/sss_sync_inter × Max(MGRP, SMTC period)) × CSSFinter		
DRX cycle ≤ 320ms	Max(600ms, (1.5 × M _{pss/sss_sync_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×		
	CSSF _{inter}		
DRX cycle > 320ms	$M_{pss/sss_sync_inter} imes DRX \ cycle imes CSSF_{inter}$		

NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

Condition NOTE1,2	Tssb_time_index_inter		
No DRX	Max(120ms, 3 × Max(MGRP, SMTC period)) × CSSF _{inter}		
DRX cycle ≤ 320ms	$Max(120ms, Ceil(3 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF_{inter}$		
DRX cycle > 320ms	3 × DRX cycle × CSSF _{inter}		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for			
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

Table 9.3.4-4: Time period for time index detection (Frequency range FR2)

Condition NOTE1,2	T _{SSB_time_index_inter}		
No DRX	Max(200ms, M _{SSB_index_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}		
DRX cycle ≤ 320ms	Max(200ms, (1.5 × M _{SSB_index_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×		
-	CSSF _{inter}		
DRX cycle > 320ms	$M_{SSB_index_inter} \times DRX \ cycle \times CSSF_{inter}$		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for			
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

9.3.4.1 Void

9.3.4.2 Void

9.3.5 Inter-frequency measurements

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRQ and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-1: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

Condition NOTE1,2	T SSB_measurement_period_inter		
No DRX	Max(200ms, 8 × Max(MGRP, SMTC period)) × CSSF _{inter}		
DRX cycle ≤ 320ms	$Max(200ms, Ceil(8 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF_{inter}$		
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1 NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

Table 9.3.5-2: Measurement period for inter-frequency measurements with gaps (Frequency FR2)

Condition NOTE1,2	T SSB_measurement_period_inter		
No DRX	Max(400ms, M _{meas_period_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}		
DRX cycle ≤ 320ms	Max(400ms, (1.5 × M _{meas_period_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×		
-	CSSF _{inter}		
DRX cycle > 320ms	$M_{meas_period_inter} \times DRX \ cycle \times CSSF_{inter}$		
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1			
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for			
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.			

- 9.3.5.1 Void
- 9.3.5.2 Void
- 9.3.5.3 Void

9.3.6 Inter-frequency measurements reporting requirements

9.3.6.1 Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

9.3.6.2 Event-triggered Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.3.6.3.

9.3.6.3 Event-triggered Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. Both $T_{identify_inter_without_index}$ and $T_{identify_inter_with_index}$ are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSB measured from the cell being configured remains detectable during the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4. If a cell which has been detectable at least for the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_inter}$ defined in clause 9.3.5 provided the timing to that cell has not changed more than \pm 3200/2 $^{\mu}$ Tc while measurement gap has not been available and the L3 filtering has not been used, where μ is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used an additional delay can be expected.

9.3.7 Void

9.3.8 Inter-frequency SFTD measurement requirements

9.3.8.1 Introduction

This clause contains requirements for a UE supporting NR inter-frequency SFTD measurement and is applicable in RRC_CONNECTED state. The UE shall, depending on network request, perform inter-frequency SFTD measurement

and report SFTD result with or without SS-RSRP. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2] and SFTD measurement reporting delay in clause 9.3.8.3.

UE which fulfils the requirements in clause 9.3.8 is not supposed to fulfil the requirements defined in clause 9.2.5.4.

9.3.8.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this clause are applicable under the side condition SCH $\hat{E}s/Iot \ge -3$ dB for the inter-frequency neighbour cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest applicable inter-frequency neighbour cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more strongest cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell regardless of its SSB position in the SMTC period, provided that the carrier frequency where SFTD measurement is configured and the serving carrier(s) form a supported CA or NR-DC band combination of the UE. The SFTD measurement shall be conducted with sustained connection to the PCell and activated SCell(s) in MCG. Depending on capability, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 8.2.2.2.6.

When measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

When no DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure\ SFTD1}$ as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure SFTD1} = 14 SMTC periods
 - For carrier frequency in FR2: $T_{measure_SFTD1} = 112$ SMTC periods
- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: $T_{measure\ SFTD1} = CSSF_{inter} \times 8 \times Max(MGRP, SMTC\ period)$
 - For carrier frequency in FR2: $T_{measure_SFTD1} = CSSF_{inter} \times 64 \times Max(MGRP, SMTC period)$
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 19 SMTC periods
 - For carrier frequency in FR2: T_{measure_SFTD1} = 152 SMTC periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: $T_{measure_SFTD1} = CSSF_{inter} \times 13 \times Max(MGRP, SMTC period)$
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 104 × Max(MGRP, SMTC period)

where $CSSF_{inter}$ is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

When DRX is used, the same $T_{measure_SFTD1}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case PCell is changed due to handover, the UE shall terminate the inter-frequency SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfil the requirement in clause 10.1.21.3. The measurement accuracy for additionally reported SS-RSRP shall fulfil the requirement in clauses 10.1.4.1 and 10.1.5.1 for neighbour cell in FR1 and FR2, respectively.

9.3.8.3 SFTD Measurement reporting delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of $2 \times TTI_{DCCH}$ resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than $T_{measure_SFTD1}$ defined in clause 9.3.8.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.4 Inter-RAT measurements

9.4.1 Introduction

The requirements in this clause are specified for NR–E-UTRAN FDD and NR–E-UTRAN TDD measurements and are applicable without an explicit E-UTRAN neighbour cell list containing physical layer cell identities, for a UE:

- in RRC_CONNECTED state, and
- configured with SA or NR-DC operation mode or configured in NE-DC operation mode by PCell with NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) on E-UTRA non-serving frequency carrier, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, or E-CID RSRP and RSRQ) configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements specified in clause 8.19 of TS 36.133 [15] shall apply.

Parameter T_{Inter1} used in inter-RAT requirements in clause 9.4 is specified in Table 9.4.1-1.

Table 9.4.1-1: Minimum available time for inter-RAT measurements

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)	Minimum available time for inter- frequency and inter- RAT measurements during 480 ms period (Tinter1, ms)
0	6	40	60
1	6	80	30
2	3	40	24 ^{Note 1}
3	3	80	12 ^{Note 1}
4	6	20	120 Note 1
6	4	20	72 Note 1,3,6
7	4	40	36 Note 1,4,6
8	4	80	18 ^{Note 1,5,6}
10	3	20	48 Note 1
NOTE 1: When determining UE requirements using Tinter1 for gap pattern IDs 2, 3, 4,			

- NOTE 1: When determining UE requirements using Tinter1 for gap pattern IDs 2, 3, 4, 6, 7, 8, 10, Tinter1 = 60 for gap pattern IDs 2, 4, 6, 7, 10, and Tinter1 = 30 for gap pattern IDs 3 and 8 shall be used.
- NOTE 2: Measurement gaps pattern configurations applicability is as specified in Table 9.1.2-1.
- NOTE 3: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 48 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 4: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 24 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 5: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 12 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 6: This gap pattern is applicable for E-UTRA inter-frequency measurements only if gap based NR measurements are also configured.

A UE configured with gap pattern ID 2, 3 or 10 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than $500~\mu s$ from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends not later than 500 µs before the end of the measurement gap in case of FDD and not later than 750 µs before the end of measurement gap in case of TDD.

A UE configured with gap pattern ID 6, 7 or 8 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 μs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends no later than 1500 μ s before the end of the measurement gap in case of FDD and no later than 1750 μ s before the end of measurement gap in case of TDD.

9.4.2 NR – E-UTRAN FDD measurements

9.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN FDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.2.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable FDD cell within T_{Identify, E-UTRAN FDD} according to the following expression:

$$T_{\rm Identify,E-UTRAN\;FDD} = T_{\rm Basic Identify} \cdot \frac{480}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} \ ms,$$

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{\text{Measure, E-UTRAN FDD}}$ defined in Table 9.4.2.2-1.

Table 9.4.2.2-1: Measurement period and measurement bandwidth

Configuration	Physical Layer Measurement period: TMeasure, E-UTRAN FDD [ms]	Measurement bandwidth [RB]
0	480 x CSSF _{interRAT}	6
1 (Note 1)	240 x CSSF _{interRAT}	50
NOTE 1: This configuration is optional.		

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN FDD cell within T_{Identify, E-UTRAN FDD} specified in Table 9.4.2.3-1.

Table 9.4.2.3-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (s) (DRX cycles)		
	Gap period = 40 ms, 20 ms	Gap period = 80 ms	
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.2.2 apply	clause 9.4.2.2 apply	
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSF _{interRAT})	(30*CSSF _{interRAT})	
0.32	6.4* CSSF _{interRAT}	7.68* CSSF _{interRAT}	
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})	
0.32< DRX-cycle ≤	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSF _{interRAT})	
10.24			
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is	as defined in clause 9.4.2.2.		

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers, and the UE physical layer shall be capable of

reporting NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN FDD}$ specified in Table 9.4.2.3-2.

Table 9.4.2.3-2: Requirement to measure E-UTRAN FDD cells

DRX cycle length (s)	T _{measure} , E-UTRAN FDD (s) (DRX cycles)	
≤0.08	Non-DRX requirements in clause 9.4.2.2 apply	
0.08< DRX-cycle ≤10.24	Note1 (5* CSSF _{interRAT})	
NOTE 1: The time depends on the DRX cycle length.		
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.2.2.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR - E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.4 Measurement reporting requirements

9.4.2.4.1 Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.2.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.2.4.3.

9.4.2.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{Identify, E-UTRAN \, FDD}$ defined in clauses 9.4.2.2 and 9.4.2.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify,\,E-UTRAN\,FDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure,\,E-UTRAN\,FDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.3 NR – E-UTRAN TDD measurements

9.4.3.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN TDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],

RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.3.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, the UE shall be able to identify a new detectable TDD cell within $T_{Identify, E-UTRAN TDD}$ according to the following expression:

- When configuration 0 or configuration 1 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\;TDD} = T_{\rm BasicIdentify} \cdot \frac{_{480}}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} \hspace{0.5cm} ms,$$

- When configuration 2 or configuration 3 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\,TDD} = T_{\rm BasicIdentify} \cdot \frac{_{480}}{T_{\rm Inter1}} \cdot {\rm CSSF}_{\rm interRAT} + 240 \cdot {\rm CSSF}_{\rm interRAT} \hspace{0.5cm} ms,$$

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{\text{Measure, E-UTRAN TDD}}$ defined in Table 9.4.3.2-1.

Table 9.4.3.2-1: T_{Measure, E-UTRAN TDD} for different configurations

Configuration	Measurement bandwidth		UL/DL sub- If frame (5 ms)	Dwl	PTS	T _{Measure} , E-UTRAN TDD (ms)
	(RB)	DL	UL	Normal CP	Extende d CP	
0	6	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	480 x CSSF _{interRAT}
1 (Note 1)	50	2	2	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	240 x CSSF _{interRAT}
2	6	1	3	$19760 \cdot T_{\rm s}$	$20480 \cdot T_{\rm s}$	720 x CSSF _{interRAT}
3 (Note 1)	50	1	3	19760 · T _s	20480· <i>T</i> _s	480 x CSSF _{interRAT}

NOTE 1: This configuration is optional.

NOTE 2: Void

The UE shall be capable of identifying and performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN TDD cell within $T_{Identify, E-UTRAN \, TDD}$ specified in Table 9.4.3.3-1.

Table 9.4.3.3-1: Requirement to identify a newly detectable E-UTRAN TDD cell

DRX cycle length (s)	Tidentify, E-UTRAN TDD (S) (DRX cycles)		
	Gap period = 40 ms, 20	Gap period = 80 ms	
	ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in	
	clause 9.4.3.2 apply	clause 9.4.3.2 apply	
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSFinterRAT)	(30*CSSF _{interRAT})	
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT	
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})	
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSF _{interRAT})	
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.3.2.			

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN TDD}$ specified in Table 9.4.3.3-2.

Table 9.4.3.3-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	Tmeasure, E-UTRAN TDD (S) (DRX cycles)		
≤0.08	Non-DRX Requirements in clause 9.4.3.2 apply		
0.128	For configuration 2 Note3, non-DRX requirements		
	in clause 9.4.3.2 apply,		
	Otherwise: Note1 (5*CSSF _{interRAT})		
0.128 <drx-cycle≤< td=""><td>Note1 (5*CSSF_{interRAT})</td></drx-cycle≤<>	Note1 (5*CSSF _{interRAT})		
10.24			
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSFinterRAT is	r is as defined in clause 9.4.3.2.		
NOTE 3: See Table 9.4.3	.3.2-1.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.4 Measurement reporting requirements

9.4.3.4.1 Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.3.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.3.4.3.

9.4.3.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{Identify, E-UTRAN \, TDD}$ defined in clauses 9.4.3.2 and 9.4.3.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify,\,E-UTRAN\,TDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure,\,E-UTRAN\,TDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.4 Inter-RAT RSTD measurements

9.4.4.1 NR – E-UTRAN FDD RSTD measurements

9.4.4.1.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSTD measurements requested via LPP [22, 27].

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using

autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ starts.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts.

9.4.4.1.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT E-UTRAN FDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{RSTD \, InterRAT \, E-UTRAN \, FDD}$ ms as given below:

$$T_{\text{RSTD InterRAT, E-UTRAN FDD}} = T_{\text{PRS}} \cdot (M - 1) + \Delta \qquad ms$$
,

where

 $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ is the total time for detecting and measuring at least n cells,

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.1.2-1, where each PRS positioning occasion comprises of N_{PRS} (1 \leq N_{PRS} \leq 6) consecutive downlink positioning subframes defined in TS 36.211 [23],

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN FDD carrier frequencies.

Table 9.4.4.1.2-1: Number of PRS positioning occasions within $\,T_{\rm RSTD\;InterRAT,\;E-UTRAN\;FDD}$

Positioning subframe	Number of PRS positioning occasions ${\cal M}$	
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT
>160 ms	8 x CSSF _{interRAT}	16 x CSSFinterRAT

NOTE 1: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN FDD carrier frequency f2.

NOTE 2: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN FDD carrier frequency f1 and the E-UTRAN FDD carrier frequency f2 respectively.

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ provided:

$$(PRS \hat{E}_s / Iot)_{ref} \ge -6 \text{ dB for all Frequency Bands for the reference cell,}$$

 $(PRS \hat{E}_s / Iot)_i \ge -13 \text{ dB for all Frequency Bands for neighbour cell } i,$

 $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref}$ and $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i}$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

 $PRS\,\hat{E}_s$ / Iot is defined as the ratio of the average received energy per PRS resource element during the useful part of the symbol to the average received power spectral density of the total noise and interference for this resource element, where the ratio is measured over all resource elements which carry PRS.

The time $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells i shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.1.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.1.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN FDD} + T_{MIB} + T_{ECGI}$$
,

where

 $T_{Detect,\ E-UTRAN\ FDD} = T_{Identify,\ E-UTRAN\ FDD}$ - $T_{measure,\ E-UTRAN\ FDD}$ is according to clause 9.4.2 assuming CSSF $_{interRAT}=1$ and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect,\ E-UTRAN\ FDD}=0$) when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN and/or PHICH configuration of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver ($T_{MIB}=0$ when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data and ECGI acquisition is not needed), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.2.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-1. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, FDD}$ ACK/NACKs specified in Table 9.4.4.1.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.1.2.2-1, 9.4.4.1.2.2-2, and 9.4.4.1.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.1.2.2-1: Number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, fdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.1.2.2-2: Void

Configuration of the serving cell in which the transmitted ACK/NACKs Nack/nack, mib+ecgi, fdd are counted **Duplex mode configuration** SCS FDD 84 15 kHz FDD 30 kHz 193 402 FDD 60 kHz 28 TDD Note 1 15 kHz TDD Note 1 81 30 kHz TDD Note 1 159 60 kHz TDD Note 2 233 60 kHz TDD Note 2 491 120 kHz

Table 9.4.4.1.2.2-3: Number of ACK/NACKs transmitted by the UE during TMIB+TECGI

TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

9.4.4.2 NR - E-UTRAN TDD RSTD measurements

9.4.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSTD measurements requested via LPP [22, 27].

When the UE is in NE-DC operation mode and an NR-E-UTRAN TDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\ InterRAT,E-UTRAN\ TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts. When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{RSTD InterRAT, E-UTRAN TDD}$ starts.

9.4.4.2.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT -UTRAN TDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{RSTD\ InterRAT.E-UTRAN\ TDD}$ ms as given below:

$$T_{\text{RSTD InterRAT. E-UTRAN TDD}} = T_{\text{PRS}} \cdot (M-1) + \Delta$$
 ms

where

 $T_{RSTD InterRAT, E-UTRAN TDD}$ is the total time for detecting and measuring at least n cells,

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.2.2-1, where a PRS positioning occasion is as defined in clause 9.4.4.1.2,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left\lceil \frac{n}{M} \right\rceil$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN TDD carrier frequencies.

Table 9.4.4.2.2-1: Number of PRS positioning occasions within $T_{RSTD\,InterRAT,\,E-UTRAN\,TDD}$

Positioning subframe	Number of PRS positioning occasions ${\it M}$		
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2	
160 ms	16 × CSSFinterRAT	32 × CSSF _{interRAT}	
>160 ms	8 × CSSF _{interRAT}	16 × CSSF _{interRAT}	
NOTE 1: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN TDD carrier frequency f2.			
and the neighbour ce	E 2: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN TDD carrier frequency f1 and the E-UTRAN TDD carrier frequency f2 respectively		

The requirements in this clause shall apply for all TDD special subframe configurations specified in TS 36.211 [23] and for the TDD uplink-downlink configurations as specified in Table 9.4.4.2.2-2 for UE requiring measurement gaps for these measurements. For UEs capable of performing inter-RAT RSTD measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 9.4.4.2.2-3 shall apply.

Table 9.4.4.2.2-2: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations	
6, 15	3, 4 and 5	
25	1, 2, 3, 4, 5 and 6	
50, 75, 100	0, 1, 2, 3, 4, 5 and 6	
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].		

Table 9.4.4.2.2-3: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements without gaps

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations	
6, 15	1, 2, 3, 4 and 5	
25, 50, 75, 100	0, 1, 2, 3, 4, 5 and 6	
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].		

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{\text{RSTD InterRAT.E-UTRANTDD}}$ provided:

 $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref} \ge -6 \text{ dB for all Frequency Bands for the reference cell,}$ $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i} \ge -13 \text{ dB for all Frequency Bands for neighbour cell } i,$

 $\left(\text{PRS } \hat{\mathbf{E}}_{\text{s}} / \text{Iot} \right)_{\text{ref}} \text{ and } \left(\text{PRS } \hat{\mathbf{E}}_{\text{s}} / \text{Iot} \right)_{i} \text{ conditions apply for all subframes of at least } L = \frac{M}{2} \text{ PRS positioning}$

occasions.

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

PRS \hat{E}_s / Iot is as defined in clause 9.4.4.1.2.

The time $T_{RSTD\,InterRAT,E-UTRAN\,TDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.2.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.2.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN TDD} + T_{MIB} + T_{ECGI}$$
,

where

 $T_{Detect,\ E-UTRAN\ TDD} = T_{Identify,\ E-UTRAN\ TDD}$ - $T_{measure,\ E-UTRAN\ TDD}$ is according to clause 9.4.3 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the

subframe and slot timing of the cell, provided the UE is configured with measurement gaps (T_{Detect, E-UTRAN TDD}=0 when both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset* are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN and/or PHICH configuration of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver ($T_{MIB}=0$ when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data and ECGI acquisition is not needed), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.3.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.2.2.2-1. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, TDD}$ ACK/NACKs specified in Table 9.4.4.2.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.2.2.2-1, 9.4.4.2.2.2-2 and 9.4.4.2.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.2.2.2-1: Minimum number of ACK/NACKs transmitted by the UE during T_{MB}

Nack/nack, mib, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
15	FDD	15 kHz
39	FDD	30 kHz
85	FDD	60 kHz
0	TDD Note 1	15 kHz
4	TDD Note 1	30 kHz
12	TDD Note 1	60 kHz
46	TDD Note 2	60 kHz
104	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

Table 9.4.4.2.2.2-2: Void

Table 9.4.4.2.2.2-3: Minimum number of ACK/NACKs transmitted by the UE during T_{MIB}+T_{ECGI}

Nack/nack, mib+ecgi, tdd	Configuration of the serving cell in which the transmitted At are counted	
	Duplex mode configuration	scs
84	FDD	15 kHz
193	FDD	30 kHz
402	FDD	60 kHz
28	TDD Note 1	15 kHz
81	TDD Note 1	30 kHz
159	TDD Note 1	60 kHz
233	TDD Note 2	60 kHz
491	TDD Note 2	120 kHz
	ration is as specified in Table A.3.3.1-1 or	

9.4.5 Inter-RAT E-CID measurements

NR-F-UTRAN FDD F-CID RSRP and RSRQ measurements 9.4.5.1

9.4.5.1.1 Introduction

The requirements in clause 9.4.5.1. shall apply provided the UE has received ECID-RequestLocationInformation message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN FDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.1.2 Requirements

The requirements in clause 9.4.2 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.1.3.

9.4.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI_{DCCH} where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.4.5.2 NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements

9.4.5.2.1 Introduction

The requirements in clause 9.4.5.2. shall apply provided the UE has received ECID-RequestLocationInformation message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN TDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.2.2 Requirements

The requirements in clause 9.4.3 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.2.3.

9.4.5.2.3 Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.5 L1-RSRP measurements for Reporting

9.5.1 Introduction

When configured by the network, the UE shall be able to perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed for a serving cell, including PCell, PSCell, or SCell, on the resources configured for L1-RSRP measurements within the active BWP.

The UE shall be able to measure all CSI-RS resources and/or SSB resources of the *nzp-CSI-RS-ResourceSet* and/or *csi-SSB-ResourceSet* within the CSI-Resource*Config* settings configured for L1-RSRP for the active BWP, provided that the number of resources does not exceed the UE capability indicated by *beamManagementSSB-CSI-RS*.

The UE shall report the measurement quantity (*reportQuantity*) and send periodic, semi-persistent or aperiodic reports, according to the *reportConfigType* according to the CSI reporting configuration(s) (*CSI-ReportConfig*) for the active BWP.

9.5.2 Requirements applicability

The requirements in clause 9.5 apply, provided:

- The CSI-RS or SSB or CSI-RS and SSB resources configured for L1-RSRP measurements are measurable.

An SSB resource configured for L1-RSRP shall be considered measurable when for each relevant SSB the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.1 and 10.1.20.1 for FR1 and FR2, respectively, for a corresponding band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.4.1 for a corresponding band.

A CSI-RS resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.2 and 10.1.20.2 for FR1 and FR2, respectively, for a corresponding band,
- CSI-RS_RP and CSI-RS Ês/Iot according to Annex B.2.4.2 for a corresponding band.

A CSI-RS and SSB resource configured for L1-RSRP shall be considered measurable when the measurable resource conditions are met for both CSI-RS resource and SSB resource.

Requirements are defined for periodic, semi-persistent and aperiodic resources.

9.5.3 Measurement Reporting Requirements

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to clause 10.1.19 for FR1 and 10.1.20 for FR2 if *nrofReportedRS* is configured to one. If *nrofReportedRS* is configured to

be larger than one, or if *groupBasedBeamReporting* is enabled, the UE shall use differential L1-RSRP based reporting as defined in clause 10.1.19 for FR1 and 10.1.20 for FR2. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in 10.1.6.

9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in a Semi-Persistent L1-RSRP measurement report shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUSCH, if a DCI request has been received.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUCCH, if an activation command [7] has been received.

The UE shall transmit the semi-persistent L1-RSRP reporting on PUSCH or PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.3 Aperiodic Reporting

Reported L1-RSRP measurements contained in aperiodic triggered, aperiodic triggered periodic and aperiodic triggered semi-persistent L1-RSRP reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send aperiodic L1-RSRP measurement reports, if a DCI trigger has been received.

After the UE receives CSI request in DCI, the UE shall transmit the aperiodic L1-RSRP reporting on PUSCH over the air interface at the time specified according to clause 6.1.2.1 in TS 38.214 [26].

9.5.4 L1-RSRP measurement requirements

9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_SSB}$.

The value of T_{L1-RSRP} Measurement Period SSB is defined in Table 9.5.4.1-1 for FR1 and Table 9.5.4.1-2 for FR2, where

- M=1 if higher layer parameter timeRestrictionForChannelMeasurement is configured, and M=3 otherwise
- N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when SSB is not overlapped with measurement gap and SSB is partially overlapped with
 - SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is P_{sharing factor}, when SSB is not overlapped with measurement gap and SSB is fully overlapped with SMTC period (T_{SSB} = T_{SMTCperiod}).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}, \text{ when SSB is partially overlapped with measurement gap and SSB is partially overlapped}$

with SMTC occasion (T_{SSB} < T_{SMTCperiod}) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $\frac{1}{1-\frac{T_{SSB}}{M\,GRP}}$ * $P_{sharing\,factor}$, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{\min(T_{SMTCperiod}, MGRP)}}$, when SSB is partially overlapped with measurement gap ($T_{SSB} < MGRP$) and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $\frac{1}{1-\frac{T_{SSB}}{MRGP}}$ * P_{sharing factor}, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P is $\frac{1}{1-\frac{T_{SSB}}{MGRP}}$ * $P_{sharing\ factor}$, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$) $P_{sharing\ factor} = 1$
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
 carrier, and,
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,
- $P_{\text{sharing factor}} = 3$, otherwise.

Where:

 $T_{SSB} = ssb$ -periodicityServingCell

 $T_{SMTCperiod}$ = the configured SMTC period

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, T_{SMTCperiod} corresponds to the value of higher layer parameter *smtc2*; Otherwise T_{SMTCperiod} corresponds to the value of higher layer parameter *smtc1*. T_{SMTCperiod} is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.1-1: Measurement period TL1-RSRP_Measurement_Period_SSB for FR1

Configuration		T _{L1-RSRP_Measurement_Period_SSB} (ms)
non-DRX		max(T _{Report} , ceil(M*P)*T _{SSB})
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{SSB}))
DRX cycle > 320ms		ceil(M*P)*T _{DRX}
Note: $T_{SSB} = ssb$ -periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T_{DRX} is the DRX cycle length. T_{Report} is configured periodicity for reporting.		

Table 9.5.4.1-2: Measurement period T_{L1-RSRP_Measurement_Period_SSB} for FR2

Configuration		T _{L1-RSRP_Measurement_Period_SSB} (ms)		
non-DRX		max(T _{Report} , ceil(M*P*N)*T _{SSB})		
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{SSB}))		
DRX cycle > 320ms		ceil(1.5*M*P*N)*T _{DRX}		
Note: T _{SSB} = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length.				
T _{Report} is configured periodicity for reporting.				

9.5.4.2 CSI-RS based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured CSI-RS resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_CSI-RS}$.

The value of T_{L1-RSRP} Measurement Period CSI-RS is defined in Table 9.5.4.2-1 for FR1 and in Table 9.5.4.2-2 for FR2, where

- For periodic and semi-persistent CSI-RS resources, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise
- For aperiodic CSI-RS resources M=1
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for with QCL-TypeD all resources in the resource set.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided TCI state is provided with QCL-TypeD for all resources in the resource set in the MAC CE activating the resource set.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided *qcl-info* is configured for all resources in the resource set and for each resource one RS has QCL-TypeD with

- SSB for L1-RSRP measurement, or
- another CSI-RS in resource set configured with repetition ON.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.19.2 and 10.1.20.2 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requirements apply provided *qcl-info* is configured with QCL-TypeD for all resources in the resource set.

For FR1.

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P=1, when CSI-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=\frac{1}{1-\frac{T_{CSI-RS}}{MGRP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P=P_{sharing factor}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- P=1, when aperiodic CSI-RS resource is not overlapped with measurement gap.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{M_{GRP}} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < $T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $-P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}, \ \, \text{when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped} \\ \, \text{with SMTC occasion } (T_{CSI-RS} < T_{SMTCperiod}) \ \, \text{and SMTC occasion is not overlapped with measurement gap and} \\ \, T_{SMTCperiod} = MGRP \ \, \text{and} \ \, T_{CSI-RS} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{\min(T_{SMTCperiod},MGRP)}}$, when CSI-RS is partially overlapped with measurement gap ($T_{CSI-RS} < MGRP$) and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or
 - fully overlapped with measurement gap.
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1, if the CSI-RS configured for L1-RSRP measurement outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure

is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,

- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured
- $P_{sharing factor} = 3$, otherwise.

Where:

 $T_{SMTCperiod}$ = the configured SMTC period.

T_{CSI-RS} = the periodicity of CSI-RS configured for L1-RSRP measurement

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for L1-RSRP measurement and SMTC means that CSI-RS for L1-RSRP measurement is within the SMTC window duration.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.2-1: Measurement period T_{L1-RSRP Measurement Period CSI-RS} for FR1

Configuration		T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)	
non-DRX		max(T _{Report} , ceil(M*P)*T _{CSI-RS})	
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{CSI-RS}))	
DRX cycle > 320ms		ceil(M*P)*T _{DRX}	
Note 1:	T _{CSI-RS} is the	periodicity of CSI-RS configured for L1-RSRP	
Note 2:	measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting. the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3.		

Table 9.5.4.2-2: Measurement period TL1-RSRP Measurement Period CSI-RS for FR2

Configuration		T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)
non-DRX		max(T _{Report} , ceil(M*P*N)*T _{CSI-RS})
DRX cycle ≤ 320ms		max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{CSI-RS}))
DRX cycle > 320ms		ceil(M*P*N)*T _{DRX}
Note 1: Note 2:	T _{CSI-RS} is the periodicity of CSI-RS configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting. the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3.	

9.5.5 Measurement restriction for CSI-RS and SSB for L1-RSRP measurement

The UE is required to be capable of measuring SSB and CSI-RS for L1-RSRP without measurement gaps. The UE is required to perform the SSB and CSI-RS measurements with measurement restrictions as described in the following clauses.

9.5.5.1 Measurement restriction for SSB based L1-RSRP

For FR1, when the SSB for L1-RSRP measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
 - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

9.5.5.2 Measurement restriction for CSI-RS based L1-RSRP

For both FR1 and FR2, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for L1-RSRP measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and the
 other CSI-RS. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no
 requirements are defined.
 - The CSI-RS for L1-RSRP measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,

- Otherwise, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

9.5.6 Scheduling availability of UE during L1-RSRP measurement

Scheduling availability restrictions when the UE is performing L1-RSRP measurement are described in the following clauses.

9.5.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH in FR1.

9.5.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured for L1-RSRP measurement.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

9.5.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- For the case where RS for L1-RSRP measurement is CSI-RS which is QCLed with active TCI state for PDCCH/PDSCH and not in a CSI-RS resource set with repetition ON, and N=1 applies as specified in clause 9.5.4.2
 - There are no scheduling restrictions due to L1-RSRP measurement performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on
 - symbols corresponding to the SSB indexes configured for L1-RSRP measurement, and/or
 - symbols corresponding to the periodic CSI-RS resource configured for L1-RSRP measurement, and/or
 - symbols corresponding to the semi-perssitent CSI-RS resource configured for L1-RSRP measurement when the resource is activated, and/or
 - symbols corresponding to the aperiodic CSI-RS resource configured for L1-RSRP measurement when the reporting is triggered.

When intra-band carrier aggregation is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the band on the symbols that fully or partially overlap with restricted symbols.

If following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

9.6 NE-DC: Measurements

9.6.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA FDD or TDD PSCell. The requirements apply to UEs that have been configured with NE-DC.

9.6.2 SFTD Measurements

9.6.2.1 Introduction

This clause contains requirements on UE capabilities for reporting of SFN and frame time difference between NR PCell and E-UTRA PSCell in RRC_CONNECTED state. The requirements comprise measurement reporting delay and measurement accuracy. The overall measurement reporting delay includes a RRC procedure delay specified in TS 38.331 [2], and the SFTD measurement reporting delay specified below.

9.6.2.2 SFTD Measurement requirements

When no DRX is used in either of the NR PCell and E-UTRA PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(0.2, 5 * SMTC period)$ s.

When DRX is used in either of the NR PCell or the E-UTRA PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in Table 9.6.2.2-1.

Table 9.6.2.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) ^{Note2}	T _{measure_} SFTD1 (S)
DRX cycle≤0.04	max(0.2,5 x SMTC period) (Note1)
0.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note2: DRX cycle length in this table configured for PCell or PSC	ends upon the DRX cycle in use le refers to the DRX cycle length ell. When DRX is used in both PCell and this table refers to the longer of the DRX PSCell.

If PSCell is changed without changing carrier frequency of PSCell while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall

restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NEDC}$$

where:

M is the number of times the E-UTRA PSCell is changed over the measurement period (T_{measure SFTD2}), and

T_{PSCell change NEDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed to a different carrier frequency, the UE shall terminate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in clause 10.1.21.1.

10 Measurement Performance requirements

10.1 NR measurements

10.1.1 Introduction

The requirements in clause 10.1 apply as follows:

- intra-frequency requirements apply for PCell measurements in SA, NR-DC, or NE-DC operaion mode,
- intra-frequency requirements apply for PSCell measurements in NR-DC or EN-DC operation mode,
- intra-frequency requirements apply for SCell measurements in SA operation mode with NR CA or any MR-DC operation mode with NR CA,
- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies,
- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

10.1.2 Intra-frequency RSRP accuracy requirements for FR1

10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

Accı	ıracy		Conditions							
Normal	Extreme	SSB		lo ^{Note}						
condition	condition	Ês/lot	NR operating band groups Note 2		Minimur	n lo	Maximum Io			
		dB		dBm/S	CS _{SSB}					
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70			
		±9 ≥-6 dB	NR_TDD_FR1_C	-120	-117	N/A	-70			
±4.5	±9		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70			
				NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70			
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50			

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in EP1

The accuracy requirements in Table 10.1.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

Accı	ıracy			Condit	ions				
Normal	Extreme	SSB	SSB Io Note 1 range						
condition	condition	Ês/lot Note 2	NR operating band groups Note 4		Minimum	lo	Maximum lo		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2	±3	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
		NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3	±3	≥-6 dB	Note 3	Note 3	Note 3	N/A	Note 3		

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.2 Void

10.1.3 Intra-frequency RSRP accuracy requirements for FR2

10.1.3.1 Intra-frequency SS-RSRP accuracy requirements

10.1.3.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.3.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

Accı	ıracy						
Normal	Extreme	SSB	lo Note 2 range				
condition	condition	Ês/lot		Minimum	lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
±6	±9	≥-6	in Table according to class, oper	as SSB_RP B.2.2-2, to UE Power rating band of arrival	N/A	-70	
±8	±11		N/A		-70	-50	

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.3.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR2.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2

Acci	uracy		Co	nditions	
Normal	Extreme	SSB		lo ^{Note 2} rai	nge
condition	condition	Ês/lot	Minimum Io		Maximum Io
			dBm / SC	S _{SSB} Note 1	
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}
±6	±9	≥-6	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50
С	alues based of lauses 7.3.2 ar elected depend	nd 7.3.4 of TS	38.101-2 [19]		
а	cross the band	lwidth.	,		e constant EPRE
Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.					
	he parameter hich the requir			SSB Ês/lot of	the pair of cells to

10.1.3.2 Void

10.1.4 Inter-frequency RSRP accuracy requirements for FR1

10.1.4.1 Inter-frequency SS-RSRP accuracy requirements

10.1.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.4.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

Accı	ıracy	Conditions							
Normal	Extreme	SSB		lo ^{Note 1} range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimum	lo	Maximum lo		
		dB		dBm/	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	N/A	-70		
±4.5	±9	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70		
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: Void

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.1.2 Relative Accuracy of SS-RSRP in FR1

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency in FR1compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.4.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.

- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB

Table 10.1.4.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

Accı	ıracy		Conditions					
Normal	Extreme	SSB	B Io Note 1 range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimur	n lo	Maximum lo	
		dB		dBm/S	CS _{SSB}			
dB	dB			SCS _{SSB} = SCS _{SS} 15 kHz = 30 kHz		dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±4.5	±6	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-119 -116 N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

10.1.4.2 Void

10.1.5 Inter-frequency RSRP accuracy requirements for FR2

10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

-50

Accuracy **Conditions** lo Note 2 range SSB **Extreme** Normal Ês/lot condition condition Minimum Io Maximum lo dBm / SCS_{SSB} Note 1 SCS_{SSB} = SCS_{SSB} = dB dB dB dBm/BW_{Channel} dBm/BW_{Channel} 120kHz 240kHz Same value as SSB RP in Table B.2.3-2, according to UE Power N/A -70 ±6 ±9

class, operating band and angle of arrival

N/A

-70

Table 10.1.5.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.5.1.2 Relative SS-RSRP Accuracy

±11

±8

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell on a frequency in FR2 compared to the SS-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.1.2-1 are valid under the following conditions:

≥-4

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.5.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2

Accı	ıracy		Co	nditions			
Normal	Extreme	SSB		lo ^{Note 2} range	е		
condition	condition	Ês/lot		um lo	Maximum lo		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}		
			120kHz	240kHz			
			Same value a	s SSB_RP in			
±6	±9	≥-4		, according to	-50		
	1.9	=		iss, operating	-30		
			band and an				
			and EIS spheric				
			TS 38.101-2 [19	9]. Applicable si	de condition		
	selected depe						
			ce point, and as	sumed to have	constant EPRE		
	across the ba		<u> </u>				
					may need to be		
	•	ensure Ês/lot at UE baseband is above the value defined in					
1	this table.						
			SB Ês/lot is the minimum SSB Ês/lot of the pair of cells to				
\	which the req	uirement app	lies.				

10.1.5.2 Void

10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting is defined from $0~\mathrm{dBm}$ to $-30~\mathrm{dB}$ with $2~\mathrm{dB}$ resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.6.1-1: SS-RSRP and CSI-RSRP measurement report mapping

Reported value	Measured quantity value (L3 SS-RSRP)	Measured quantity value (L1 SS-RSRP and CSI-RSRP)	Unit
RSRP_0	SS-RSRP<-156	Not valid	dBm
RSRP_1	-156≤ SS-RSRP<-155	Not valid	dBm
RSRP_2	-155≤ SS-RSRP<-154	Not valid	dBm
RSRP_3	-154≤ SS-RSRP<-153	Not valid	dBm
RSRP_4	-153≤ SS-RSRP<-152	Not valid	dBm
RSRP_5	-152≤ SS-RSRP<-151	Not valid	dBm
RSRP_6	-151≤ SS-RSRP<-150	Not valid	dBm
RSRP_7	-150≤ SS-RSRP<-149	Not valid	dBm
RSRP_8	-149≤ SS-RSRP<-148	Not valid	dBm
RSRP_9	-148≤ SS-RSRP<-147	Not valid	dBm
RSRP_10	-147≤ SS-RSRP<-146	Not valid	dBm
RSRP_11	-146≤ SS-RSRP<-145	Not valid	dBm
RSRP_12	-145≤ SS-RSRP<-144	Not valid	dBm
RSRP_13	-144≤ SS-RSRP<-143	Not valid	dBm
RSRP_14	-143≤ SS-RSRP<-142	Not valid	dBm
RSRP_15	-142≤ SS-RSRP<-141	Not valid	dBm
RSRP_16	-141≤ SS-RSRP<-140	RSRP<-140	dBm
RSRP_17	-140≤ SS-RSRP<-139	-140≤RSRP<-139	dBm
RSRP_18	-139≤ SS-RSRP<-138	-139≤ RSRP<-138	dBm
•••			
RSRP_111	-46≤ SS-RSRP<-45	-46≤ RSRP<-45	dBm
RSRP_112	-45≤ SS-RSRP<-44	-45≤ RSRP<-44	dBm
RSRP_113	-44≤ SS-RSRP<-43	-44≤ RSRP	dBm
RSRP_114	-43≤ SS-RSRP<-42	Not valid	dBm
RSRP_115	-42≤ SS-RSRP<-41	Not valid	dBm
RSRP_116	-41≤ SS-RSRP<-40	Not valid	dBm
RSRP_117	-40≤ SS-RSRP<-39	Not valid	dBm
RSRP_118	-39≤ SS-RSRP<-38	Not valid	dBm
RSRP_119	-38≤ SS-RSRP<-37	Not valid	dBm
RSRP_120	-37≤ SS-RSRP<-36	Not valid	dBm
RSRP_121	-36≤ SS-RSRP<-35	Not valid	dBm
RSRP_122	-35≤ SS-RSRP<-34	Not valid	dBm
RSRP_123	-34≤ SS-RSRP<-33	Not valid	dBm
RSRP_124	-33≤ SS-RSRP<-32	Not valid	dBm
RSRP_125	-32≤ SS-RSRP<-31	Not valid	dBm
RSRP_126	-31≤ SS-RSRP	Not valid	dBm
RSRP_127 (Note)	Infinity	Infinity	dBm

ote: The value of RSRP_127 is applicable for RSRP threshold configured by the network as defined in TS 38.331 [2], but not for the purpose of measurement reporting.

Table 10.1.6.1-2: Differential SS-RSRP and CSI-RSRP measurement (for L1 reporting) report mapping

Reported value	Measured quantity value (difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0 ≥ △ RSRP>-2	dB
DIFFRSRP_1	-2≥ ∆ RSRP>-4	dB
DIFFRSRP_2	-4≥ ∆ RSRP>-6	dB
DIFFRSRP_3	-6≥ ∆ RSRP>-8	dB
DIFFRSRP_4	-8≥ ∆ RSRP>-10	dB
DIFFRSRP_5	-10 ≥ ∆ RSRP>-12	dB
DIFFRSRP_6	-12≥ ∆ RSRP>-14	dB
DIFFRSRP_7	-14≥ ∆ RSRP>-16	dB
DIFFRSRP_8	-16 ≥ ∆ RSRP>-18	dB
DIFFRSRP_9	-18 ≥ ∆ RSRP>-20	dB
DIFFRSRP_10	-20 ≥ ∆ RSRP>-22	dB
DIFFRSRP_11	-22≥ ∆ RSRP>-24	dB
DIFFRSRP_12	-24≥ ∆ RSRP>-26	dB
DIFFRSRP_13	-26≥ ∆ RSRP>-28	dB
DIFFRSRP_14	-28 ≥ ∆ RSRP>-30	dB
DIFFRSRP_15	-30 ≥ ∆ RSRP	dB

10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.7.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.7.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

Accı	ıracy	Conditions							
Normal	Extreme	SSB	lo Note 1 range						
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum Io		
		dB		dBm /	SCS _{SSB}				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BWchannel		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2.5	±4	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
		NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

10.1.8 Intra-frequency RSRQ accuracy requirements for FR2

10.1.8.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

10.1.8.1.1 Absolute SS-RSRQ Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.8.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

Table 10.1.8.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

Acc	uracy		Conditions						
Normal	Extreme	SSB		lo ^{Note 2} rang	е				
condition	condition	Ês/lot		num lo	Maximum Io				
			dBm / SC	S _{SSB} Note 1					
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz		dBm/BW _{Channel}				
±2.5	±4	≽-3	Same value as SS B.2.2-2, according	to UE Power	-50				
±3.5	±4	≥-6	class, operating baarrival	and and angle of	-50				
	Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.								
Note 3:	n the test cases	s, the SSB Ês/		meters may need to	be adjusted to ensure				

10.1.9 Inter-frequency RSRQ accuracy requirements for FR1

10.1.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

10.1.9.1.1 Aboslute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.9.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.9.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

Accı	ıracy	Conditions						
Normal	Extreme	SSB	lo Note 1 range					
condition	condition	Ês/lot	NR operating band groups Note 3		Minimum	lo	Maximum lo	
		dB		dBm /	SCS _{SSB}			
dB	dB dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BWchannel	dBm/BW _{Channel}	
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±2.5	±4	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3.5	<u>±</u> 4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2	

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.9.1.2 Relative Accuracy of SS-RSRQ in FR1

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR1 compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.9.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27 dB$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.9.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

Accı	ıracy	Conditions						
Normal	Extreme	SSB		lo ^{Note 1} range				
condition	condition	Ês/lot Note 2	NR operating band groups Note 4	Minimum Io			Maximum lo	
		dB		dBm /	SCS _{SSB}			
dB	dB dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3	±4	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.10 Inter-frequency RSRQ accuracy requirements for FR2

10.1.10.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

10.1.10.1.1 Aboslute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.10.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.10.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

Acc	uracy		Conditions				
Normal	Extreme	SSB		lo ^{Note 2} rang	je		
condition	condition	Ês/lot	Minim	num lo	Maximum Io		
			dBm / SC	S _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±2.5	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50		
±3.5	±4	≥-4	class, operating baarrival	and and angle of	-50		
Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.							
Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.							
Note 3: In	the test cases	s, the SSB Ês/		meters may need to	be adjusted to ensure		

10.1.10.1.2 Relative Accuracy of SS-RSRQ in FR2

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR2 compared to the RSRP measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.10.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.10.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2

Acc	uracy			Conditions		
Normal	Extreme	SSB		lo ^{Note 2} rang	е	
condition	condition	Ês/lot	Minim	num lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±3	±4	≥-3	Same value as SS B.2.2-2, according	to UE Power	-50	
±4	±4	≥-4	class, operating band and angle of arrival		-30	
					auses 7.3.2 and 7.3.4 of	
T	S 38.101-2 [19]. Applicable s	side condition select	ed depending on an	gle of arrival.	
Note 2: Id	specified at th	ne Reference p	point, and assumed	to have constant EP	RE across the bandwidth.	
Note 3: T	he parameter S	SSB Ês/lot is t	he minimum SSB Ê	s/lot of the pair of ce	lls to which the	
re	equirement app	olies.		•		
	· · · · · · · · · · · · · · · · · · ·					
			e the value defined		,	
				-		

10.1.11 RSRQ report mapping

10.1.11.1 SS-RSRQ measurement report mapping

The reporting range of SS-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-1: SS-RSRQ measurement report mapping

Reported value	Measured quantity value	Unit
SS-RSRQ_0	SS-RSRQ<-43	dB
SS-RSRQ_1	-43≤ SS-RSRQ<-42.5	dB
SS-RSRQ_2	-42.5≤ SS-RSRQ<-42	dB
SS-RSRQ_3	-42≤ SS-RSRQ<-41.5	dB
SS-RSRQ_4	-41.5≤ SS-RSRQ<-41	dB
SS-RSRQ_122	17.5≤ SS-RSRQ<18	dB
SS-RSRQ_123	18≤ SS-RSRQ<18.5	dB
SS-RSRQ_124	18.5≤ SS-RSRQ<19	dB
SS-RSRQ_125	19≤ SS-RSRQ<19.5	dB
SS-RSRQ_126	19.5≤ SS-RSRQ<20	dB
SS-RSRQ_127	20 ≤ SS-RSRQ	dB

10.1.12 Intra-frequency SINR accuracy requirements for FR1

10.1.12.1 Intra-frequency SS-SINR accuracy requirements in FR1

10.1.12.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.12.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.

Table 10.1.12.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

Accı	ıracy		Conditions							
Normal	Extreme	SSB	lo Note 1 range							
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum	lo	Maximum Io			
		dB		dBm /	SCS _{SSB}					
dB dB				SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}			
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50				
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50			
			NR_TDD_FR1_C	-120	-117	N/A	-50			
±3.0	±4	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50			
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50			
			NR_FDD_FR1_G	-118	-115	N/A	-50			
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50			
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2			

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

10.1.13 Intra-frequency SINR accuracy requirements for FR2

10.1.13.1 Intra-frequency SS-SINR accuracy requirements in FR2

10.1.13.1.1 Absolute SS-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.13.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

Table 10.1.13.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2

Acc	curacy	Conditions				
Normal	Extreme	SSB		je		
condition	condition	Ês/lot	Minim	ium lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1		
dB				SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±3	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50	
±3.5	±4	≥-6			-50	
					lauses 7.3.2 and 7.3.4 of	
			side condition select			
					PRE across the bandwidth.	
	Ês/lot at UE baseband is above the value defined in this table.					
Note 4:	The requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.			

10.1.14 Inter-frequency SINR accuracy requirements for FR1

10.1.14.1 Inter-frequency SS-SINR accuracy requirements in FR1

10.1.14.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.14.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

Table 10.1.14.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

Accı	ıracy		Conditions						
Normal	Evtromo	SSB		lo ^l	lo ^{Note 1} range				
condition	II Extreme Fs/lot NR operating hand		lo	Maximum lo					
		dB		dBm /	SCS _{SSB}				
dB dB				SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50			
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3.0	±4	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	<u>±</u> 4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.14.1.2 Relative Accuracy of SS-SINR in FR1

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR1 compared to the SS-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.14.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \leq 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.14.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

Accı	uracy	Conditions						
Normal	Extreme	SSB		lo ^{Note 1} range				
condition	condition	Ês/lot Note 2,4	NR operating band groups Note 5				Maximum lo	
		dB		dBm/S	dBm / SCS _{SSB}			
dB	dB dB			SCS _{SSB} = 120 kHz	SCS _{SSB} = 240 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: The requirements apply for SSB Ês/lot ≤ 25 dB.
- NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.15 Inter-frequency SINR accuracy requirements for FR2

10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2

Acc	uracy		Conditions				
Normal	Extreme	SSB		lo ^{Note 2} rang	je		
condition	condition	Ês/lot		ium lo	Maximum Io		
			dBm / SC	Sss Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±3	<u>±</u> 4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50		
±3.5	±4	≥-4			-50		
					lauses 7.3.2 and 7.3.4 of		
			side condition select				
					PRE across the bandwidth.		
	3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure						
	Ês/lot at UE baseband is above the value defined in this table.						
Note 4: T	he requiremen	ts apply for SS	SB \hat{E} s/lot \leq 25 dB.				

10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR2 compared to the SS-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 dB$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.2-1: SS-SINR Inter frequency relative accuracy in FR2

/laximum lo						
3m/BW _{Channel}						
-50						
-50						
3.2 and 7.3.4 of						
ival.						
ss the bandwidth.						
ich the						
ted to ensure						
Ês/lot at UE baseband is above the value defined in this table. Note 5: The requirements apply for SSB Ês/lot ≤ 25 dB.						

10.1.16 SINR report mapping

10.1.16.1 SS-SINR measurement report mapping

The reporting range of SS-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR measurement report mapping

Reported value	Measured quantity value	Unit
SS-SINR_0	SS-SINR<-23	dB
SS-SINR_1	-23≤ SS-SINR<-22.5	dB
SS-SINR_2	-22.5≤ SS-SINR<-22	dB
SS-SINR_3	-22≤ SS-SINR<-21.5	dB
SS-SINR_4	-21.5≤ SS-SINR<-21	dB
SS-SINR_123	38≤ SS-SINR<38.5	dB
SS-SINR_124	38.5≤ SS-SINR<39	dB
SS-SINR_125	39≤ SS-SINR<39.5	dB
SS-SINR_126	39.5≤ SS-SINR<40	dB
SS-SINR_127	40≤ SS-SINR	dB

10.1.17 Power Headroom

10.1.17.1 Power Headroom Report

10.1.17.1.1 Power Headroom Report Mapping

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Table 10.1.17.1-1: Power headroom report mapping

Reported value	Measured quantity value (dB)		
POWER_HEADROOM_0	PH < -32		
POWER_HEADROOM_1	-32 ≤ PH < -31		
POWER_HEADROOM_2	-31 ≤ PH < -30		
POWER_HEADROOM_3	-30 ≤ PH < -29		
POWER_HEADROOM_53	20 ≤ PH < 21		
POWER_HEADROOM_54	21 ≤ PH < 22		
POWER_HEADROOM_55	22 ≤ PH < 24		
POWER_HEADROOM_56	24 ≤ PH < 26		
POWER_HEADROOM_57	26 ≤ PH < 28		
POWER_HEADROOM_58	28 ≤ PH < 30		
POWER_HEADROOM_59	30 ≤ PH < 32		
POWER_HEADROOM_60	32 ≤ PH < 34		
POWER_HEADROOM_61	34 ≤ PH < 36		
POWER_HEADROOM_62	36 ≤ PH < 38		
POWER_HEADROOM_63	PH ≥ 38		

10.1.18 PCMAX,c,f

The UE is required to report the UE configured maximum output power $(P_{CMAX,c,f})$ together with the power headroom. This clause defines the requirements for the $P_{CMAX,c,f}$ reporting.

10.1.18.1 Report Mapping

The $P_{CMAX,c,f}$ reporting range is defined from -29 dBm to 33 dBm with 1 dB resolution. Table 10.1.18.1-1 defines the reporting mapping.

Table 10.1.18.1-1 Mapping of P_{CMAX,c.f}

Reported value	Measured quantity value	Unit
PCMAX_C_00	P _{CMAX,c,f} < -29	dBm
PCMAX_C_01	$-29 \le P_{CMAX,c,f} < -28$	dBm
PCMAX_C_02	$-28 \le P_{CMAX,c,f} < -27$	dBm
PCMAX_C_61	$31 \le P_{CMAX,c,f} < 32$	dBm
PCMAX_C_62	$32 \le P_{CMAX,c,f} < 33$	dBm
PCMAX_C_63	33 ≤ P _{CMAX,c,f}	dBm

10.1.19 L1-RSRP accuracy requirements for FR1

10.1.19.1 SSB based L1-RSRP accuracy requirements

10.1.19.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

Accuracy				Condi			
Normal	Extreme	SSB		lo ^{Note 1} range			
condition	condition	Ês/lot	NR operating band groups Note 2		Minimum	lo	Maximum lo
		dB		dBm /	SCS _{SSB}		
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70
		±9.5 ≥-3dB	NR_TDD_FR1_C	-120	-117	N/A	-70
±5.0	±9.5		NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70
			NR_FDD_FR1_G	-118	-115	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.19.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.2-1: SSB based L1-RSRP relative accuracy in FR1

Accuracy				Condit				
Normal	Extreme	SSB	SSB Io Note 1 range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 4		Minimum Io			
				dBm /	SCS _{SSB}			
dB	dB	dB		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of SSBs to which the requirement applies.

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2..

10.1.19.2 CSI-RS based L1-RSRP accuracy requirements

10.1.19.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.1-1.

Table 10.1.19.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR1

Accuracy					Condition			
Normal	Extreme	CSI-			lo ^{Note}			
condition	condition	RS Ês/lot	NR operating band groups ^{Note 2}		Mi	nimum lo		Maximum Io
				dB	m / SCS _{CS}	il-RS		
dB	dB	dB		SCS _{CSI-} RS = 15 kHz	SCS _{CSI-} RS = 30 kHz	SCS _{CSI-} RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-70
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-70
			NR_TDD_FR1_C	-120	-117	-114	N/A	-70
±5.0	±9.5	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-70
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-70
			NR_FDD_FR1_G	-118	-115	-112	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-70
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	N/A	-70	-50

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

Table 10.1.19.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR1

Accuracy					Condition			
		CSI-						
Normal condition	Extreme condition	RS Ês/lot Note 2	NR operating band groups Note 4		Minimum Io			Maximum Io
		dB		dB	m / SCScs	SI-RS		
dB	dB			SCS _{CSI-} RS = 15 kHz	SCScsi- RS = 30 kHz	SCScsi- RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-50
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	-114	N/A	-50
±3	±4	≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-50
			NR_FDD_FR1_G	-118	-115	-112	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-50

NOTE 2: The parameter CSI-RS Ês/lot is the minimum CSI-RS Ês/lot of the pair of CSI-RS resources to which the requirement applies.

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.20 L1-RSRP accuracy requirements for FR2

10.1.20.1 SSB based L1-RSRP accuracy requirements

10.1.20.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.1-1: SSB based L1-RSRP absolute accuracy in FR2

ſ	Accu	ıracy	Conditions				
ĺ	Normal	Extreme	SSB	lo ^{Note 1} range			
	condition	condition	Ês/lot		Minimum Io		
ĺ				dBm / SCS _{SSB} Note 2			
	dB	dB	dB			dBm/BW _{Channel}	dBm/BW _{Channel}

±6.5	±9.5	≥-3	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	N/A	-70
±8.5	±11.5	≥-3	N/A	-70	-50

NOTE 1: lo specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.20.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.2-1: SSB based L1-RSRP relative accuracy in FR2

Acc	uracy		Conditions				
Normal	Extreme	SSB		lo Note 1 rang	е		
condition	condition	Ês/lot	Minim	um lo	Maximum Io		
			dBm / SC	Sss Note 3			
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}		
			120kHz	240kHz			
			Same value a	s SSB_RP in			
			Table B.2.4.1	-2, according			
±6.5	±9.5	≥-3	to UE Po	wer class,	-50		
			operating ba	nd and angle			
				rival			
	•		ce point, and as	sumed to have	constant EPRE		
	across the ba			•			
				SSB Es/lot of	the pair of SSBs		
	to which the r						
	NOTE 3: Values based on Refsens and EIS spherical coverage as defined in						
		and 7.3.4 of TS 38.101-2 [19]. Applicable side condition					
	selected depe						
NOTE 4:	In the test cas	ses, the SSB	Es/lot and relat	ed parameters	may need to be		

adjusted to ensure Ês/lot at UE baseband is above the value defined in

10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

this table.

10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.

- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.1-1.

Table 10.1.20.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR2

Accı	ıracy		Conditions					
Normal	Extreme	CSI-RS		lo ^{Note 1} range				
condition	condition	Ês/lot		Minimum	lo	Maximum lo		
			dBm / SCS	Scsi-Rs Note 2				
dB	dB	dB	SCScsi-RS SCScsi-RS = 60kHz = 120kHz		dBm/BW _{Channel}	dBm/BW _{Channel}		
±6.5	±9.5	≥-3	Same value as CSI- RS_RP in Table B.2.4.2- 2, according to UE Power class, operating band and angle of arrival		N/A	-70		
+8.5	+11.5	≥-3		/A	-70	-50		

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.20.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.2-1.

Table 10.1.20.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR2

Accı	Accuracy		Conditions		
Normal	Extreme	CSI-RS		е	
condition	condition	Ês/lot	Minim	ium lo	Maximum lo
			dBm/S	CS _{CSI-RS}	
dB	dB	dB	SCScsi-RS = SCScsi-RS = 120kHz		dBm/BW _{Channel}

±6.5	±9.5	≥-3	Same value as CSI-RS RP in Table B.2.4.2-2, according to UE Power class, operating band and angle of arrival	-50		
NOTE 1:	lo specified a	t the Referen	ce point, and assumed to have	constant EPRE		
	across the bandwidth.					
NOTE 2:	The parameter	er CSI-RS Ês	lot is the minimum CSI-RS Ês	lot of the pair of		
			h the requirement applies.			
NOTE 3			and EIS spherical coverage as	defined in		
INOIL 3.						
			TS 38.101-2 [19]. Applicable si	de condition		
	selected depending on angle of arrival.					
NOTE 4:	In the test cases, the CSI-RS Ês/lot and related parameters may need to					
	be adjusted to	o ensure Ês/l	ot at UE baseband is above the	e value defined in		
	this table					

10.1.21 SFTD accuracy requirements

10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell lo range conditions in FR1

	Io Note 1 range			
	NR operating band groups Note 4, 5	Minimum Io Note 2, 3 dBm/ SCSssB		Maximum lo
Parameter				
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50
	NR_FDD_FR1_B	-120.5	-117.5	-50
	NR_TDD_FR1_C	-120	-117	-50
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50
	NR_FDD_FR1_G	-118	-115	-50
	NR_FDD_FR1_H	-117.5	-114.5	-50

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The condition level is increased by ΔR_{IB,c} as defined in clause 7.3B in TS 38.101-3 [20], depending on E-UTRA NR band combination.
- NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [20], if applicable depending on E-UTRA NR band combination.
- NOTE 4: NR operating band groups are as defined in clause 3.5.
- NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [20] are applicable.

For FR2 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-2.

Table 10.1.21.1-2: PCell lo range conditions in FR2

Parameter	Minimum Io Note 2, 3		Maximum Io	
Parameter	dBm/ S	dBm/ SCS _{SSB}		
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50	
NOTE 1: lo is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.				

For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- RSRP_{|dBm} according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.
- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell lo range conditions

Doromotor	Io Note 1 range			
Parameter ——	E-UTRA operating band groups Note 3	Minimum Io	Maximum lo	
		dBm/15kHz Note 2	dBm/BW _{Channel}	
	FDD_A, TDD_A	-121	-50	
	FDD_C, TDD_C	-120	-50	
	FDD_D	-119.5	-50	
Conditions	FDD_E, TDD_E	-119	-50	
	FDD_F	-118.5	-50	
	FDD_G	-118	-50	
	FDD_H	-117.5	-50	
	FDD_N	-114.5	-50	

NOTE 1: When in dBm/15kHz, the minimum lo condition is expressed as the average lo per RE over all REs in that symbol. Io may be different in different symbols within a subframe.

NOTE 2: The condition level is increased by Δ>0, when applicable, as described in clauses B.4.2 and B.4.3 in TS36.133 [15].

NOTE 3: E-UTRA operating band groups are as defined in clause 3.5 in TS 36.133 [15].

Table 10.1.21.1-4: SFTD measurement accuracy

	Conditions		
Accuracy	Ês/lot Note 2	Frequency range	
Ts Note 1	dB		
40*64*Tc	> 0 AD	FR1	
40*64*Tc	≥-3 dB	FR2	

NOTE 1: To is the basic timing unit defined in TS 38.211 [6].

NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies.

10.1.21.2 SFTD acuracy requirements for NR-DC

The SFN and frame timing difference (SFTD) is measured between PCell in FR1 and PSCell in FR2 under NR dual connectivity.

The accuracy requirements in Table 10.1.21.2-3 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-1.

Table 10.1.21.2-1: PCell lo range conditions in FR1

	Io Note 1 range			
	NR operating band groups Note 2	Minimum Io		Maximum Io
Parameter		dBm/ SCS _{SSB}		
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50
	NR_FDD_FR1_B	-120.5	-117.5	-50
	NR_TDD_FR1_C	-120	-117	-50
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50
	NR_FDD_FR1_G	-118	-115	-50
	NR_FDD_FR1_H	-117.5	-114.5	-50

NOTE 1: Io is assumed to have constant EPRE across the bandwidth. NOTE 2: NR operating band groups are as defined in clause 3.5.2.

For FR2 PSCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.2-2: PSCell lo range conditions in FR2

	lo ^{Note 1} range			
Parameter	Minimum Io Note 2, 3		Maximum Io	
Parameter	dBm/ SCS _{SSB}		dBm/BWchannel	
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	GBIII/B VV Channel	
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50	

NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

Table 10.1.21.2-3: SFTD measurement accuracy

	Conditions		
Accuracy	Ês/lot Note 2	Frequency range	
Ts Note 1	dB		
40*64*Tc	≥ -3 dB	Between FR1 and FR2	
NOTE 1: Tc is the basic timir	ng unit defined in TS 38.2	11 [6].	
NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the			
requirement applies	S.		

10.1.21.3 Inter frequency SFTD acuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and inter-frequency neighbour cell.

The accuracy requirements in Table 10.1.21.3-3 are applicable under the following conditions:

For FR1 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-1.

Table 10.1.21.3-1: PCell, inter frequency neighbour cell lo range conditions in FR1

Parameter NR	operating band groups Note 2	Minim	um lo	
Parameter		141111111	iuiii io	Maximum Io
		dBm/ S	dBm/ SCS _{SSB}	
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}
NR_	FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50
	NR_FDD_FR1_B	-120.5	-117.5	-50
	NR_TDD_FR1_C	-120	-117	-50
Conditions NR_	FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50
NR_	FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50
	NR_FDD_FR1_G	-118	-115	-50
	NR_FDD_FR1_H	-117.5	-114.5	-50

For FR2 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.3-2: PCell, inter frequency neighbour cell lo range conditions in FR2

	lo ^{Note 1} range			
Donomoton	Minimum Io Note 2, 3 dBm/ SCSssB SCSssB = 15 kHz SCSssB = 30 kHz		Maximum Io	
Parameter -			dD/DW	
			dBm/BW _{Channel}	
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50	
NOTE 2: Va 2 [NOTE 3: In	llues based on Refsens and EIS spherica 19]. Applicable side condition selected de	d parameters may need to be adjusted to	id 7.3.4 of TS 38.101-	

Table 10.1.21.3-3: Inter frequency SFTD measurement accuracy

	Conditions		
Accuracy	Ês/lot Note 2	Frequency range	
Ts Note 1	dB		
40*64*Tc	≥ -3 dB	FR1, FR2	
NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].			
NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the			
requirement applies.			

10.2 E-UTRAN measurements

10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC or NE-DC operation mode.

The requirements in clause 10.2 are applicable for a UE:

- in RRC_CONNECTED state
- performing measurements with appropriate measurement gaps according to clause 9.1.2.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The reporting range and mapping specified for RSRQ measurements in clause 9.1.7 of TS 36.133 [15] shall apply.

10.2.4 E-UTRAN RSTD measurements

The requirements in this clause are valid for UE supporting this capability.

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR — E-UTRAN FDD and inter-RAT NR — E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

The reporting range and mapping for E-UTRA RS-SINR measurements shall be the same as specified for RS-SINR measurements in clause 9.1.17.1 of TS 36.133 [15].

11 Void

Annex A (normative): Test Cases

A.1 Purpose of annex

A.2 Requirement classification for statistical testing

Requirements in this specification are either expressed as absolute requirements with a single value stating the requirement, or expressed as a success rate. There are no provisions for the statistical variations that will occur when the parameter is tested.

Annex A outlines the tests in more detail and lists the test parameters needed. The test will result in an outcome of a test variable value for the device under test (DUT) inside or outside the test limit. Overall, the probability of a "good" DUT being inside the test limit(s) and the probability of a "bad" DUT being outside the test limit(s) should be as high as possible. For this reason, when selecting the test variable and the test limit(s), the statistical nature of the test is accounted for.

The statistical nature depends on the type of requirement. Some have large statistical variations, while others are not statistical in nature at all. When testing a parameter with a statistical nature, a confidence level is set. This establishes the probability that a DUT passing the test actually meets the requirements and determines how many times a test has to be repeated and what the pass and fail criteria are. Those aspects are not covered by TS 38.133. The details of the tests on how many times to run it and how to establish confidence in the tests are described in TS 38.533 [5]. This Annex establishes the variable to be used in the test and whether it can be viewed as statistical in nature or not.

A.2.1 Types of requirements in TS 38.133

A.2.1.1 Time and delay requirements on UE higher layer actions

A very large part of the RRM requirements are delay requirements:

- In RRC_IDLE state mobility (clause A.6.1 and A.7.1) there is cell re-selection delay.
- In RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6) there is handover delay, cell search delay and measurement reporting delay.
- In RRC Connection Control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2) there is RRC re-establishment delay.

All have in common that the UE is required to perform an action observable in higher layers (e.g. camp on the correct cell) within a certain time after a specific event (e.g. when a new strong pilot or reference signal appears). The delay time is statistical in nature for several reasons, among others that several of the measurements are performed by the UE in a fading radio environment.

The variations make a strict limit unsuitable for a test. Instead there is a condition set for a correct action by the UE, e.g. that the UE shall camp on the correct cell within X seconds. Then the rate of correct events is observed during repeated tests and a limit is set on the rate of correct events, usually 90% correct events are required. How the limit is applied in the test depends on the confidence required, further detailed are in TS 38.533 [5].

A.2.1.2 Measurements of power levels, relative powers and time

A very large number of requirements are on measurements that the UE performs:

- In RRC_CONNECTED state mobility (clauses A.4.3, A.5.3, A.6.3 and A.7.3) there are measurement reports.

- In Measurement Performance Requirements (clauses A.4.7, A.5.7, A.6.7 and A.7.7) there are requirements for all type of measurements.

The accuracy requirements on measurements are expressed in this specification as a fixed limit (e.g. +/-X dB), but the measurement error will have a distribution that is not easily confined in fixed limits. Assuming a Gaussian distribution of the error, the limits will have to be set at +/-3.29 σ if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

A.2.1.3 Implementation requirements

A few requirements are strict actions the UE should take or capabilities the UE should have, without any allowance for deviations. These requirements are absolute and should be tested as such. Examples are:

- "Event triggered report rate" in RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6)
- "Correct behaviour at time-out" in RRC connection control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2)

A.2.1.4 Physical layer timing requirements

There are requirements on Timing (clauses A.4.4, A.5.4, A.6.4 and A.7.4). There are both absolute and relative limits on timing accuracy depending upon the type of requirement. Examples are:

- Initial Transmit Timing (clauses A.4.4.1, A.5.4.1, A.6.4.1 and A.7.4.1) has an absolute limit on timing accuracy.
- Timing Advance (clauses A.4.4.2, A.5.4.2, A.6.4.2 and A.7.4.2) has a relative limit on timing accuracy.

A.3 RRM test configurations

A.3.1 Reference measurement channels

A.3.1.1 PDSCH

A.3.1.1.1 FDD

Table A.3.1.1.1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit			Value		
Reference channel		SR.1.1 FDD				
Channel bandwidth	MHz	Defined in test case				
Number of transmitter antennas		1				
Allocated resource blocks for PDSCH Note 1		24				
Allocated slots per Radio Frame		10				
Radio frame containing SSB	slots	Note 5				
Radio frame not containing SSB	slots	10				
MCS index		4				
Modulation		QPSK				
Target Coding Rate		1/3				
Number of control symbols		2				
PDSCH mapping type		Type A				
Information Bit Payload						
For slots with RMSI Note 2	bits	1608				
For slots without RMSI	bits	1864				
Number of Code Blocks per slot		1				
Binary Channel Bits Per slot						
For slots with RMSI Note 2, Note 4	bits	5184				
For slots without RMSI	bits	6048				

Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.

Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.

Note 2: PDSCH is scheduled on the slots with RMSI.

Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].

Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.

A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit	Value							
Reference channel		SR.1.1	SR.1.2						
		TDD	TDD						
Channel bandwidth	MHz	Defined in	Defined						
		test case	in test						
			case						
Number of transmitter		1	1						
antennas									
Allocated resource blocks		24	24						
for PDSCH Note 1									
Allocated slots per Radio									
Frame									
Radio frame containing	slots	Note 5	Note 5						
SSB									
Radio frame not	slots	4	6						
containing SSB									
MCS table		64QAM	64QAM						
MCS index		4	4						
Modulation		QPSK	QPSK						
Target Coding Rate		1/3	1/3						
Number of control symbols		2	2						
PDSCH mapping type		Type A	Type A						
Information Bit Payload									
For slots with RMSI Note 2	bits	1608	1608						
For slots without RMSI	bits	1864	1864						
For special slots	bits	N/A	1128						
Number of Code Blocks		1	1						
per slot									
Binary Channel Bits Per			_						
slot									
For slots with RMSI Note 2,	bits	5184	5184						
Note 4									
For slots without RMSI	bits	6048	6048						
Note 6									
For special slots Note 6	bits	-	3744	recourse blocks which do not everlap with the recourse					

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.

Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for SCS=30kHz

Parameter	Unit	t Value							
Reference channel		SR.2.1 TDD							
Channel bandwidth	MHz	Defined in test case							
Number of transmitter antennas		1							
Allocated resource blocks for PDSCH Note 1		24							
Allocated slots per Radio Frame									
Radio frame containing SSB	slots	Note 5							
Radio frame not containing SSB	slots	10							
MCS table		64QAM							
MCS index		4							
Modulation		QPSK							
Target Coding Rate		1/3							
Number of control symbols		2							
PDSCH mapping type		Type A							
Information Bit Payload									
For slots with RMSI Note 2	bits	1608							
For slots without RMSI	bits	1864							
Number of Code Blocks per slot		1							
Binary Channel Bits Per slot									
For slots with RMSI Note 2, Note 4	bits	6048							

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.

Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for SCS=120kHz

Parameter	Unit				Value
Reference channel		SR.3.1	SR.3.2	SR.3.3	
		TDD	TDD	TDD	
Channel bandwidth	MHz	100	100	100	
Number of transmitter		1	1	1	
antennas					
Allocated resource blocks for PDSCH		24 Note 1	24 ^{Note 7}	48 ^{Note 7}	
Allocated slots per Radio					
Frame					
Radio frame containing SSB	slots	Note 5	Note 5	Note 5	
Radio frame not	slots	48	48	48	
containing SSB					
MCS table		64QAM	64QAM	64QAM	
MCS index		4	4	4	
Modulation		QPSK	QPSK	QPSK	
Target Coding Rate		1/3	1/3	1/3	
Number of control symbols		2	2	2	
PDSCH mapping type		Type A	Type A	Type A	
Information Bit Payload					
For slots with RMSI	bits	1608	1608	3104	
For slots without RMSI	bits	1864	1864	3624	
Number of Code Blocks		1	1	1	
per slot					
Binary Channel Bits Per slot					
For slots with RMSI Note 4	bits	5184	5184	10368	
For slots without RMSI	bits	6048	6048	12096	

- Note 1: Allocated in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block
- Note 2: Void
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 7: Allocated in the same resource blocks as the CORESET.
- Note 8: When DRX is configured, PDSCH is scheduled only while *drx-onDurationTimer* is running, unless otherwise specified in the test case.

A.3.1.2 CORESET for RMSI scheduling

A.3.1.2.1 FDD

Table A.3.1.2.1-1: RMSI CORESET Reference Channel for FDD with SCS=15KHz

Parameter	Unit		Value
Reference channel		CR.1.1 FDD	
Channel bandwidth	MHz	Defined in test case	
Subcarrier spacing for RMSI CORESET	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
Subcarrier spacing for SSB	kHz	15	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

Note 1: DCI formats are defined in TS 38.212.

Note 2: DCI format shall depend upon the test configuration.

Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.

Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].

Note 5: Cell ID shall depend upon the test configuration.

Note 6: Payload size shall depend upon the test configuration.

Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3]

Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.2.2 TDD

Table A.3.1.2.2-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz

Parameter	Unit		Value		
Reference channel		CR.1.1 TDD			
Channel bandwidth	MHz	Defined in test case			
Subcarrier spacing	kHz	15			
Allocated resource blocks for RMSI CORESET Note 7		24			
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1			
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)			
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4			
Number of transmitter antennas		1			
Duration of RMSI CORESET Note 7	symbols	2			
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder granularity		6			
REG bundle size		6			
Mapping from REG to CCE		Distributed			
Cell ID		Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

Parameter	Unit		•	Value	
Reference channel		CR.2.1 TDD			
Channel bandwidth	MHz	Defined in test case			
Subcarrier spacing	kHz	30			
Allocated resource blocks for RMSI CORESET Note 7		24			
SSB and RMSI CORESET multiplexing configuration		Pattern 1			
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)			
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4			
Number of transmitter antennas		1			
Duration of RMSI CORESET Note 7	symbols	2			
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder granularity		6			
REG bundle size		6			
Mapping from REG to CCE		Distributed			
Cell ID		Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

Parameter	Unit			Value
Reference channel		CR.3.1 TDD	CR.3.2 TDD	
Channel bandwidth	MHz	100	100	
Subcarrier spacing	kHz	120	120	
Allocated resource blocks for RMSI CORESET		24 Note 7	48 Note 9	
SSB and RMSI CORESET multiplexing configuration		Pattern 1 Note 7	Pattern 1 Note 9	
Offset between SSB and RMSI CORESET Note 3	RB	0 (Note 8) Note 7	0 (Note 8) Note 9	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	Index 4	
Number of transmitter antennas		1	1	
Duration of RMSI CORESET	symbols	2 Note 7	2 Note 9	
DCI Format Note 1		Note 2	Note 2	
Aggregation level	CCE	8	8	
DMRS precoder granularity		6	6	
REG bundle size		6	6	
Mapping from REG to CCE		Distributed	Distributed	
Cell ID		Note 5	Note 5	
Payload (without CRC)	bits	Note 6	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-12 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-8 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.
- Note 9: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 2 in Table 13-10 in TS 38.213 [3].

A.3.1.3 CORESET for RMC scheduling

A.3.1.3.1 FDD

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

Parameter	Unit			Valu	е		
Reference channel		CCR.1.1 FDD	CCR.1.2 FDD	CCR.1.3 FDD	CCR.1.4 FDD		
Channel bandwidth	MHz	Defined in test case	Defined in test case	Defined in test case	Defined in test case		
Subcarrier spacing	kHz	15	15	15	15		
Allocated resource blocks for CORESET Note 3		24	18	24	18		
Number of transmitter antennas		1	1	1	1		
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
DMRS precoder granularity		Same as REG bundle size	Same as REG bundle size	Same as REG bundle size	Same as REG bundle size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		
Beamforming Pre- Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

Note 3: Allocated in the resource blocks where the associated RMC is scheduled.

A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

Parameter	Unit			Valu	ie		
Reference channel		CCR.1.1	CCR.1.2	CCR.1.3	CCR.1.4		
		TDD	TDD	TDD	TDD		
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		
Subcarrier spacing	kHz	15	15	15	15		
Allocated resource		24	18	24	18		
blocks for CORESET Note 3							
Number of transmitter antennas		1	1	1	1		
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
DMRS precoder		Same as	Same as	Same as	Same as		
granularity		REG	REG	REG	REG		
-		bundle size	bundle size	bundle size	bundle size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		
Beamforming Pre-		N/A	N/A	N/A	N/A		
Coder							
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

Note 3: Allocated in the resource blocks where the associated RMC is scheduled.

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

Parameter	Unit			\	/alue		
Reference channel		CCR.2.1	CCR.2.2	CCR.2.3	CCR.2.4		
		TDD	TDD	TDD	TDD		
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		
Subcarrier spacing	kHz	30	30	30	30		
Allocated resource		24	24	18	18		
blocks for CORESET Note							
Number of transmitter		1	1	1	1		
antennas							
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
		Same as	Same as	Same as	Same as		
DMRS precoder		REG	REG	REG	REG		
granularity		bundle size	bundle	bundle	bundle		
			size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		
Beamforming Pre-Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	8	4	2		
DCI formats		Note 1	Note 1	Note 1	Note 1	·	
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

Table A.3.1.3.2-3: Control Channel RMC for TDD with SCS=120KHz

Parameter	Unit				Value			
Reference channel		CCR.3.1	CCR.3.2	CCR.3.3	CCR.3.4	CCR.3.5	CCR.3.6	CCR.3.7
		TDD	TDD	TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz	100	100	100	100	100	100	100
Subcarrier spacing	kHz	120	120	120	120	120	120	120
Allocated resource blocks for CORESET Note 3		24	24	24	24	24	24	48
Number of transmitter antennas		1	1	1	1	1	1	1
monitoringSlotPeriodicityAndOffset		sl160	sl160	sl160	sl160	sl160	sl160	sl160
Note 4		0	0	80	0	0	80	0
monitoringSymbolsWithinSlot		1100000	0011000	1100000	1100000	0011000	1100000	1100000
		0000000	0000000	0000000	0000000	0000000	0000000	0000000
Duration of CORESET	slot	1	1	1	1	1	1	1
REG bundle size		6	6	6	6	6	6	6
		Same as	Same as	Same as	Same as	Same as	Same as	Same as
DMRS precoder granularity		REG	REG	REG	REG	REG	REG	REG
Divino precoder grandianty		bundle size	bundle	bundle	bundle	bundle size	bundle size	bundle
			size	size	size			size
CCE to REG mapping		Interleaved	Interleave	Interleave	Interleave	Interleaved	Interleaved	Interleave
COL to NEO mapping			d	d	d			d
Interleave n_shift		0	0	0	0	0	0	0
Interleave size		2	2	2	2	2	2	2
Beamforming Pre-Coder		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aggregation level	CCE	4	4	4	8	8	8	4
DCI formats		Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

Note 3: Allocated in the same resource blocks where the associated PDSCH RMC is scheduled.

Note 4: monitoringSlotPeriodicityAndOffet is set to "sl1 0" if it is specifically stated that cell(s) configured with one of the control channel RMCs above shall transmit PDCCHs continuously.

A.3.1.4 TDD UL/DL configuration

Table A.3.1.4-1: TDD UL/DL configuration for SCS=15kHz

Parameter	Unit		Value	
Reference channel		TDDConf.1.1		
referenceSubcarrierSpacing	kHz	15		
TDD UL/DL pattern 1 Note 2		'DSUU' S='10DL:2GP:2UL'		
dl-UL-	ms	4		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		10		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dl-UL- TransmissionPeriodicity	ms	1		
nrofDownlinkSlots		1		
nrofDownlinkSymbols		0		
nrofUplinkSlot		0		
nrofUplinkSymbols		0		

Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

Table A.3.1.4-2: TDD UL/DL configuration for SCS=30kHz

Parameter	Unit		Value
Reference channel		TDDConf.2.1	
referenceSubcarrierSpacing	kHz	30	
TDD UL/DL pattern 1 Note 2		'3D1S4U' S='6DL:4GP:4UL'	
dl-UL-	ms	4	
TransmissionPeriodicity			
nrofDownlinkSlots		3	
nrofDownlinkSymbols		6	
nrofUplinkSlot		4	
nrofUplinkSymbols		4	
TDD UL/DL pattern 2 Note 2		'DD'	
dl-UL- TransmissionPeriodicity	ms	1	
nrofDownlinkSlots		2	
nrofDownlinkSymbols		0	
nrofUplinkSlot		0	
nrofUplinkSymbols		0	

Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

Table A.3.1.4-3: TDD UL/DL configuration for SCS=120kHz

Parameter	Unit	Value	
Reference channel		TDDConf.3.1	
referenceSubcarrierSpacing	kHz	120	
TDD UL/DL pattern 1 Note 2		'DDDSU'	
		S='10DL:2GP:2UL'	
dl-UL-	ms	0.625	
TransmissionPeriodicity			
nrofDownlinkSlots		3	
nrofDownlinkSymbols		10	
nrofUplinkSlot		1	
nrofUplinkSymbols		2	
TDD UL/DL pattern 2 Note 2		Not configured	
dl-UL-	ms	Not configured	
TransmissionPeriodicity			
nrofDownlinkSlots		Not configured	
nrofDownlinkSymbols		Not configured	
nrofUplinkSlot		Not configured	
nrofUplinkSymbols		Not configured	

Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

A.3.2 OFDMA channel noise generator (OCNG)

A.3.2.1 Generic OFDMA Channel Noise Generator (OCNG)

The OCNG pattern is used in a test for modelling allocations of unused resources in the channel bandwidth to virtual UEs (which are not under test). The OCNG pattern comprises PDCCH and PDSCH transmissions to the virtual UEs.

A.3.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

Table A.3.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the		

Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BW_{occupied} where specified in the test case.

A.3.2.1.2 OCNG pattern 2: Generic OCNG pattern for all unused REs for 2AoA setup

Table A.3.2.1.2-2: OP.2: Generic OCNG pattern for all unused REs for 2AoA setup

OCNG Parameters	Control Region	Data Region
Probe	Transmitting the serving beam	
Resource allocation	Unused REs (Note 1) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.	Unused REs (Note 2) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.

Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell.

Note 3: No OCNG is transmitted from the probe transmitting non-serving beam.

A.3.2.1.3 OCNG pattern 3: Generic OCNG pattern for unused REs in the same bandwidth as CORESET

Table A.3.2.1.3-1: OP.3: Generic OCNG pattern for unused REs in the same BW as CORESET

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.

A.3.2.1.4 OCNG pattern 4: Generic OCNG pattern for all unused REs outside SSB slot(s)

Table A.3.2.1.4-1: OP.4: Generic OCNG pattern for all unused REs outside SSB slot(s)

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

A.3.2.1.5 OCNG pattern 5: Generic OCNG pattern for unused REs in the same bandwidth as CORESET for 2AoA setup

Table A.3.2.1.5-1: OP.5: Generic OCNG pattern for unused REs in the same BW as CORESET for 2AoA setup

OCNG Parameters	Control Region	Data Region	
Probe	Transmitting the serving beam		
Resource allocation	Unused REs (Note 1) in the symbols	Unused REs (Note 2) in the symbols where	
	where SSB/CSI-RS are not	SSB/CSI-RS are not transmitted from both the	
	transmitted from both the serving	serving beam probe and non-serving beam	
	beam probe and non-serving beam	probe.	
	probe.		
Channel	PDCCH	PDSCH	
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK	
		modulated data	
Antenna transmission	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
scheme			
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
Aggregation level	Same as used in PDCCH RMC	N/A	
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
CP length Same as used in PDCCH RMC		Same as used in PDSCH RMC	
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG			
shall not be allocat	be allocated outside the allocated bandwidth of the CORESET of the serving cell.		
Note 2: REs not allocated	REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the		
allocated bandwidt	allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the		
allocated bandwidt	pandwidth of the CORESET of the serving cell.		

A.3.2.2 Void

A.3.3 Reference DRX configurations

A.3.3.1 DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms

No OCNG is transmitted from the probe transmitting non-serving beam.

Table A.3.3.1-1: DRX.1: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value	
drx-onDurationTimer	1 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
drx-LongCycleStartOffset	40 ms	
shortDRX	disable	
TimeAlignmentTimer	500 ms	
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]		

A.3.3.2 DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.2-1: DRX.2: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value	
drx-onDurationTimer	1 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
drx-LongCycleStartOffset	640 ms	
shortDRX	disable	
TimeAlignmentTimer	500 ms	
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment		
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]		

A.3.3.3 DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity

Table A.3.3.3-1: DRX.3: DRX cycle = 40 ms and time alignment timer (TAT) = Infinity

Field	Value	
drx-onDurationTimer	6 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
drx-LongCycleStartOffset	40 ms	
shortDRX	disable	
TimeAlignmentTimer Infinity		
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment		
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]		

A.3.3.4 DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity

Table A.3.3.4-1: DRX.4: DRX cycle = 160 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf2
drx-RetransmissionTimer	Psf16
longDRX-CycleStartOffset	sf160, 0
shortDRX	disable
TimeAlignmentTimer	Infinity
Note: This DRX configuration is applicable for F-I	ITRA serving cell. For further information see

Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].

A.3.3.5 DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.5-1: DRX.5: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf1920
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf320, 0
shortDRX	disable
TimeAlignmentTimer Infinity	
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].	

A.3.3.6 DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms

Table A.3.3.6-1: DRX.6: DRX cycle = 320 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	320 ms
shortDRX	disable
TimeAlignmentTimer 500 ms	
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.7 DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.7-1: DRX.7: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value	
drx-onDurationTimer	6 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
drx-LongCycleStartOffset	640 ms	
shortDRX	disable	
TimeAlignmentTimer Infinity		
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment		

timer parameters are specified in clause 6.3.2 in TS 38.331 [2]

A.3.3.8 DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.8-1: DRX.8: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value	
drx-onDurationTimer	6 ms	
drx-InactivityTimer	1 ms	
drx-RetransmissionTimerDL	1 slot	
drx-RetransmissionTimerUL	1 slot	
drx-LongCycleStartOffset	320 ms	
shortDRX	disable	
TimeAlignmentTimer Infinity		
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]		

A.3.3.9 DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.9-1: DRX.9: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf2
drx-InactivityTimer	psf2
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset	sf40, 0
shortDRX	disable
TimeAlignmentTimer 500 ms	
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	
clause 6.3.2 in TS 36.331 [16].	

A.3.3.10 DRX Configuration 10: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.10-1: DRX.10: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf2
drx-RetransmissionTimer	psf16
longDRX-CycleStartOffset sf640, 0	
shortDRX disable	
TimeAlignmentTimer 500 ms	
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see	

clause 6.3.2 in TS 36.331 [16].

A.3.3.11 DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity

Table A.3.3.11-1: DRX.11: DRX cycle = 20 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	6 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	20 ms
shortDRX	disable
TimeAlignmentTimer Infinity	
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.12 DRX Configuration 12: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.12-1: DRX.12: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value
drx-onDurationTimer	psf6
drx-InactivityTimer	psf2
drx-RetransmissionTimer psf16	
longDRX-CycleStartOffset sf640, 0	
shortDRX disable	
TimeAlignmentTimer Infinity	
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].	

A.3.4 Test Cases with Different Channel Bandwidths

A.3.4.1 Test Cases with Different E-UTRA Channel Bandwidths

A.3.4.1.1 Introduction

In Annex A test cases involving E-UTRA cell(s) may be defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement.

A.3.4.1.2 Principle of testing

If multiple test cases involving E-UTRA cell(s) are defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement that is E-UTRA channel bandwidth independent, then the UE needs to be tested with only one channel bandwidth in each E-UTRA cell and with the same bandwidth in all the E-UTRA cells used in the test case.

A.3.5 Test Cases for Synchronous and Asynchronous DC Operations

A.3.5.1 EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations

A.3.5.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for EN-DC operation in synchronous and asynchronous scenarios.

In Annex A test cases may be defined in both synchronous EN-DC and asynchronous EN-DC scenarios to verify the same type of RRM requirement.

A.3.5.1.2 Principle of Testing

If EN-DC test cases are defined in both synchronous and asynchronous EN-DC scenarios to verify the same type of RRM requirement then the UE capable of both synchronous and asynchronous EN-DC operations needs to be tested with one of the tests in either synchronous or asynchronous EN-DC scenarios.

A.3.6 Antenna configurations

A.3.6.1 Antenna configurations for FR1

Unless otherwise specified, NR FDD or NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

A.3.6.1.1 Antenna connection for 4 Rx capable UEs

A.3.6.1.1.1 Introduction

All tests in clause A.4 and A.6 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.4 or A.6 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

A.3.6.1.1.2 Principle of testing

A.3.6.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one band where 2RX is supported and 4RX is not supported, all single carrier tests specified in clause A.4 and A.6 except those in A.4.7 and A.6.7 shall be tested on any band where 2RX is supported and 4RX is not supported with the antenna connection specified in A.3.6.1.1.2.4. For single carrier tests specified in clause A.4.7 or A.6.7, all tests shall be tested with the antenna connection specified in A.3.6.1.1.2.4 for bands where 2RX is supported and 4RX is not supported, and the antenna connection specified in A.3.6.1.1.2.5 for bands where 4RX is supported.

For 4RX capable UEs which do not support any band where 2RX is supported and 4RX is not supported, all tests specified in clauses A.4 and A.6 shall be tested using the antenna connection specified in clause A.3.6.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6.1.1.2.1-1 and table A.3.6.1.1.2.1-2.

Table A.3.6.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection

Test case	SNR during T3 (dB)			
	Test 1	Test 2	Test 3	Test 4

A.4.5.1.1	-18	N/A	N/A	N/A
			· ·	-
A.4.5.1.3	-18	N/A	N/A	N/A
A.4.5.1.5	-18	N/A	N/A	N/A
A.4.5.1.7	-18	N/A	N/A	N/A
A.5.5.1.1	-18	N/A	N/A	N/A
A.5.5.1.3	-18	N/A	N/A	N/A
A.5.5.1.5	-18	N/A	N/A	N/A
A.5.5.1.7	-18	N/A	N/A	N/A
A.6.5.1.1	-18	N/A	N/A	N/A
A.6.5.1.3	-18	N/A	N/A	N/A
A.6.5.1.5	-18	N/A	N/A	N/A
A.6.5.1.7	-18	N/A	N/A	N/A
A.7.5.1.1	-18	N/A	N/A	N/A
A.7.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.5	-18	N/A	N/A	N/A
A.7.5.1.7	-18	N/A	N/A	N/A

Table A.3.6.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

Test case	SNR dur	SNR during T3 (dB)		SNR during T4 (dB)	
	Test 1	Test 2	Test 1	Test 2	
A.4.5.1.2	-18	N/A	-8	N/A	
A.4.5.1.4	-18	N/A	-8	N/A	
A.4.5.1.6	-18	N/A	-8	N/A	
A.4.5.1.8	-18	N/A	-8	N/A	
A.5.5.1.2	-18	N/A	-8	N/A	
A.5.5.1.4	-18	N/A	-8	N/A	
A.5.5.1.6	-18	N/A	-8	N/A	
A.5.5.1.8	-18	N/A	-8	N/A	
A.6.5.1.2	-18	N/A	-8	N/A	
A.6.5.1.4	-18	N/A	-8	N/A	
A.6.5.1.6	-18	N/A	-8	N/A	
A.6.5.1.8	-18	N/A	-8	N/A	
A.7.5.1.2	-18	N/A	-8	N/A	
A.7.5.1.4	-18	N/A	-8	N/A	
A.7.5.1.6	-18	N/A	-8	N/A	
A.7.5.1.8	-18	N/A	-8	N/A	

Table A.3.6.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection

Test case	SNR for RS in set q ₀ during T3, T4 and T5
	(dB)
	Test 1

A.4.5.5.1	-15
A.4.5.5.2	-15
A.4.5.5.3	-15
A.4.5.5.4	-15
A.5.5.5.1	-15
A.5.5.5.2	-15
A.5.5.5.3	-15
A.5.5.5.4	-15
A.6.5.5.1	-15
A.6.5.5.2	-15
A.6.5.5.3	-15
A.6.5.5.4	-15
A.7.5.5.1	-15
A.7.5.5.2	-15
A.7.5.5.3	-15
A.7.5.5.4	-15

A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell is on a band where 4RX is supported.

A.3.6.1.1.2.3 EN-DC tests

All EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.6 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.7 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PSCell or SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

A.3.6.1.1.2.4 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported and 4RX is not supported, it is left to the UE declaration and antenna port configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 RX ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.5 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.6.1.1.2.1 and A.3.6.1.1.2.2, no test parameters or requirements are modified.

A.3.6.1.1.2.6 EN-DC LTE Antenna connection for bands where 2RX is supported

For E-UTRAN bands where 2RX is supported and 4RX is not supported, it is left to the UE declaration and antenna port configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 RX ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.7 EN-DC LTE Antenna connection for bands where 4RX is supported

For E-UTRAN bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, the default Downlink Antenna Configuration for NR FR2 cells is 1x2.

In case of Downlink Antenna Configuration 2x2 for NR FR2 cells, unless otherwise specified, the downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.

In both cases, the downlink signal is received assuming 2 UE baseband receivers. As the UE is tested following the Blackbox Approach with regard to the UE Rx antennas, the exact UE Rx antenna configuration is not relevant for the test configuration and has no impact on the test implementation.

A.3.7 EN-DC test setup

A.3.7.1 Introduction

A.3.7.2 E-UTRAN Serving Cell Parameters

A.3.7.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

Table A.3.7.2.1-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with all NR cells in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the NR carrier. The E-UTRA serving cell shall configured to not interfere with NR operation and the E-UTRA serving cell signal power shall not be critical to the test purpose.

Table A.3.7.2.1-1: E-UTRAN cell specific test parameters for tests with all NR cells in FR1

Parameter	Unit	E-UTRAN Cell
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BWchannel		5 MHz: N _{RB,c} = 25
		10 MHz: $N_{RB,c} = 50$
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	0
PHICH_RA	dB	_
PHICH_RB	dB	_[
PDCCH_RA	dB	
PDCCH_RB	dB	

PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104
Ê _s /N _{oc}	dB	17
Ês/lot	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
lo Note5	dBm/Ch BW	-59.13+10log(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: E_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.3.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

Table A.3.7.2.2-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with one or more NR cells in FR2.

Table A.3.7.2.2-1: E-UTRAN cell specific test parameters for tests with one or more NR cells in FR2

Parameter	Unit	E-UTRAN Cell
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BWchannel	MHz	5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	0
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	

PDCCH_RA	dB
PDCCH_RB	dB
PDSCH_RA	dB
PDSCH_RB	dB
OCNG_RA ^{Note3}	dB
OCNG_RB ^{Note3}	dB

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: The E-UTRA signal is required only to ensure the E-UTRA link to the DUT in the EN-DC operation. The Test System shall provide a stable and noise-free E-UTRA signal without need of precise propagation modelling, path loss and polarization control. Further details of the E-UTRA signal configuration are not defined as part of the cell specific test parameters, since the E-UTRA link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

A.3.7A NR FR1-FR2 test setup

Some Test cases in clause A.7 have NR cells in both FR1 and FR2. Unless otherwise stated within the test, the NR FR1 Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free NR FR1 signal without need of precise propagation modelling, path loss and polarization control. Further details of the NR FR1 signal configuration are not defined as part of the cell specific test parameters, since the NR FR1 link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

A.3.7B Void

A.3.7C LTE-FR1/FR2 test setup

Some Test cases in clause A.5 have LTE and FR2 NR cells. Unless otherwise stated within the test, the LTE Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free LTE signal without need of precise propagation modelling, path loss and polarization control. Further details of the LTE signal configuration are not defined as part of the cell specific test parameters, since the LTE link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

A.3.7D NE-DC test setup

A.3.7D.1 Introduction

A.3.7D.2 E-UTRAN Serving Cell Parameters

A.3.7D.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

The parameters are same as as specified in clause A.3.7.2.1.

A.3.7D.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

The parameters are same as as specified in clause A.3.7.2.2.

A.3.8 PRACH configurations

A.3.8.1 Introduction

This clause provides the typical PRACH configurations used for RRM test cases defined in Annex A. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.8.2 PRACH configurations in FR1

A.3.8.2.1 FR1 PRACH configuration 1

FR1 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR1.

Table A.3.8.2.1-1: Parameters for FR1 PRACH configuration 1

Field	Value	Comment
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-OccasionAndCB- PreamblesPerSSB	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
ra-ContentionResolutionTimer	sf48	48 sub-frames
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].
Note: For further information s	ee clause 6.3.2 in T	S 38.331 [2].

A.3.8.2.2 FR1 PRACH configuration 2

FR1 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based non-contention based random access in FR1.

Table A.3.8.2.2-1: Parameters for FR1 PRACH configuration 2

Field	Value	Comment
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	table 6.6.6.2 6 III 16 66.211 [6].
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE doesn't use this field if is transmitting CFRA to convey BFR.
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE uses this field only if is transmitting CFRA to convey BFR
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]	

A.3.8.2.3 FR1 PRACH configuration 3

FR1 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR1.

Table A.3.8.2.3-1: Parameters for FR1 PRACH configuration 3

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, $N_{CS} = 23$	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.4 FR1 PRACH configuration 4

FR1 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR1 to convey BFR.

Table A.3.8.2.4-1: Parameters for FR1 PRACH configuration 4

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n200	Max number of RA preamble transmission performed before declaring a failure is 200	
ra-ResponseWindow	sl1	1 slot	
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 93	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3 PRACH configurations in FR2

A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR2.

Table A.3.8.3.1-1: Parameters for FR2 PRACH configuration 1

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-OccasionAndCB- PreamblesPerSSB	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions n48: 48 contention based preambles per SSB
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined in TS 38.331 [2].
ra-ContentionResolutionTimer	sf48	48 sub-frames
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS 38.321 [7].
Note: For further information s	ee clause 6.3.2 in T	S 38.331 [2].

A.3.8.3.2 FR2 PRACH configuration 2

FR2 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based non-contention based random access in FR2.

Table A.3.8.3.2-1: Parameters for FR2 PRACH configuration 2

Field	Value	Comment	
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH	
-		periodicity, and other detailed configuration	
		defined in table 6.3.3.2-4 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for	
		contention based and contention free	
		random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root	
		sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH	
. ==		occasions	
msg1-FDM	One	One PRACH transmission occasions	
	15.2	FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission	
ro Doorono (Mindow	sl10	performed before declaring a failure is 6 10 slots	
ra-ResponseWindow zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS	
Backon Parameter Index	2	38.321 [7].	
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE doesn't	
		use this field if is transmitting CFRA to	
		convey BFR.	
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't	
		use ssb-ResourceList and BFR-SSB-	
		Resource IEs at the same time. UE uses	
		this field only if is transmitting CFRA to	
		convey BFR	
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -	
		105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3.3 FR2 PRACH configuration 3

FR2 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Table A.3.8.3.3-1: Parameters for FR2 PRACH configuration 3

Field	Value	Comment	
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH	
		periodicity, and other detailed configuration	
		defined in table 6.3.3.2-4 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for	
		contention based and contention free	
		random acces	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root	
		sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH	
		occasions	
msg1-FDM	One	One PRACH transmission occasions	
		FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission	
		performed before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS	
		38.321 [7].	
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -	
	_	105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3.4 FR2 PRACH configuration 4

FR2 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR2 to convey BFR.

Table A.3.8.3.4-1: Parameters for FR2 PRACH configuration 4

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n200	Max number of RA preamble transmission
		performed before declaring a failure is 200.
ra-ResponseWindow	sl40	40 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2].

A.3.9 BWP configurations

A.3.9.1 Introduction

This clause provides the typical BWP configurations used for RRM test cases defined in Annex A. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.3. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.9.2 Downlink BWP configurations

A.3.9.2.1 Initial BWP

Table A.3.9.2.1-1: Downlink BWP patterns for initial BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		DLBWP.0.1	DLBWP.0.2	
Starting PRB index		0	RB _c Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	
Note 1: RB _c is the lowest PRB index to guarantee the BWP including CORESET #0 which is defined in Clause A.3.1.2.				

A.3.9.2.2 Dedicated BWP

Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3
Starting PRB index		0	RB _b Note 1	RBa Note 2
Bandwidth	RB	Same as RF channel defined in each test	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz
Note 1: RB _b is the lowest PRB index to guarantee the BWP not fully overlapped with SSB				
PRB index (RBJ, RBJ+1,, RBJ+19) which is defined in Clause A.3.10.				
Note 2: RB _a is the lowest PRB index to guarantee the BWP including SSB PRB index				
(RB _J , RB _{J+1} ,, RB _{J+19}) which is defined in Clause A.3.10.				

A.3.9.3 Uplink BWP configurations

A.3.9.3.1 Initial BWP

Table A.3.9.3.1-1: Uplink BWP patterns for initial BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		ULBWP.0.1	ULBWP.0.2	
Starting PRB index		0	RB _c Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	
Note 1: RBc is same as RBc for DLBWP.0.2 as defined in Table A.3.9.2.1-1.				

A.3.9.3.2 Dedicated BWP

Table A.3.9.3.2-1: Uplink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		ULBWP.1.1	ULBWP.1.2	ULBWP.1.3
Starting PRB index		0	RB _b Note 1	RBa Note 2
Bandwidth	RB	Same as RF channel defined in each test	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz
Note 1: RB _b is same as RB _b for DLBWP.1.2 as defined in Table A.3.9.2.2-1.				
Note 2: RBa is same as RBa for DLBWP.1.3 as defined in Table A.3.9.2.2-1.				

A.3.10 SSB Configurations

A.3.10.1 SSB Configurations for FR1

A.3.10.1.1 SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.1-1: SSB.1 FR1: SSB Pattern 1 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values	
Channel bandwidth	10 MHz	
SSB SCS	15 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 2 2-5		
Slot numbers containing SSB Note 2	0	
SFN containing SSB SFN mod (max(T _{SSB} ,10ms)/10ms) =		
RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)Note 1		
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS		
38.104 [13].		
Note 2: These values have been derived from other parameters for information		
purposes (as per TS 38.213 [3]). They are not settable parameters themselves		

A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.2-1: SSB.2 FR1: SSB Pattern 2 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values
Channel	bandwidth	40 MHz
SSB SCS	5	30 kHz
SSB peri	odicity (T _{SSB})	20 ms
Number of	of SSBs per SS-burst	1
	H block index	0
Symbol n	numbers containing SSB Note 3	4-7 or 2-5 Note 2
Slot num	bers containing SSB Note 3	0
SFN conf	SFN containing SSB SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numb	RB numbers containing SSB within channel BW (RBJ, RBJ+1,, RBJ+19)Note 1	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2:	Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.	
Note 3:	Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.	

A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.3-1: SSB.3 FR1: SSB Pattern 3 for SSB SCS=15 kHz in 10 MHz channel

	SSB Parameters	Valu	ies
Channel	bandwidth	10 MHz	
SSB SCS	3	15 kHz	
SSB peri	odicity (T _{SSB})	20 ms	
Number	of SSBs per SS-burst	2	
SS/PBCI	H block index	0	1
Symbol r	numbers containing SSB Note 2	2-5 8-11	
Slot num	bers containing SSB Note 2	0 0	
SFN con	taining SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numb	pers containing SSB within channel BW	/ (RBJ, RBJ+1,, RBJ+19) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.4-1: SSB.4 FR1: SSB Pattern 4 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values	
Channel b	bandwidth	40 MHz	
SSB SCS	}	30 kHz	
SSB perio	odicity (T _{SSB})	20 ms	
Number c	of SSBs per SS-burst	2	
SS/PBCH	l block index	0	1
	umbers containing SSB Note 3	4-7 or 2-5 Note 2	8-11
Slot numb	pers containing SSB Note 3	0 0	
SFN cont	aining SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numb	ers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in			
	TS 38.104 [13].		
Note 2:	Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current		
	band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is		
	chosen.		·
Note 3:	Note 3: These values have been derived from other parameters for information purposes		
	(as per TS 38.213 [3]). They are not set	table parameters the	mselves.

A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MHz

Table A.3.10.1.5-1: SSB.5 FR1: SSB Pattern 5 for SSB SCS=15 kHz in 10 MHz channel

SSB	Parameters	Values
Channel bandwidth		10 MHz
SSB SCS		15 kHz
SSB periodicity (T _{SSB}		20 ms
Number of SSBs per	SS-burst	1
SS/PBCH block index		0
Symbol numbers con		2-5
Slot numbers contain	Slot numbers containing SSB Note 2 0	
SFN containing SSB	SFN containing SSB SFN mod $(max(T_{SSB}, 10ms)/10ms) =$	
RB numbers containi	ng SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MHz

Table A.3.10.1.6-1: SSB.6 FR1: SSB Pattern 6 for SSB SCS=30 kHz in 40 MHz channel

	SSB Parameters	Values	
Channel	bandwidth	40 MHz	
SSB SCS	3	30 kHz	
SSB peri	odicity (T _{SSB})	20 ms	
Number of	of SSBs per SS-burst	1	
SS/PBCH	l block index	0	
Symbol n	numbers containing SSB Note 3	4-7 or 2-5 Note 2	
Slot num	bers containing SSB Note 3	0	
SFN cont	SFN containing SSB SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$		
RB numb	pers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1:	Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in			
	TS 38.104 [13].		
Note 2:	Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current		
	band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is		
	chosen.		
Note 3:	Note 3: These values have been derived from other parameters for information purposes		
	(as per TS 38.213 [3]). They are not set	table parameters themselves.	

A.3.10.2 SSB Configurations for FR2

A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Val	ues
Channel bandwidth	100 MHz	
SSB SCS	120 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	2	
SS/PBCH block index	0	1
Symbol numbers containing SSBs Note 2	4-7 8-11	
Slot numbers containing SSB Note 2	0 0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from other parameters for information purposes (as		
per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity (T _{SSB})	20 ms		
Number of SSBs per SS-burst	2		
SS/PBCH block index	0	1	
Symbol numbers containing SSBs Note 2	8-11	12-13	0-1
Slot numbers containing SSB Note 2	0	0	1
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSBs within channel BW			
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.3-1: SSB.3 FR2: SSB Pattern 3 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	120 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2	4-7	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	240 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2 8-11		
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+39)Note 1		
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: These values have been derived from other parameters for information purposes (as		
per TS 38.213 [3]). They are not settable	e parameters themselves.	

A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Val	ues	
Channel bandwidth	100 MHz		
SSB SCS	120 kHz		
SSB periodicity (T _{SSB})	20 ms		
Number of SSBs per SS-burst	2		
SS/PBCH block index	2	3	
Symbol numbers containing SSBs Note 2	2-5	6-9	
Slot numbers containing SSB Note 2	1	1	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		
RB numbers containing SSBs within channel BW			
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as			
per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Valu	ies
Channel bandwidth	100 MHz	
SSB SCS	240 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	2	
SS/PBCH block index	2	3
Symbol numbers containing SSBs Note 2	2-5 6-9	
Slot numbers containing SSB Note 2	1 1	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+39}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13]. Note 2: These values have been derived from other parameters for information purposes (as		
per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values
Channel bandwidth	100 MHz
SSB SCS	120 kHz
SSB periodicity (T _{SSB})	20 ms
Number of SSBs per SS-burst	1
SS/PBCH block index	1
Symbol numbers containing SSBs Note 2	8-11
Slot numbers containing SSB Note 2	0
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19)Note 1	
Note 1: RBs containing SSB can be configured in any frequency location within the cell	
	nronization raster defined in TS 38.104 [13].
	ner parameters for information purposes (as
per TS 38.213 [3]). They are not settable	parameters themselves.

A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters		Val	ues
Channel	Channel bandwidth 100 MHz		
SSB SCS	5	240 kHz	
SSB peri	odicity (T _{SSB})	20 ms	
Number of	of SSBs per SS-burst	1	
SS/PBCH block index 1			
Symbol numbers containing SSBs Note 2 12-13 0-1		0-1	
Slot numbers containing SSB Note 2 0 1		1	
SFN containing SSB SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$		10ms)/10ms) = 0	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+39) ^{Note 1}		39) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
	bandwidth according to the allowed syncl		
Note 2:	These values have been derived from oth		
	per TS 38.213 [3]). They are not settable	parameters themselve	S.

A.3.11 SMTC Configurations

A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.1-1: SMTC.1: SMTC Pattern 1 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.2-1: SMTC.2: SMTC Pattern 2 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	5 ms

A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms

Table A.3.11.3-1: SMTC.3: SMTC Pattern 3 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	160 ms
SMTC offset	0 ms
SMTC duration 1 ms	

A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.4-1: SMTC.4: SMTC Pattern 4 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	1 ms

A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.5-1: SMTC.5: SMTC Pattern 5 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	5 ms

A.3.11.6 SMTC pattern 6: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.6-1: SMTC.6: SMTC Pattern 6 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	17 ms
SMTC duration	5 ms

A.3.12 Test Cases with Different CC Configurations

A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations

A.3.12.1.1 Introduction

In Annex A EN-DC test cases may be defined for two component carriers (CCs) as well as for more than two CCs to verify the same RRM requirement.

A.3.12.1.2 Principle of testing

If multiple EN-DC test cases are defined for two CCs as well as for more than two CCs to verify the same type of RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with the maximum number of CCs in EN-DC supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with two CCs in EN-DC supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations

A.3.12.2.1 Introduction

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

A.3.12.2.2 Principle of testing

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with the maximum number of CCs in CA supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with at least two CCs in CA supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in CA would depend on the test equipment capability.

A.3.13 Test Cases in SA and EN-DC Operations

A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

Editor's note: this clause may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.

A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and
- verifies at least all RRM requirements covered in the test case(s), which is not performed.

A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers

A.3.13A.1 Introduction

The following applies to UE compliant to this version of the specification when undergoing tests with a mix of E-UTRA/NR FR1 and NR FR2 carriers in clauses A.5, A.7 and A.8.

A.3.13A.2 Principle of Testing in EN-DC

For test cases in clause A.5 listed in Table A.3.13A.2-1, the following applies:

- UE does not have to pass the test case

Table A.3.13A.2-1: Test cases UE does not have to pass in current version of specification (EN-DC)

Clause	Test case slogan
A.5.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle
A.5.5.3.5	SCell Activation and deactivation of SCell in FR2

A.3.13A.3 Principle of Testing in SA

For test cases in clause A.7 listed in Table A.3.13A.3-1, the following applies:

UE does not have to pass the test case

Table A.3.13A.3-1: Test cases UE does not have to pass in current version of specification (SA)

Clause	Test case slogan
A.7.5.3.2	SCell Activation and deactivation for FR1+FR2 inter-band with target SCell
	in FR2
A.7.5.6.1.2	NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.6.2.5	SA event triggered reporting tests for FR2 without SSB time index detection
	when DRX is not used (PCell in FR1)
A.7.6.2.6	SA event triggered reporting tests for FR2 without SSB time index detection
	when DRX is used (PCell in FR1)
A.7.6.2.7	SA event triggered reporting tests for FR2 with SSB time index detection
	when DRX is not used (PCell in FR1)
A.7.6.2.8	SA event triggered reporting tests for FR2 with SSB time index detection
	when DRX is used (PCell in FR1)

A.3.13A.4 Principle of Testing in E-UTRA

For test cases in clause A.8 listed in Table A.3.13A.4-1, the following applies:

- UE does not have to pass the test case.

Table A.3.13A.4-1: Test cases UE does not have to pass in current version of specification (E-UTRA)

Clause	Test case slogan
A.8.4.2.5	NR Inter-RAT event triggered reporting tests for FR2 without SSB time
	index detection when DRX is not used
A.8.4.2.6	NR Inter-RAT event triggered reporting tests for FR2 without SSB time
	index detection when DRX is used
A.8.4.2.7	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index
	detection when DRX is not used
A.8.4.2.8	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index
	detection when DRX is used

A.3.13B Test Cases for EN-DC and NE-DC Operations

A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations

A.3.13B.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying active BWP switch requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

A.3.13B.1.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations

A.3.13B.2.1 Introduction

This clause defines a principle which is applicable to test cases verifying SFTD accuracy requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

A.3.13B.2.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

A.3.14 CSI-RS configurations

A.3.14.1 FDD

Table A.3.14.1-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 FDD	CSI-RS.1.2 FDD	CSI-RS.1.3 FDD	CSI-RS.1.4 FDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	4	4
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
				0 for resource #0
		0 1	0 for a second 110	1 for resource #1
		0 for resource #0	0 for resource #0	2 for resource #2
non CCI DC Deserveded	0 for recovered #0			3 for resource #3
nzp-CSI-RS-Resourceld	0 for resource #0			4 for resource #4
		4 6	4 for recovered #4	5 for resource #5
		1 for resource #1	1 for resource #1	6 for resource #6
				7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot5	slot10	n.a.	n.a.
Offset	1	1	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
			6 for resource #0	0 for resource #0
		0 (1 for resource #1
		6 for resource #0		2 for resource #2
firstOFDMSymbolInTimeDo	4 for resource #0			3 for resource #3
main	4 for resource #0		101	4 for resource #4
		40 for no occurre 114		5 for resource #5
		10 for resource #1	10 for resource #1	6 for resource #6
				7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)

Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

A.3.14.2 TDD

Table A.3.14.2-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 TDD	CSI-RS.1.2 TDD	CSI-RS.1.3 TDD	CSI-RS.1.4 TDD	
Resource Type	periodic	periodic	aperiodic	aperiodic	
Resource Set Config					
nzp-CSI-ResourceSetId	0	0	0	0	
repetition	n.a.	off	off	on	
aperiodicTriggeringOffset	n.a.	n.a.	4	4	
trs-Info	n.a.	n.a.	n.a.	n.a.	
Resource Config					
				0 for resource #0	
		0 for recourse #0	0 for resource #0	1 for resource #1	
		0 for resource #0	0 for resource #0	2 for resource #2	
nan CCI DC Descursed	0 for resource #0			3 for resource #3	
nzp-CSI-RS-ResourceId	o for resource #0			4 for resource #4	
		1 for resource #1	1 for resource #1	5 for resource #5	
		1 101 Tesource #1	1 for resource #1	6 for resource #6	
				7 for resource #7	
powerControlOffset	0	0	0	0	
powerControlOffsetSS	db0	db0	db0	db0	
scramblingID	0	0	0	0	
Period (slots)	slot5	slot10	n.a.	n.a.	
Offset	1	1	n.a.	n.a.	
and Info Dorin dia CCL DC	TCI.State.0	TCI.State.0	n.a.	n.a.	
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.1	n.a.		
frequencyDomainAllocation	000001	0001	0001	0001	
nrofPorts	2	1	1	1	
				0 for resource #0	
		6 for recourse #0	C for recourse #0	1 for resource #1	
		6 for resource #0	6 for resource #0	2 for resource #2	
 firstOFDMSymbolInTimeDomain	4 for recourse #0			3 for resource #3	
IllistOFDiviSymbolinTimeDomain	4 for resource #0			4 for resource #4	
		10 for resource #1	10 for resource #1	5 for resource #5	
		10 for resource #1	To for resource #1	6 for resource #6	
				7 for resource #7	
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM	
density	1 3 3 3		3		
startingRB	0	0	0	0	
nrofRBs					
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.					

Table A.3.14.2-2: CSI-RS Reference Measurement Channels for SCS=30kHz

	CSI-RS.2.1 TDD	CSI-RS.2.2 TDD	CSI-RS.2.3 TDD	CSI-RS.2.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	4	4
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
			0 for resource #0	0 for resource #0
		0 for resource #0		1 for resource #1
		0 for resource #0	2 for resource #2	
nzp-CSI-RS-Resourceld	0 for resource #0			3 for resource #3
	0 101 Tesource #0			4 for resource #4
		1 for resource #1	1 for resource #1	5 for resource #5
		i ioi resource #1		6 for resource #6
				7 for resource #7

powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot10	slot20	n.a.	n.a.
Offset	2	2	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
	5 for resource #0	6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1
				2 for resource #2 3 for resource #3
firstOFDMSymbolInTimeDomain			10 for resource #1	4 for resource #4
		10 for resource #1		5 for resource #5
				6 for resource #6 7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)
Note 1: If the configured value of DDRs is larger than the width of the corresponding RWD relevant for the test case				

If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

Table A.3.14.2-3: CSI-RS Reference Measurement Channels for SCS=120kHz

	CSI-RS.3.1 TDD	CSI-RS.3.2 TDD	CSI-RS.3.3 TDD	CSI-RS.3.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	4	4
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		0 for resource #0	0 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
nzp-CSI-RS-ResourceId	0 for resource #0	1 for resource #1	1 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot40	slot80	n.a.	n.a.
Offset	8	8	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
firstOFDMSymbolInTimeDomain		6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
	5 for resource #0	10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7

cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test				

case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases in clause A.5 and A.7. The applicable AoA setup is defined in each test case in clause A.5 and A.7.

A.3.15.1 Setup 1: Single AoA in Rx beam peak direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table 3.15.3-1: Set of relative angular offsets between active probes for each power class

UE Power class	Relative angular offset between active probes
1	FFS
2	FFS
3	30°, 60°, 90°, 120° and 150°
4	FFS

A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak

Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak A.3.15.4.1 without change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the non Rx beam peak signal shall not be changed between test iterations.

A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class.

For UE power class 3, the relative angular offset between the directions (AoAs) of the 2 active probes shall be changed for each test iteration, within the probe alignment described above. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

A.3.16 TCI State Configuration

A.3.16.1 Introduction

This clause provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this clause are configured in each test when applicable to indicate that certain DL signals are QCL'ed with the referenceSignal configured in the TCI states.

A.3.16.2 TCI states

Table A.3.16.2-1: TCI States

Parameter	TCI.State.0	TCI.State.1	TCI.State.2	TCI.State.3
tci-StateId	ld0	ld1	ld2	ld3
qcl-Type1	typeC	typeC	typeA	typeA
qcl-Type2 ^{Note1}	typeD	typeD	typeD	typeD
referenceSignal	SSB0	SSB1	Resource #4 in TRS resource set 1 Note3	Resource #4 in TRS resource set 2 Note3

Note 1: qcl-Type2 of typeD only where applicable. For RRM test cases, this will be only in FR2

referenceSignal configurations towards which the TCI states are configured are defined in a test-Note 2:

Reference TRS resource sets are defined in A.3.17, and the applicable TRS resource set(s) are Note 3: specified in each test case. When a single TRS resource set is configured in a test case, it is considered as resource set 1.

Table A.3.16.2-2: Void

A.3.17 Configurations of CSI-RS for tracking

A.3.17.1 Configuration of CSI-RS for tracking for FR1

A.3.17.1.1 FDD

Table A.3.17.1.1-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value	
Reference channel		TRS.1.1 FDD	
Bandwidth		BW of Active BWP ^{Note 1}	
SCS	kHz	15	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		l ₀ = 5 for CSI-RS resource 1 and 3	
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2	
CSI-RS dilset		11 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	O ^{Note 2}	
TCI state TCI.State.0			
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases			

Note 2: Unless otherwise specified in the test case

Table A.3.17.1.1-2: CSI-RS for tracking for SCS=30kHz

Unit	Value
	TRS.1.2 FDD
	BW of Active BWP ^{Note 1}
kHz	30
	k ₀ =0 for CSI-RS resource 1,2,3,4
	I ₀ = 5 for CSI-RS resource 1 and 3
	l ₀ = 9 for CSI-RS resource 2 and 4
	1 for CSI-RS resource 1,2,3,4
	'No CDM' for CSI-RS resource 1,2,3,4
	3 for CSI-RS resource 1,2,3,4
slots	40 for CSI-RS resource 1,2,3,4
slots	20 for CSI-RS resource 1 and 2
	21 for CSI-RS resource 3 and 4
dB	ONote 2
	TCI.State.0
	kHz

Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases

Note 2: Unless otherwise specified in the test case

A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value	
Reference channel		TRS.1.1 TDD	
Bandwidth		BW of Active BWP ^{Note 1}	
SCS	kHz	15	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		l ₀ = 5 for CSI-RS resource 1 and 3	
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	10 for CSI-RS resource 1 and 2 11 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	0 ^{Note 2}	
TCI state		TCI.State.0	
Note 1 BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases Note 2: Unless otherwise specified in the test case			

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value	
Reference channel		TRS.1.2 TDD	
Bandwidth		BW of Active BWP ^{Note 1}	
SCS	kHz	30	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3	
CSI-RS		l ₀ = 9 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4	
CCI DC offeet	slots	20 for CSI-RS resource 1 and 2	
CSI-RS offset		21 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	O ^{Note 2}	
TCI state		TCI.State.0	
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases			

Note 2: Unless otherwise specified in the test case

A.3.17.2 Configuration of CSI-RS for tracking for FR2

A.3.17.2.1 TDD

Table A.3.17.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1

Parameter	Unit	Value	
Reference channel		TRS.2.1 TDD	
Bandwidth		BW of Active BWP ^{Note 1, 3}	
SCS	kHz	120	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		I ₀ = 1 for CSI-RS resource 1 and 3	
CSI-RS		I ₀ = 5 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4	
CSI-RS offset	alata	40 for CSI-RS resource 1 and 2	
CSI-RS Offset	slots	41 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	0 ^{Note 2}	
TCI state		TCI.State.0	
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases			
Note 2: Unless otherwise specified in the test case			
Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size.			

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

Parameter	Unit	Value		
Reference channel		TRS.2.2 TDD		
Bandwidth		BW of Active BWP ^{Note 1, 3}		
SCS	kHz	120		
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I ₀ = 2 for CSI-RS resource 1 and 3		
CSI-RS		I ₀ = 6 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4		
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2 41 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	O ^{Note 2}		
TCI state TCI.State.1		TCI.State.1		
Note 1: BW of TRS is configured sam	Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases			
Note 2: Unless otherwise specified in the test case				
Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active				

A.3.18 Additional definitions related to OTA testing for FR2 RRM test cases

A.3.18.1 Introduction

FR2 RRM test cases are performed over the air (OTA). This clause provides additional definitions and clarifications on the OTA measurements and metrics defined or refered in the test cases.

A.3.18.2 PRACH Power Measurement

PRACH power is measured as EIRP(Link=Link angle, Meas=Link angle) as defined in clause 3.1 of TS 38.101-2 [19].

A.4 EN-DC tests with all NR cells in FR1

- A.4.1 Void
- A.4.2 Void
- A.4.3 RRC_CONNECTED state mobility
- A.4.3.1 Void
- A.4.3.2 RRC Connection Mobility Control
- A.4.3.2.1 Void
- A.4.3.2.2 Random Access
- A.4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC
- A.4.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.1.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.1.1-2.

Table A.4.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell in EN-DC

	Config	Description				
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	4	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations depending on UE capability					

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1,2		SSB pattern 3 in FR1	As defined in A.3.10
	Config 3,4		SSB pattern 4 in FR1	
Duplex Mode for Cell 2	Config 1,2		FDD	
	Config 3,4		TDD	
TDD Configuration	Config 3,4		TDDConf.2.1	

OCNG Patter				OCNG pattern 1	As defined in A.3.2.1.
PDSCH parai	meters ^{Note}	Config 1,2		SR.1.1 FDD	As defined in A.3.1.1.
4		Config 3,4	1	SR.2.1 TDD	
RMSI CORES	SET	Config 1,2			CR.1.1 FDD
Reference Ch	Reference Channel				
		Config 3,4			CR.2.1 TDD
Dedicated CC		Config 1,2			CCR.1.1 FDD
Reference Ch	nannel				
		Config 3,4			CCR.2.1 TDD
NR RF Chann				1	
EPRE ratio of			dB		
EPRE ratio of			dB		
EPRE ratio of			dB	_	
EPRE ratio of			dB	0	
		PDCCH_DMRS	dB		
EPRE ratio of			dB		
EPRE ratio of	EPRE ratio of PDSCH to PDSCH_DMRS		dB	_	
000 ::	\hat{E}_s/I_{ot}		dB	3	Power of SSB with index
SSB with index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	0 is setto be above configured rsrp-
macx o	1 v _{oc}	Config 3,4	1	-101	ThresholdSSB
	\hat{E}_s/N_{oc}	1	dB	3	
	SS-RSRF	Note 3	dBm/ SCS	-95	
000 ::1	\hat{E}_s/I_{ot}		dB	-17	Power of SSB with index
SSB with index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	1 is set to be below configured rsrp-
	1 voc	Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	
	SS-RSRF	Note 3	dBm/ SCS	-115	
In Note 2		Config 1,2	dBm	-65.3/9.36MHz	For symbols without SSB
10		Config 3,4		-62.2/38.16MHz	index 1
ss-PBCH-Blo	ckPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured U	E transmitte	ed power (dBm	23	As defined in clause
$P_{\text{CMAX, f,c}}$					6.2.4 in TS 38.101-1.
PRACH Conf	iguration			FR1 PRACH configuration 1	As defined in A.3.8.2.
Propagation (Condition		-	AWGN	
			1	l	l

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.4.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission..

A.4.3.2.2.1.2.5 void

A.4.3.2.2.1.2.6 void

A.4.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.4.3.2.2.2 Non-contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.2.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.4.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell in EN-DC

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is o	nly required to be tested in one of the supported test configurations depending on UE capability

Table A.4.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB pattern 3 in FR1	SSB pattern 3 in FR1	As defined in A.3.10
	Config 3,4		SSB pattern 4 in FR1	SSB pattern 4 in FR1	
CSI-RS Configuration	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
	Config 3,4]		CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode for Cell 2	Config 1,2		FDD	FDD	
	Config 3,4]	TDD	TDD	
TDD Configuration	Config 3,4		TDDConf.2.1	TDDConf.2.1	
OCNG Pattern Note 1			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH parameters Note	Config 1,2		SR.1.1 FDD	SR.1.1 FDD	As defined in
4	Config 3,4		SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
RMSI CORESET	Config 1,2		CR.1.1 TDD	CR.1.1 TDD	
Reference Channel					
	Config 3,4		CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1,2		CCR.1.1 TDD	CCR.1.1 TDD	
	Config 3,4		CCR.2.1 TDD	CCR.2.1 TDD	
NR RF Channel Number			1	1	
EPRE ratio of PSS to SS	S	dB			
EPRE ratio of PBCH_DM	EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_DMRS to SSS		dB	0	0	
EPRE ratio of PDCCH to PDCCH_DMRS		dB			
EPRE ratio of PDSCH_D	MRS to SSS	dB			
EPRE ratio of PDSCH to	PDSCH_DMRS	dB			

SSB with	\hat{E}_s/I_{ot}		dB	3	3	Power of SSB with
index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	index 0 is set to be above configured
	1 V _{oc}	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}	-	dB	3	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	-95	
SSB with index 1	\hat{E}_s/I_{ot}		dB	-17	-17	Power of SSB with index 1 is set to be
index i	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	below configured
	1 oc	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	-17	-17	
	SS-RSR	P Note 3	dBm/ SCS	-115	-115	
lo Note 2		Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 14016 2		Config 3,4		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-Blo	ockPower	•	dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured U	Configured UE transmitted power (dBm	23	23	As defined in clause
$P_{\mathrm{CMAX, f,c}}$)						6.2.4 in TS 38.101- 1.
PRACH Con	figuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.
Propagation	Condition		-	AWGN	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2.. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated

with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.3 Void

A.4.4 Timing

A.4.4.1 UE transmit timing

A.4.4.1.1 NR UE Transmit Timing Test for FR1

A.4.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 4.4.1.1.1-1.

Table A.4.4.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	LTE FDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	LTE FDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
4	LTE TDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
5	LTE TDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
6	LTE TDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE	is only required to be tested in one of the supported test configurations

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Table A.4.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.4.4.1.1.1-3.

Table A.4.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2,3,4,5,6	Freq1	Freq1	
Duplex Mode		1,4		DD	
Duplex Mode		2,3,5,6	TDD		
		1,4	Not Ap	plicable	
TDD configuration		2,5	TDDC	onf.1.1	
		3,6	TDDC	onf.2.1	
		1,4	10: N _R	_{B,c} = 52	
BW _{channel}	MHz	2,5	10: N _R	B,c = 52	
		3,6	40: N _{RE}	s,c = 106	1
Initial BWP Configuration		1,2,3,4,5,6	DLBV ULBV	/P.0.1 /P.0.1	
Dedicated BWP Configuration		1,2,3,4,5,6	DLBWP.1.1 ULBWP.1.1		
DRx Cycle	ms	1,2,3,4,5,6	N/A DRX.8 ^{Note5}		
PDSCH Reference		1,4	SR.1.	1 FDD	
measurement channel		2,5	SR.1.1 TDD		
		3,6	SR.2.1 TDD		
RMSI CORESET		1,4	CR.1.1 FDD		
Reference Channel		2,5	CR.1.1 TDD		
		3,6	CR.2.	1 TDD	
		1,4		.1 FDD	
Dedicated CORESET Reference Channel		2,5	CCR.1	.1 TDD	
		3,6	CCR.2	.1 TDD	
OCNG Patterns		1,2,3,4,5,6	OF		
		1,4	SSB.		
SSB configuration		2,5	SSB.		
		3,6	SSB.		
SMTC configuration		1,2,3,4,5,6	SMTC.2		
		1,4		.1 FDD	
TRS configuration		2,5		.1 TDD	
		3,6	TRS.1	.2 TDD	
PDSCH/PDCCH	kHz	1,2,4,5	1	5	
subcarrier spacing	NI IZ	3,6	3	0	

EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH					
DMRS to SSS					
EPRE ratio of PBCH to					
PBCH DMRS					
EPRE ratio of PDCCH					
DMRS to SSS					
EPRE ratio of PDCCH to	dB	1,2,3,4,5,6	0	0	
PDCCH DMRS	uБ	1,2,3,4,5,0	U	U	
EPRE ratio of PDSCH					
DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH					
EPRE ratio of OCNG					
DMRS to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
$N_{\!\! oc}^{\!$	dBm/15 kHz	1,2,3,4,5,6	-98	-98	
Note2	dBm/SCS	1,2,4,5	-98	-98	
1 Voc	ubili/SCS	3,6	-95	-95	
\hat{E}_s/I_{ot}		1,2,3,4,5,6	3	3	
\hat{E}_s/N_{oc}		1,2,3,4,5,6	3	3	
SS-RSRP ^{Note3}	dDm/CCC	1,2,4,5	-95	-95	
	dBm/SCS	3,6	-92	-92	
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	-65.2	-65.2	
	dBm/38.1MHz	3,6	-59.2	-59.2	
Propagation condition		1,2,3,4,5,6	AWGN		
SRS Config		1,2,4,5	SRSConf.1 ^{Note6}	SRSConf.3 ^{Note6}	
		3, 6	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: DRx related parameters are given in Table A.3.3.8-1 Note 6: SRS configs are given in Table A.4.4.1.1.1-3

Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping	n1	n1	n1	

repetitionFactor				
freqDomainPosition	0	0	0	
freqDomainShift	0	0	0	
freqHopping	14 for test	25	14	Matches
c-SRS	configuration			N _{RB,c}
	1,2,4,5			
	25 for test			
	configuration 3,6			
freqHopping	0	0	0	
b-SRS				
freqHopping	0	0	0	
b-hop				
groupOrSequenceHopping	Neither	Neither	Neither	
resourceType	Periodic	Periodic	Periodic	
periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to
				align with
				DRx
				periodicity
sequenceld	0	0	0	Any 10 bit
				number

A.4.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ($N_{TA} + N_{TA_offset}$)× $T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.4.4.1.1.2-1

Table A.4.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value		
	Test1	Test2	
15	+64*64Tc	+32*64Tc	
30	+32*64T _c	+16*64T _c	

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c \pm T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.4.4.2 UE timer accuracy

A.4.4.3 Timing advance

A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

A.4.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.4.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.4.4.3.1.2-1: Timing advance supported test configurations

Table A.4.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_old for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192 * T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096 * T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.4.4.3.1.2-3: Cell specific test parameters for timing advance

.		11.24	Test1	
Param	eter	Unit	T1	T2
Dunlay mada	Config 1,4		FDD	
Duplex mode	Config 2,3,5,6		TDD	
	Config 1,4		Not Applicat	ole
TDD configuration	Config 2,5		TDDConf.1.	1
	Config 3,6		TDDConf.2.	1
	Config 1,4		10: N _{RB,c} = 5	52
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 5	52
	Config 3,6		40: N _{RB,c} = 1	06
	Config 1,4		10: N _{RB,c} = 5	52
BWP BW	Config 2,5	MHz	10: N _{RB,c} = 5	52
	Config 3,6		40: $N_{RB,c} = 1$	06
DRx Cycle		ms	Not Applicab	
-	Config 1,4		SR.1.1 FDD	
PDSCH Reference	Config 2,5		SR.1.1 TDD	
measurement channel	Config 3,6		SR2.1 TDD	
	Config 1,4		CR.1.1 FDD	
RMSI CORESET	Config 2,5		CR.1.1 TDD)
Reference Channel	Config 3,6		CR2.1 TDD	
	Config 1,4		CCR.1.1 FD	D
Dedicated CORESET Reference Channel	Config 2,5		CCR.1.1 TD	D
	Config 3,6		CCR.2.1 TD	D
	Config 1,4		TRS.1.1 FD	D
TRS configuration	Config 2,5		TRS.1.1 TD	D
· ·	Config 3,6		TRS.1.2 TD	D
OCNG Patterns	<u> </u>		OCNG patter	n 1
00D 0	Config 1,2,4,5		SSB.1 FR1	
SSB Configuration	Config 3,6		SSB.2 FR1	
CMTC configuration	Config 1,2,4,5		SMTC.1 FR	
SMTC configuration	Config 3,6		SMTC.2 FR	1
PDSCH/PDCCH	Config 1,2,4,5	LU-	15 kHz	
subcarrier spacing	Config 3,6	Hz Hz	30 kHz	
PUCCH/PUSCH	Config 1,2,4,5	Id-	15 kHz	
subcarrier spacing	Config 3,6	Hz Hz	30 kHz	
EPRE ratio of PSS to S	SS	dB	0	

parameters themselves.

Note 3:

EPRE rat	io of PBCH DMRS to SSS			
EPRE rat	io of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS				
EPRE rat	io of PDCCH to PDCCH DMRS]		
EPRE rat	io of PDSCH DMRS to SSS			
EPRE rat	io of PDSCH to PDSCH			
EPRE rat	io of OCNG DMRS to SSS(Note 1)			
EPRE rat	io of OCNG to OCNG DMRS (Note			
1)				
N_{oc} Note2		dBm/15kH	-98	
1 ' oc		Z		
N_{oc} Note2			-98	
1 ' oc	Config 3,6	dBm/SCS	-95	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	3	
\hat{E}_s/N_{oc}		dB	3	
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	-67.57	
10	Config 3,6	dBm/ 38.16MHz	-62.58	
Propagat	ion condition	-	AWGN	
Note 1:	OCNG shall be used such that both	cells are fully	allocated and a constant total transmitted power spectral	
density is achieved for all OFDM symbols.				
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over				
	subcarriers and time and shall be m	odelled as AW	/GN of appropriate power for N_{oc} to be fulfilled.	

Table A.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

lo levels have been derived from other parameters for information purposes. They are not settable

Fie	eld	Value	Comment
c-SRS	Config 1,2,4,5	12	
U-5K5	Config 3,6	24	Frequency hopping is disabled
b-S	RS	0	Prequency hopping is disabled
b-h	пор	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDon	nainShift	0	
groupOrSequ	enceHopping	neither	No group or sequence hopping
		sl5=2 for SCS	Once every 5 slots
SRS-Pariodia	cityAndOffset	15kHz	
SING-I GIIOGII	dityAndOnset	sl5=4 for SCS	
		30kHz	
pathlossRe	eferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usa	age	Codebook	Codebook based UL transmission
startP	osition	0	resourceMapping setting. SRS on last
nrofSy	mbols	n1	symbol of slot, and 1symbols for SRS
repetitio	nFactor	n1	without repetition.
combO	ffset-n2	0	transmissionComb setting
cyclicS	Shift-n2	0	transmissionComb setting
nrofSR	S-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further	er information see cla	use 6.3.2 in TS 38	1

A.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.4.5 Signaling characteristics

A.4.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.1.1-1. The test parameters are given in Tables A.4.5.1.1.1-2, A.4.5.1.1.1-3, and A.4.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.1.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.4.5.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	y required to pass in one of the supported test configurations in FR1

Table A.4.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter	Unit	Value
		Test 1
Active E-UTRA PCell		Cell 1

E-UTRA RF Chann	ol Number		1
	CI INUITIDEI		
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3, 4, 5,		
configuration	6		DLBWP.0.1
DL dedicated	Config 1, 2, 3, 4, 5,		
BWP	6		DLBWP.1.1
configuration			<i>323</i> ,,,,,,,
UL initial BWP	Config 1, 2, 3, 4, 5,		
configuration	6		ULBWP.0.1
UL dedicated	Config 1, 2, 3, 4, 5,		
			LILDWD 4.4
BWP	6		ULBWP.1.1
configuration			
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4	1	CCR.1.3 FDD
CORESET	Comig 1, 4		0011.1.01 00
Reference			
Channel			
Channel	0		000 4 0 TDD
	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier	Config 3, 6		30 kHz
spacing			00 Ki 12
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
SSB index assigned	as Klivi Ko		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix a	and Antenna		2x2 Low
Configuration			
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy	~	·
	to average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS	uВ	†
	energy to average		
	SSS RE energy	1	DEC : " :
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310		1113	1
		1	'

N311			1	
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD	
reporting	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
tracking	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
T1		S	0.2	
T2		S	0.48	
T3		S	0.48	
D1		S	0.44	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit		Test 1	
			T1	T2	Т3
EPRE ratio of P	DCCH DMRS to SSS	dB		4	
EPRE ratio of P	DCCH to PDCCH	dB		0	
DMRS					
EPRE ratio of P	BCH DMRS to SSS	dB			
EPRE ratio of P	BCH to PBCH DMRS	dB			
EPRE ratio of P	SS to SSS	dB			
EPRE ratio of P	DSCH DMRS to SSS	dB		0	
EPRE ratio of P	DSCH to PDSCH	dB			
DMRS					
EPRE ratio of C	CNG DMRS to SSS	dB			
EPRE ratio of C	CNG to OCNG DMRS	dB			
SNR on RLM-	Config 1, 4	dB	1	-7	-15
RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
\mathcal{N}	Config 1, 4	dBm/		-98	
1 voc	Config 2, 5	15		-98	
	Config 3, 6	kHz		-98	
N_{oc}	Config 1, 4	dBm/		-98	
1 voc	Config 2, 5	SCS		-98	
	Config 3, 6			-95	
Propagation cor	ndition		TDL-0	C 300ns 1	100Hz

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Table A.4.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1	
	Value	
gapOffset	0	

Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).

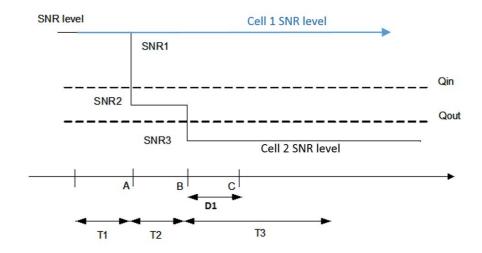


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

A.4.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.4.5.1.2.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channe	E-UTRA RF Channel Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3, 4,		DLBWP.0.1
configuration	5, 6		DEDVVI .O. I
DL dedicated	Config 1, 2, 3, 4,		DLBWP.1.1
BWP configuration	5, 6		525***
UL initial BWP	Config 1, 2, 3, 4,		ULBWP.0.1
configuration	5, 6		0221111011
UL dedicated	Config 1, 2, 3, 4,		ULBWP.1.1
BWP configuration	5, 6		AL (A . II . I . I
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
DIACL CODECET	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated CORESET	Config 1, 4		CCR.1.1 FDD
Reference			
Channel			
	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
J	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
PRACH	Config 1, 2, 4, 5		Table
Configuration	Joining 1, 2, 7, 3		A.3.8.2.1-1
2 or mgaration	Config 3, 6		Table
	551119 5, 5		A.3.8.2.1-1
SSB index assigned	as RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna			2x2 Low
Configuration			
In sync	DCI format		1-0
transmission	Number of		2
parameters	Control OFDM		
	symbols		

	Aggregation level	CCE	4
	Ratio of	dB	0
	hypothetical		
	PDCCH RE		
	energy to		
	average SSS RE		
	energy Ratio of	dB	0
İ	hypothetical	ub	U
İ	PDCCH DMRS		
	energy to		
	average SSS RE		
	energy		
	DMRS precoder		REG bundle
	granularity		size
Out of our o	REG bundle size		6
Out of sync transmission	DCI format Number of		1-0 2
parameters	Control OFDM		2
parameters	symbols		
	Aggregation	CCE	8
	level	001	· ·
	Ratio of	dB	4
	hypothetical		
	PDCCH RE		
	energy to		
	average SSS RE		
	energy Ratio of	dB	4
	hypothetical	ub.	7
	PDCCH DMRS		
	energy to		
	average SSS RE		
	energy		5-0: "
	DMRS precoder		REG bundle
	granularity REG bundle size		size 6
DRX	NEG buridie size		OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000 1
N310 N311			1
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1
reporting	Coming 1, 4		FDD
· op og	Config 2, 5		CSI-RS.1.1
	,		TDD
	Config 3, 6		CSI-RS.2.1
			TDD
CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking	Config 2, 5		TRS.1.1 TDD
T1	Config 3, 6		TRS.1.2 TDD
T1 T2		S	0.2 0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Nista 4. All - C		ا المقلم	Contracts the

All configurations are assigned to the UE prior to the Note 1: start of time period T1.
UE-specific PDCCH is not transmitted after T1 starts.

Note 2:

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

	Parameter	Unit	Test 1				
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS dB 0				•	,		
EPRE rati	o of PDCCH to PDCCH DMRS	dB			0		
EPRE rati	o of PBCH DMRS to SSS	dB					
EPRE rati	o of PBCH to PBCH DMRS	dB					
EPRE rati	o of PSS to SSS	dB					
EPRE rati	o of PDSCH DMRS to SSS	dB			0		
EPRE rati	o of PDSCH to PDSCH DMRS	dB					
EPRE rati	o of OCNG DMRS to SSS	dB					
EPRE rati	o of OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
λ/	Config 1, 4	dBm/			-98		
N_{oc}	Config 2, 5	15	-98				
	Config 3, 6	kHz	-98				
λ/	Config 1, 4	dBm/	-98				
N_{oc}	Config 2, 5	SCS			-98		
	Config 3, 6		-95				
Propagation	on condition			TDL-C	300ns	100Hz	
Note 1:	OCNG shall be used such that the resources in Cell 2 are fully allocated					ited	
	and a constant total transmitted	power sp	ectral	density	is achi	ieved fo	or all
	OFDM symbols.						
Note 2:	Note 2: The signal contains PDCCH for UEs other than the device under test as					t as	
part of OCNG.							
	Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.						
Note 4:	Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1,			,			
SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.							
Note 5:	Note 5: The SNR values are specified for testing a UE which supports 2RX on at						
least one band. For testing of a UE which supports 4RX on all bands, the					, the		
SNR during T3 and T4 is modified as specified in clause A.3.6.							

Table A.4.5.1.2.1-4: Void

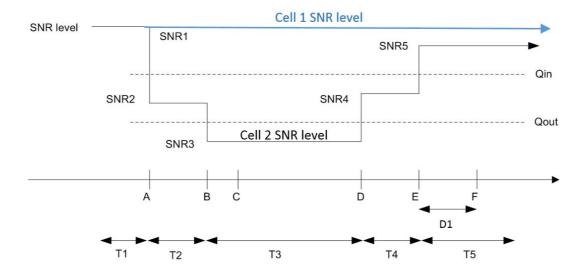


Figure A.4.5.1.2.1-1: SNR variation for in-sync testing

A.4.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.3.1-1. The test parameters are given in Tables A.4.5.1.3.1-2 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.1.3.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is o	The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCel	I		Cell 1
E-UTRA RF Channe	l Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: $N_{RB,c} = 52$
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1

UL dedicated BWP	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
configuration				
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4	CR.1.1 FDD		
Reference Channel	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
Dedicated	Config 1, 4		CCR.1.3 FDD	
CORESET				
Reference Channel				
	Config 2, 5		CCR.1.3 TDD	
	Config 3, 6		CCR.2.2 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	
garaman	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC	Config 1, 2, 4, 5		SMTC.1	
Configuration	Config 3, 6		SMTC.1	
PDSCH/PDCCH			15 kHz	
subcarrier spacing	Config 1, 2, 4, 5	+	30 kHz	
PRACH	Config 3, 6		Table A.3.8.2.1-1	
	Config 1, 2, 4, 5			
Configuration	Config 3, 6		Table A.3.8.2.1-1	
SSB index assigned	as RLM RS		0	
OCNG parameters			OP.1	
CP length			Normal	
	d Antenna Configuration		2x2 Low	
Out of sync	DCI format		1-0	
transmission	Number of Control		2	
parameters	OFDM symbols			
	Aggregation level	CCE	8	
	Ratio of hypothetical	dB	4	
	PDCCH RE energy to			
	average SSS RE energy			
	Ratio of hypothetical	dB	4	
	PDCCH DMRS energy			
	to average SSS RE			
	energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX Configuration			DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	0	
T311 timer		ms	1000	
N310			1	
N311			1	
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD	
reporting	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD	
COI-ICO IOI LIACKING	Config 1, 4		TRS.1.1 TDD	
	Config 3, 6			
T1	Louing 3, 0		TRS.1.2 TDD	
		S	0.2	
T2		S	0.68	
T3		S	0.68	
D1		S	0.64	
	rations are assigned to the			
	ic PDCCH is not transmitted		arts.	
Note 3: E-UTRAN	is in non-DRX mode under	test.		

Table A.4.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

	Parameter	Unit	Test 1		
			T1	T2	T3
EPRE ratio	of PDCCH DMRS to SSS	dB	4		
EPRE ratio	of PDCCH to PDCCH DMRS	dB		0	
EPRE ratio	of PBCH DMRS to SSS	dB			
EPRE ratio	of PBCH to PBCH DMRS	dB			
EPRE ratio	of PSS to SSS	dB		0	
EPRE ratio	of PDSCH DMRS to SSS	dB			
EPRE ratio	of PDSCH to PDSCH DMRS	dB			
EPRE ratio	of OCNG DMRS to SSS	dB			
EPRE ratio	of OCNG to OCNG DMRS	dB			
SNR on	Config 1, 4	dB	1	-7	-15
RLM-RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
λ/	Config 1, 4	dBm/15k		-98	
N_{oc}	Config 2, 5	Hz		-98	
	Config 3, 6			-98	
λ	Config 1, 4	dBm/SCS		-98	
N_{oc}	Config 2, 5			-98	
	Config 3, 6		-95		
Propagatio	n condition		TDL-C 300ns 100Hz		
			es in Cell 2 are fully allocated and a constant total		
	transmitted power spectral densit				
		he signal contains PDCCH for UEs other than the device under test as part of OCNG.			
	SNR levels correspond to the sig				
Note 1.	Note 4: The SNP in time periods T1 T2 and T3 is denoted as SNP1 SNP2 and SNP3 respectively in				

- Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.4.5.1.3.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.4.5.1.3.1-4: Void

Table A.4.5.1.3.1-5: Void

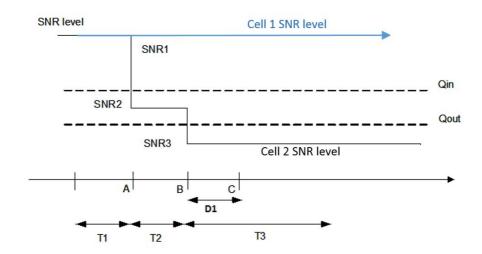


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

A.4.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	only required to pass in one of the supported test configurations in FR1

Table A.4.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel N	umber		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52	
	Config 2, 5		10: N _{RB,c} = 52	
	Config 3, 6		40: N _{RB,c} = 106	
DL initial BWP	Config 1, 2, 3, 4, 5,		DLBWP.0.1	
configuration	6		DEBWI :0.1	
DL dedicated BWP	Config 1, 2, 3, 4, 5,		DLBWP.1.1	
configuration	6		DLDVVF.1.1	
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1	
configuration	6		OLDVVI .0.1	

	1	1	
UL dedicated BWP	Config 1, 2, 3, 4, 5,		ULBWP.1.1
configuration	6		
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET	Config 1, 4		CCR.1.1 FDD
Reference Channel			
	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
CCD Cominguianon	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
SWITC Configuration			
DD0011/DD0011	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.1-1
	Config 3, 6		Table A.3.8.2.1-1
SSB index assigned as	•	 	0
	RLIVI RS		
OCNG parameters			OP.1
CP length	A		Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
In sync transmission	DCI format		1-0
parameters	Number of Control		2
parameters	OFDM symbols		2
		COF	4
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy		
	to average SSS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		_
parameters	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy	45	₹
	to average SSS RE		
	_		
	energy Ratio of hypothetical	dB	4
	PDCCH DMRS	ub	4
		1	
	energy to average		
	energy to average SSS RE energy		DEC bundle size
	energy to average SSS RE energy DMRS precoder		REG bundle size
	energy to average SSS RE energy DMRS precoder granularity		
DDV Configuration	energy to average SSS RE energy DMRS precoder		6
DRX Configuration	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3
Gap pattern ID	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3 N.A.
	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3
Gap pattern ID Layer 3 filtering T310 timer	energy to average SSS RE energy DMRS precoder granularity	ms	6 DRX.3 N.A. Enabled 1000
Gap pattern ID Layer 3 filtering T310 timer T311 timer	energy to average SSS RE energy DMRS precoder granularity	ms ms	6 DRX.3 N.A. Enabled
Gap pattern ID Layer 3 filtering T310 timer	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3 N.A. Enabled 1000
Gap pattern ID Layer 3 filtering T310 timer T311 timer	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3 N.A. Enabled 1000 1000
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	energy to average SSS RE energy DMRS precoder granularity		6 DRX.3 N.A. Enabled 1000 1000

CSI-RS for CSI	Config 2, 5		CSI-RS.1.1 TDD
reporting	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.64
T4		S	0.2
T5	·	S	0.88
D1		S	0.84

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1				
		=	T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB			0		
EPRE ratio	of PDCCH to PDCCH DMRS	dB			0		
EPRE ratio	of PBCH DMRS to SSS	dB					
EPRE ratio	of PBCH to PBCH DMRS	dB					
EPRE ratio	of PSS to SSS	dB			0		
EPRE ratio	of PDSCH DMRS to SSS	dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio	EPRE ratio of OCNG DMRS to SSS						
EPRE ratio	of OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1 -7 -15 -4.5		1		
	Config 3, 6		1 -7 -15 -4.5 1		1		
λI	Config 1, 4	dBm/15			-98		
N_{oc}	Config 2, 5	kHz	-98				
	Config 3, 6		-98		-98		
λI	Config 1, 4	dBm/SCS	-98				
N_{oc}	Config 2, 5		-98				
	Config 3, 6		-95				
Propagation	n condition			TDL	-C 300ns 1	00Hz	

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.4.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.4.5.1.4.1-4: Void

Table A.4.5.1.4.1-5: Void

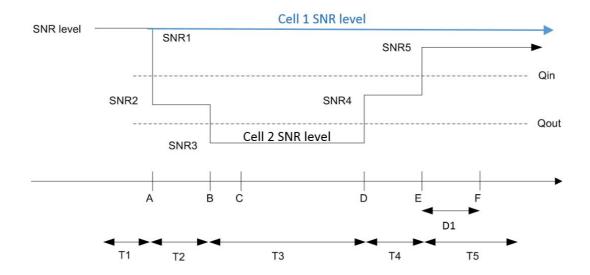


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.5.1-1: Supported test configurations for FR1 PSCell

Configuration	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
-	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.3 FDD
Channel	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
_	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1, 2, 4, 5		15 KHz
Spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDS0	CH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Co	nfiguration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44
	CH is not transmitted after T1 starts. n-DRX mode under test.		

Table A.4.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Par	ameter	Unit	Test 1			
			T1	T2	T3	
EPRE ratio of DMRS to SS		dB	4			
EPRE ratio PDCCH DM	of PDCCH to RS	dB				
EPRE ratio of PBCH DMR		dB				
EPRE ratio	of PSS to SSS	dB				
EPRE ratio of to SSS	of PBCH DMRS	dB				
EPRE ratio of PDSCH DMI		dB	0			
EPRE ratio of DMRS to SS		dB				
EPRE ratio of to SSS	of OCNG DMRS	dB				
EPRE ratio of OCNG DMR		dB				
SNR on	Config 1, 4	dB	1	-7	-15	
RLM-RS	Config 2, 5		1	-7	-15	
	Config 3, 6	1	1	-7	-15	
N_{oc}	Config 1, 4	dBm/15K		-98		
·oc	Config 2, 5	Hz		-98		
	Config 3, 6		-98			

Propagat	ion condition		TDL-C 300ns 100Hz			
Note 1:		OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant				
	total transmitted pov	ver spectral	density is achieved for all OFDM symbols.			
Note 2:	The uplink resources period T1.	s for CSI rep	porting are assigned to the UE prior to the start of time			
Note 3:		NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.				
Note 4:	Measurement gap c	Measurement gap configuration is assigned to the UE prior to the start of time period T1.				
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.					
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.					
Note 7:	SNR levels correspond to the signal to noise ratio over the SSS REs.					
Note 8:	The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.5.1-1.					
Note 9:	The SNR values are	specified fo	r testing a UE which supports 2RX on at least one band.			
	•	vhich suppo	rts 4RX on all bands, the SNR during T3 is specified in			
	section A.3.6.1.1.					

Table A.4.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field		Test 1
		Value
	gapOffset	0
Note 1:	<u> </u>	

Table A.4.5.1.5.1-4: Void

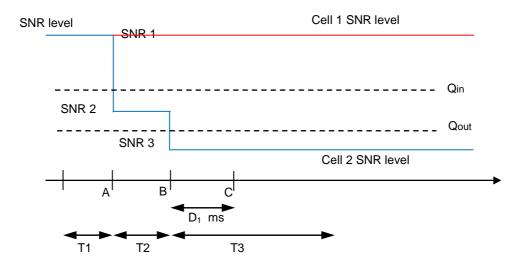


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.6.1-1, A.4.5.1.6.1-2, and A.4.5.1.6.1-3 below. There are two cells, cell 1 which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.6.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Config 1, 4			CR.1.1 FDD
Channel			
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1

SMTC Configuration	Config 1 2 4 5		SMTC.1
Sivire Configuration	Config 1, 2, 4, 5 Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier spa			15 KHz
FD3CI FDCCI Subcamer spa	Config 1, 2, 4, 5 Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
1K3 Configuration	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.1 TDD
CCL DC for DLM	Config 1, 4		Resource #4 in TRS.1.1 FDD Resource #4 in TRS.1.1 TDD
CSI-RS for RLM	Config 2, 5		
TOL fi fi f DDOOL/5	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/F	PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length	O		Normal
Correlation Matrix and Antenna			2x2 Low
	DCI format		1-0
	Number of Control OFDM		2
Out of sync transmission	symbols	0.5-	_
parameters	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
	DCI format		1-0
	Number of Control OFDM		2
In sync transmission	symbols		
parameters	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
Note 1: UE-specific PDCCH	is not transmitted after T1 start	S.	
	DRX mode under test.		

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

	Parameter	Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio	of PDCCH DMRS to	dB			0		
EPRE ratio DMRS	of PDCCH to PDCCH	dB					
EPRE ratio SSS	of PBCH DMRS to	dB					
EPRE ratio	of PSS to SSS	dB					
EPRE ratio DMRS	of PBCH to PBCH	dB					
EPRE ratio DMRS	of PDSCH to PDSCH	dB			0		
EPRE ratio SSS	of PDSCH DMRS to	dB					
EPRE ratio SSS	of OCNG DMRS to	dB					
EPRE ratio DMRS	of OCNG to OCNG	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N	Config 1, 4	dBm/15KHz			-98		
N_{oc}	Config 2, 5				-98		
	Config 3, 6				-98		
Propagation			TDL-C 300ns 100Hz				
Note 2: Note 3:	OCNG shall be used suc power spectral density is The uplink resources for NZP CSI-RS resource se	achieved for all OFD CSI reporting are as:	OM symbols. signed to the	UE prior to t	he start of tim	ne period T1.	
	period T1. Measurement gan config	uration is assigned to	n the LIF nrio	r to the start	of time period	l T1	

- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

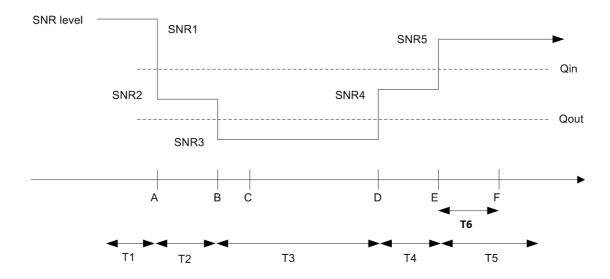


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.7.1-1, A.4.5.1.7.1-2, and A.4.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.7.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
TDD Configuration	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable TDDConf.1.1
	Config 2, 5 Config 3, 6		TDDConf.1.1 TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1 DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.3 FDD
Channel	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDS	CH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Co	onfiguration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4] [CSI-RS.1.1 FDD
	Config 2, 5] [CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1		S	1.24
	is not transmitted after T1 starts.	·	
Note 2: E-UTRAN is in non-l	DRX mode under test.		

Note 9:

specified in section A.3.6.1.1.

Table A.4.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

	Parameter	Unit		Test 1		
			T1	T2	T3	
	tio of PDCCH	dB		4		
DMRS to	tio of PDCCH to	dB				
PDCCH		иь				
	tio of PBCH DMRS	dB				
to SSS	tio of PBCH to	dB				
PBCH DI		иь				
	tio of PBCH to	dB				
PBCH DI		in.				
DMRS to	tio of PDSCH SSS	dB		0		
	tio of PDSCH to	dB				
PDSCH [
	tio of OCNG DMRS	dB				
to SSS						
	tio of OCNG to	dB				
OCNG D		-ID	4	7	45	
SNR	Config 1, 4	dB	1	-7	-15	
	Config 2, 5		·	-7	-15	
	Config 3, 6	15 (4514)	1	-7	-15	
N_{oc}	Config 1, 4	dBm/15KHz		-98		
- '00	Config 2, 5			-98		
	Config 3, 6			-98		
	ion condition			DL-C 300ns 100h		
Note 1:	OCNG shall be used					
	total transmitted pov					
Note 2:	The uplink resource	s for CSI reporting	g are assigned to	the UE prior to th	e start of time	
Note O	period T1.		(001		- 4b - 115	
Note 3:	NZP CSI-RS resour		on for CSI reportir	ng are assigned to	o the UE prior to	
the start of time period T1.						
Note 4:	Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.					
Note 5:	Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.					
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.					
Note 7:	SNR levels correspond				•	
Note 8:	The SNR in time pe				SNR3	
	respectively in figure					
Note O:	On The CND values are enseited for testing a LIE which augments 2DV on at least one					

Table A.4.5.1.7.1-3A: Void

The SNR values are specified for testing a UE which supports 2RX on at least one

band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

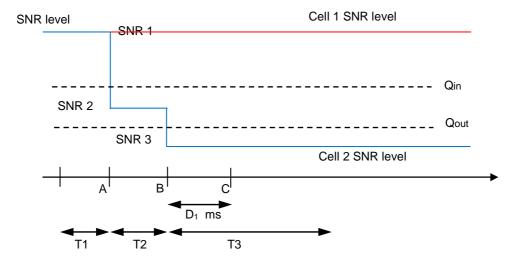


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 1 which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only	Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

Paramete	er	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
-	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDSCH			TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Antenna Co	onfiguration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
<u>T4</u>		S	0.2
T5		S	1.88 1.84
T6		S	

Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter	Unit			Test 1		
		T1	T2	T3	T4	T5

EPRE ratio of PDCCH DMRS to SSS		dB			0		
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of SSS	PBCH DMRS to	dB					
EPRE ratio of DMRS	PBCH to PBCH	dB					
EPRE ratio of	PSS to SSS	dB					
EPRE ratio of SSS	PDSCH DMRS to	dB			0		
EPRE ratio of DMRS	PDSCH to PDSCH	dB					
EPRE ratio of SSS	OCNG DMRS to	dB					
EPRE ratio of DMRS	OCNG to OCNG	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N_{oc}	Config 1, 4	dBm/15KHz			-98		
Config 2, 5			-98				· · · · · · · · · · · · · · · · · · ·
	Config 3, 6				-98		
Propagation of		1 11 11	TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

	Field	Test 1		
	Field			
	gapOffset	0		
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned.			

Table A.4.5.1.8.1-4: Void

Table A.4.5.1.8.1-5: Void

Table A.4.5.1.8.1-6: Void

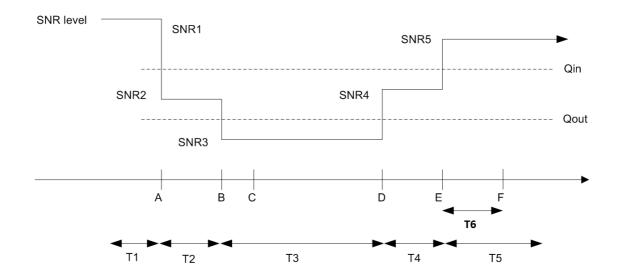


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2 Interruption

A.4.5.2.1 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.1.1-2 and A.4.5.2.1.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.1.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. CORESET indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.1.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.4	DRX related parameters are defined in
		DRA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD

RMSI CO	RESET	Config 1,4		CR.1.1 FDD
paramete		Config 2,5		CR.1.1 TDD
		Config 3,6		CR.2.1 TDD
PDCCH (CORESET	Config 1,4		CCR.1.1 FDD
paramete		Config 2,5		CCR.1.1 TDD
paramoto		Config 3,6	=	CCR.2.1 TDD
OCNG Pa	atterns	Corning 0,0		OP.1
	onfiguration			SMTC.1
TRS conf		Config 1,4		TRS.1.1 FDD
1100 00111	iguration	Config 2,5		TRS.1.1 TDD
		Config 3,6		TRS.1.2 TDD
CCD Con	figuration			
SSB Con	nguration	Config 1,2,4,5		SSB.1 FR1
0 1 1		Config 3,6		SSB.2 FR1
	n Matrix and	Antenna		1x2 Low
Configura		20		
	io of PSS to S			
	io of PBCH D			
		PBCH DMRS		
		DMRS to SSS		
		to PDCCH DMRS		
		DMRS to SSS	dB	0
	io of PDSCH			
EPRE rat	io of OCNG D	MRS to SSS(Note		
1)				
EPRE rat	io of OCNG to	OCNG DMRS		
(Note 1)				
N _{oc} Note 2			dBm/15	-104
			kHz	104
SS-RSRF	Note 3		dBm/15	-87
			kHz	-01
Ês/Iot			dB	17
Ês/Noc			dB	17
Io ^{Note3}		Config 1,2,4,5	dBm/	-58.96
		-	9.36MHz	
		Config 3,6	dBm/ 38.16MHz	-52.86
Time offs	et to Cell1 Note	4	μs	3 for intra-band EN-DC,
			33 for inter-band EN-DC	
Propagation Condition			AWGN	
Note 1:				y allocated and a constant total transmitted power
		sity is achieved for a	•	
Note 2:				not specified in the test is assumed to be constant over
	subcarriers and time and shall be modeled as AWGN of appropriate power for N_{oc} to be fulfilled.			······································
Note 3:				other parameters for information purposes. They are
		parameters themselv		
Note 4:		•		veen subframe timing boundary of E-UTRA PCell and
	slot timing be	oundary of PSCell at	the UE antenn	a connector including time alignment error between the

Table A.4.5.2.1.1-4: Void

A.4.5.2.1.2 Test Requirements

two cells

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.1.2-1.

Table A.4.5.2.1.2-1: Interruption length X at transition between active and non-active during DRX

И	NR Slot	Interruption length X
	length (ms)	Sync
0	1	1
1	0.5	1

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.2 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in ENDC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is on	ly required to be tested in one of the supported test configurations

Table A.4.5.2.2.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.4	DRX related parameters are defined in
		DKA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	Config 2,5 SR.1.1	
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1

Correlation Matrix and Antenna			1x2 Low	
Configuration				
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DM	RS to SSS			
EPRE ratio of PBCH to F	BCH DMRS			
EPRE ratio of PDCCH D	MRS to SSS			
EPRE ratio of PDCCH to	PDCCH DMRS			
EPRE ratio of PDSCH D	MRS to SSS	dB	0	
EPRE ratio of PDSCH to	PDSCH			
EPRE ratio of OCNG DM	IRS to SSS(Note			
1)				
EPRE ratio of OCNG to	OCNG DMRS			
(Note 1)				
Noc ^{Note 2}		dBm/15	-104	
		kHz	-104	
SS-RSRP Note 3		dBm/15	-87	
		kHz	-07	
Ê _s /I _{ot}		dB	17	
Ê _s /N _{oc}		dB	17	
Io ^{Note3}	Config 1,2,4,5	dBm/	-58.96	
	Oornig 1,2,4,5	9.36MHz	-50.50	
	Config 3,6	dBm/	-52.86	
	-	38.16MHz	-52.00	
Time offset to Cell1 Note	Config 1,2,4,5	μs	500	
4				
Config 3,6			250	
Propagation Condition			AWGN	
			y allocated and a constant total transmitted power	
•	ty is achieved for a	•		
Note 2: Interference fr	om other cells and	noise sources i	not specified in the test is assumed to be constant over	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_∞ to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Table A.4.5.2.2.1-4: Void

A.4.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.2.2-1.

Table A.4.5.2.2.2-1: Interruption length X at transition between active and non-active during DRX

и	NR Slot	Interruption length X
,	length (ms)	Async
0	1	2
1	0.5	2

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.3 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.4.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.3.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2 and A.4.5.2.3.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL

Table A.4.5.2.3.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:		equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combination	ns which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configuration,	

Table A.4.5.2.3.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.4.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter		Unit	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6]	TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5]	TDDConf.1.1	TDDConf.1.1
	Config 3,6]	TDDConf.2.1	TDDConf.2.1

BWchannel	Config 1,4		Note 8	Note 8
	Config 2,5	1	Note 8	Note 8
	Config 3,6	1	Note 8	Note 8
BW _{occupied}	Config 1,4	RB	52 Note 6	52 Note 6
·	Config 2,5	7	52 Note 6	52 Note 6
	Config 3,6	1	106 Note 7	106 Note 7
Initial DL BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5	1	DLBWP.0.1	DLBWP.0.1
	Config 3,6	1	DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5	1	DLBWP.1.1	DLBWP.1.1
	Config 3,6	1	DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5	1	ULBWP.0.1	ULBWP.0.1
	Config 3,6	1	ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1	ULBWP.1.1
Configuration	Config 2,5	1	ULBWP.1.1	ULBWP.1.1
	Config 3,6	1	ULBWP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5	7	SR.1.1 TDD	-
	Config 3,6	1	SR.2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5	7	CR.1.1 TDD	CR.1.1 TDD
	Config 3,6	1	CR.2.1 TDD	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5	7	CCR.1.1 TDD	CCR.1.1 TDD
	Config 3,6	7	CCR.2.1 TDD	CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2,5	7	TRS.1.1 TDD	TRS.1.1 TDD
	Config 3,6	7	TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns	Config 1,2,4,5		OP.1 Note 6	OP.1 Note 6
	Config 3,6	7	OP.1 Note 7	OP.1 Note 7
SMTC Configuration			SMTC.1	SMTC.1
TCI state			TCI.State.0	TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
	Config 3,6		SSB.2 FR1	SSB.2 FR1

·					
Correlation	on Matrix and Ar	ntenna		1x2 Low	1x2 Low
	Configuration				
	EPRE ratio of PSS to SSS				
EPRE rat	EPRE ratio of PBCH DMRS to SSS				
	tio of PBCH to P				
EPRE rat	tio of PDCCH DI	MRS to SSS			
EPRE rat	tio of PDCCH to	PDCCH DMRS			
EPRE rat	tio of PDSCH DI	MRS to SSS	dB	0	0
EPRE rat	tio of PDSCH to	PDSCH			
EPRE rat	tio of OCNG DM	IRS to SSS(Note			
1)					
EPRE rat	tio of OCNG to 0	OCNG DMRS			
(Note 1)					
Noc ^{Note 2}			dBm/15	-104	-104
			kHz	104	104
SS-RSRI	Note 3		dBm/15	-87	-87
			kHz		-
Ês/Iot			dB	17	17
Ês/Noc		T	dB	17	17
Io ^{Note3}		Config 1,2,4,5	dBm/ 9.36MHz	-58.96	-58.96
		Config 3,6	dBm/ 38.16MHz	-52.86	-52.86
Time offs	et to Cell1 Note 4		μs	3 for intra-band EN-DC,	3 + Time offset to Cell2 for
				33 for inter-band EN-	intra-band EN-DC,
				DC	33 + Time offset to Cell2 for inter-band EN-DC
Time offs	et to Cell2 Note 5		μs	-	3
	ion Condition		μο	AWGN	AWGN
Note 1:		e used such that bo	th cells are full	y allocated and a constant	
		ty is achieved for all		•	ретоп
Note 2:	-	-	-		ssumed to be constant over
					for Noc to be fulfilled within
	BW _{occupied} .			11 1 1	
Note 3: SS-RSRP and lo levels have been			n derived from	other parameters for inform	nation purposes. They are
	not settable parameters themselvess.				
Note 4: Receive time difference of signals			received betw	een subframe timing bound	dary of E-UTRA PCell and
slot timing boundary of PSCell at th			the UE antenn	a connector including time	alignment error between the
	two cells				
Note 5:	Receive time of	difference between	slot boundaries	s of signals received from the	ne two cells at the UE
		•	•	or between the two cells.	
Note 6:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52 RBs) from F _{C,low} , and lo is				

A.4.5.2.3.2 Test Requirements

Note 7:

Note 8:

independent of the BW_{channel} configured.

independent of the BW_{channel} configured.

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and Io is

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-2.

Table A.4.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

For synchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 1 subframe.

For synchronous intra-band EN-DC, the UE is only allowed to cause an interruption on E-UTRA PCell no earlier than 1 subframe before an SMTC and no later than 1 subframe after the SMTC. The interruption on E-UTRA PCell shall not exceed SMTC duration + 2 subframes.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.4.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2 and A.4.5.2.4.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.4.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config		Description				
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode				
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode				
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode				
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode				
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode				
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only re	e UE is only required to be tested in one of the supported test configurations				
Note 2:	The UE is only re	UE is only required to be tested in one with smallest aggregated channel bandwidth from supported				
	band combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test					
	configuration,	· · · · · · · · · · · · · · · · · · ·				

Table A.4.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value Comment		
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the	
		1, 2, 3	other two are NR RF channels	
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.	
Configured PSCell		Cell2	PSCell on NR RF channel number 2.	
Configured deactivated		Cell3	Deactivated SCell on NR RF channel	
SCell			number 3.	
CP length		Normal	Applicable to Cell1, Cell2 and Cell3	
DRX		OFF		
Measurement gap pattern		OFF		
Id		Oll		
SCell measurement cycle	ms	640		
(measCycleSCell)	1113	040		
T1	s	10		

Table A.4.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Paramet	ter	Unit	Cell2	Cell3
Frequency Range			FR1	FR1
Duplex mode	Config 1,4		FDD	FDD
	Config 2,3,5,6		TDD	TDD
TDD configuration	Config 1,4		Not Applicable	Not Applicable
	Config 2,5		TDDConf.1.1	TDDConf.1.1
DIM	Config 3,6		TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,4	-	Note 8	Note 8
	Config 2,5		Note 8	Note 8
DW/	Config 3,6 Config 1,4	RB	Note 8 52 Note 6	Note 8 52 Note 6
BW _{occupied}	Config 1,4	KD	52 Note 6	52 Note 6
	Config 2,5	1	106 Note 7	106 Note 7
Initial BWP	Config 1,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1	DLBWP.0.1
Comiguration	Config 3,6		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1	DLBWP.1.1
Comigaration	Config 3,6		DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1	ULBWP.0.1
Configuration	Config 2,5	1	ULBWP.0.1	ULBWP.0.1
3	Config 3,6	1	ULBWP.0.1	ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1	ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1	ULBWP.1.1
	Config 3,6		ULBWP.1.1	ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD	-
measurement channel	Config 2,5		SR.1.1 TDD	-
	Config 3,6		SR.2.1 TDD	-
RMSI CORESET	Config 1,4		CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD	CR.1.1 TDD
1	Config 3,6	1	CR.2.1 TDD	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD	CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD	CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD	CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD	TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD	TRS.1.2 TDD
OCNG Patterns	Config 1,2,4,5		OP.1 Note 6	OP.1 Note 6
	Config 3,6		OP.1 Note 7	OP.1 Note 7
SSB Configuration	Config 1,2,4,5		SSB.1 FR1	SSB.1 FR1
	Config 3,6		SSB.2 FR1	SSB.2 FR1
SMTC Configuration			SMTC.1	SMTC.1
TCI state			TCI.State.0	TCI.State.0
Correlation Matrix and Ar	ntenna		1x2 Low	1x2 Low
Configuration				
EPRE ratio of PSS to SS EPRE ratio of PBCH DM		-		
EPRE ratio of PBCH to P		1		
EPRE ratio of PDCCH D		1		
EPRE ratio of PDCCH to		-		
EPRE ratio of PDSCH DI		dB	0	0
EPRE ratio of PDSCH to		1 42	Ğ	Ĭ
EPRE ratio of OCNG DM		1		
1)				
EPRE ratio of OCNG to 0	OCNG DMRS	1		
(Note 1)	-			
N _{oc} Note 2		dBm/15 kHz	-104	-104
SS-RSRP Note 3		dBm/15	-87	-87
<u> </u>		kHz		
Ê _s /I _{ot}		dB	17	17
Ês/Noc	1	dB	17	17
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	-58.96	-58.96
	Config 3,6	dBm/ 38.16MHz	-52.86	-52.86

			I			
Time offset	to Cell1 Note	Config 1,2,4,5		500	500 + Time offset to	
4			μs		Cell2	
		Config 3,6		250	250 + Time offset to	
	Joining 6,6				Cell2	
Time offset	to Cell2 Note 5		μs	-	3	
Propagation	n Condition			AWGN	AWGN	
Note 1: (OCNG shall be	e used such that bot	th cells are full	y allocated and a constant to	tal transmitted power	
		y is achieved for all			, , , , , , , , , , , , , , , , , , ,	
	•	•	•	not specified in the test is ass	sumed to be constant over	
				WGN of appropriate power for		
	$BW_{occupied}$.	a a a a				
		In levels have heer	derived from	other parameters for informa	tion nurnoses. They are	
		rameters themselve		other parameters for informa	mon purposes. They are	
				een subframe timing bounda	ry of F-LITPA PCell and	
	•	ndary of PSCell at t	ne oe antenn	a connector including time ali	griment error between the	
	wo cells	P. C.				
	Receive time difference between slot boundaries of signals received from the two cells at the UE			two cells at the UE		
	antenna connector including time alignment error between the two cells.					
				onfined within BW _{occupied} (i.e. 10 MHz, 52 RBs) from F _{C,low} , and lo is		
	independent of the BW _{channel} configured.					
Note 7:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106 RBs) from F _{C,low} , and lo is					

A.4.5.2.4.2 Test Requirements

Note 8:

independent of the BW_{channel} configured.

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-2.

Table A.4.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

For asynchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 2 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.5.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.5.1-2 and A.4.5.2.5.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRAN SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.5.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.4.5.2.5.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on E-UTRAN RF channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.4.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1

BW _{channel}	Config 1 4	MHz	10: N _{RB,c} = 52
DVV channel	Config 1,4 Config 2,5	IVI□Z	10: N _{RB,c} = 52 10: N _{RB,c} = 52
		_	·
Initial DL BWP	Config 3,6		40: N _{RB,c} = 106 DLBWP.0.1
	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		
Dadia-tad DL DWD	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5	_	DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5	_	ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns	<u> </u>		OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
-	Config 3,6		SSB.2 FR1
Correlation Matrix and A	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	SS		
EPRE ratio of PBCH DM	IRS to SSS		
EPRE ratio of PBCH to F	PBCH DMRS		
EPRE ratio of PDCCH D	MRS to SSS		
EPRE ratio of PDCCH to	PDCCH DMRS	_	
EPRE ratio of PDSCH D	MRS to SSS	dB	0
EPRE ratio of PDSCH to		_	
EPRE ratio of OCNG DN			
1)			
EPRE ratio of OCNG to	OCNG DMRS	1	
(Note 1)			
Noc ^{Note 2}		dBm/15	
		kHz	-104
SS-RSRP Note 3		dBm/15	
-		kHz	-87
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	0 " 10 : -	dBm/	
	Config 1,2,4,5	9.36MHz	-58.96
	0 (0 0	dBm/	=2.22
	Config 3,6	38.16MHz	-52.86
	l	1	I .

Time offset to Cell1 Note 4		μs	3 for intra-band EN-DC,
		•	33 for inter-band EN-DC
Propagation Condition			AWGN
Note 1:	OCNG shall be used such that bot	th cells are full	y allocated and a constant total transmitted power
	spectral density is achieved for all	OFDM symbo	ls.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over		
	subcarriers and time and shall be modeled as AWGN of appropriate power for N₀c to be fulfilled.		WGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are		
	not settable parameters themselvess.		
Note 4:	Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and		
	slot timing boundary of PSCell at the UE antenna connector including time alignment error between the		
	two cells		

A.4.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed X defined in Table A.4.5.2.5.2-1 if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell or Y in Table A.4.5.2.3.2-1 if the NR PSCell is in the same band as the E-UTRAN deactivated SCell.

Table A.4.5.2.5.2-1: Interruption length X and Y at measurements on deactivated E-UTRA SCC

и	NR Slot	Interruption length X slot	Interruption length Y slot
μ.	length (ms)	Sync	
0	1	1	1+SMTC duration
1	0.5	1	1+SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.6.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.6.1-1 and A.4.5.2.6.1-2 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.6.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

Table A.4.5.2.6.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1 2 2	One is NR RF channel and the other two
		1, 2, 3	are E-UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parame	ter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BWchannel	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD

RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	+	CR.1.1 TDD
parameters	Config 3,6	+ +	CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5	+	CCR.1.1 TDD
parameters	Config 3,6	+	CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
TRS Configuration		-	TRS.1.1 TDD
	Config 2,5	4	
00N0 B #	Config 3,6		TRS.1.2 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TCI state	T = "		TCI.State.0
SSB Configuration	Config 1,2,4,5	_	SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and Ar	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS			
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to P			
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to			
EPRE ratio of PDSCH DI	MRS to SSS	dB	0
EPRE ratio of PDSCH to	PDSCH		
EPRE ratio of OCNG DM	IRS to SSS(Note		
1)			
EPRE ratio of OCNG to OCNG DMRS			
(Note 1)			
N _{oc} Note 2		dBm/15	-104
		kHz	-104
SS-RSRP Note 3		dBm/15	0.7
		kHz	-87
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Config 4 0 4 5	dBm/	E0.00
	Config 1,2,4,5	9.36MHz	-58.96
	O-utin C C	dBm/	50.00
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note	Config 1,2,4,5	μs	500
4		,,,,	
	Config 3,6	†	250
Propagation Condition			AWGN
	e used such that bo	oth cells are fully	allocated and a constant total transmitted power
	ty is achieved for a		

- spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for N_{cc} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

A.4.5.2.6.2 **Test Requirements**

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2
1	0.5	2

Table A.4.5.2.6.2-2: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.7 Void

A.4.5.3 SCell Activation and Deactivation Delay

A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.4.5.3.1.1-1 below. The test parameters are given in Tables A.4.5.3.1.1-2 and cell-specific parameters in A.4.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot m + $\frac{T_{\text{HARQ}} + T_{\text{activation_time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PSCell in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot $m+1+\frac{T_{\text{HARQ}}}{NR \text{ slot length}}$ to slot $m+1+\frac{T_{\text{HARQ}} + 3ms + T_X}{NR \text{ slot length}} + N_{\text{interruption}}$, as defined in clause 8.3, where $N_{\text{interruption}}$ is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe $m_1+1+\frac{T_{\text{HARQ}}}{EUTRA \text{ slot length}}$ to subframe $m_2+1+\frac{T_{\text{HARQ}+3ms}+T_X}{EUTRA \text{ slot length}} + N_{\text{interruption}}$, where m_1 and m_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and $N_{\text{interruption}}$ is the interruption length given in TS 36.133 [14] section 7.32.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot n + $\frac{T_{\text{HARQ}} + 3ms}{NR \text{ slot length}}$, as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot n + 1 + $\frac{T_{\text{HARQ}}}{NR \text{ slot length}}$ to n + 1 + $\frac{T_{\text{HARQ}} + 3ms}{NR \text{ slot length}}$, as defined in clause 8.3. The starting point of any E-UTRA PCell

interruption due to the deactivation shall occur in the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA\,subframe\,length}$ to subframe $n_2 + 1 + \frac{T_{\text{HARQ}+3\,\text{ms}}}{EUTRA\,subframe\,length}$, where n_1 and n_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for SCell is discontinued.

Table A.4.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Configuration		Description	
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	
4 LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	
5 LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mod		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	
6 LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	
Note 1:	te 1: The UE is only required to be tested in one of the supported test configurations		
Note 2:	ote 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from suppor		
	band con	pand combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test	
	configura	tion,	

Table A.4.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.1
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	S	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	1	During this time the UE shall activate the SCell.

Т3	s	1	During this time the UE shall deactivate the SCell.
Tharq	ms	k₁×NR slot length	k ₁ is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by <i>dl-DataToUL-ACK</i> if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]
Tcsi_Reporting	ms	15	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing timefor CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]
k	slot	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe}\mu} + 1$	As specified in clause 4.3 of TS 38.213 [3]

Table A. 4.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parame	ter	Unit	Cell 2	Тэ	T4	Cell 3	Т2
SSB ARFCN			T1 T2 freq1	Т3	T1	T2 freq2	Т3
	Config 1,4		neq1	F	DD	neqz	
Duplex mode	Config 2,3,5,6	-			DD .		
	Config 1,4				plicable		
TDD configuration	Config 2,5	-	TDDConf.1.1				
1 DD Configuration		1					
	Config 3,6				onf.2.1		
	Config 1,4			No	te 7		
BW _{channel}	Config 2,5	MHz		No	te 7		
	Config 3,6			No	te 7		
BWoccupied	Config 1,4	RB		52 1	Note 5		
DVV occupied		- 115			Note 5		
	Config 2,5	-					
	Config 3,6			106	Note 6		
DL initial BWP	Config 1, 2, 3, 4,			DLBV	/P.0.1		
configuration DL dedicated BWP	5, 6 Config 1, 2, 3, 4,						
configuration	5, 6			DLBV	/P.1.1		
UL initial BWP	Config 1, 2, 3, 4,						
configuration	5, 6			ULBV	/P.0.1		
UL dedicated BWP	Config 1, 2, 3, 4,			III DW	/P.1.1		
configuration	5, 6			ULBV	VF.I.I		
DRX Cycle		ms		Not Ap	plicable		
PDSCH Reference	Config 1,4		SR.1.1 FD	D		SR.1.1 FD	D
measurement channel	Config 2,5		SR.1.1 TD	D		SR.1.1 TD	D
measurement channel	Config 3,6		SR.2.1 TD			SR.2.1 TD	
RMSI CORESET	Config 1,4		CR.1.1 FD			CR.1.1 FD	
Reference Channel	Config 2,5		CR.1.1 TD			CR.1.1 TD	
Telefenee Granner	Config 3,6		CR.2.1 TD			CR.2.1 TD	
RMC CORESET	Config 1,4		CCR.1.1 FI			CCR.1.1 FI	
Reference Channel	Config 2,5		CCR.1.1 T			CCR.1.1 TI	
	Config 3,6		CCR.2.1 T			CCR.2.1 TI	
TRS configuration	Config 1,4		TRS.1.1 F TRS.1.1 T			<u>ΓRS.1.1 FI</u> ΓRS.1.1 TI	
1 K3 configuration	Config 2,5 Config 3,6		TRS.1.2 T			ΓRS.1.2 TI	
OCNG Patterns	Config 1,2,4,5		11(0.1.2 1	OP.1	Note 5	1110.1.2 11	
	Config 3,6				Note 6		
SMTC configuration	J - , -		SMTC.1				
SSB configuration	Config 1,2,4,5				1 FR1		
33B configuration	Config 3,6				2 FR1		
CSI-RS configuration	Config 1,4				1.1 FDD		
for CSI reporting	Config 2,5				1.1 TDD		
. •	Config 3,6				2.1 TDD		
PDSCH/PDCCH	Config 1,2,4,5	kHz			5		
subcarrier spacing reportConfigType	Config 3,6 Config 1-6				0 odic		
reportQuantity	Config 1-6				MI-CQI		
CSI reporting	Config 1-6						
periodicity		ms		;	5		
,	Config 3,6			1	0		
CSI reporting offset	Config 1,2,4,5	slot			2	_	-
Config 3,6				-	4		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		1					
EPRE ratio of PDCCH DMRS to SSS		1					
EPRE ratio of PDCCH to PDCCH DMRS		dB		()		
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PD	DSCH S to SSS(Note 4)	-					
FPRE ratio of OCNG DMRS	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)						
	TO DIVINO (14010 1)	+					
N_{oc} Note2		dBm/15kHz		-1	04		
1			1				

N_{\perp} Note2	Config 1,2,4,5		-104
$N_{OC}^{ m Note2}$	Config 3,6	dBm/SCS	-101
$\hat{\mathbf{E}}_{\scriptscriptstyle{\mathrm{s}}}/\mathbf{I}_{\scriptscriptstyle{\mathrm{ot}}}$	•	dB	17
\hat{E}_s/N_{oc}		dB	17
SS-RSRP ^{Note3}	Config 1,2,4,5	4D/CCC	-87
	Config 3,6	dBm/SCS	-84
SCH_RP Note 3		dBm/15 kHz	-87
IoNote3	Config 1,2,4,5	dBm/ 9.36MHz	-58.96
10.15.55	Config 3,6	dBm/ 38.16MHz	-52.87
Propagation condition		-	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW $_{
 m occupied}$.
- Note 3: SS-RSRP, lo and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]
- Note 5: All UL/DL transmission shall be confined within BW_{channel_actual-occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- Note 6: All UL/DL transmission shall be confined within BW_{channel_actual-occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.4.5.3.1.2 Test Requirements

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot m + $\frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \ slot \ length}$, $T_{activation_time} = T_{FirstSSB} + 5ms$, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$ to $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}+N_{\rm interruption}$, and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$ to subframe $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}+N_{\rm interruption}$, as defined in clause 8.3.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n + $1 + \frac{T_{\text{HARQ}}}{NR \; slot \; length}$ to n + $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{NR \; slot \; length}$, as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \; subframe \; length}$ to subframe n₂ + $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{EUTRA \; subframe \; length}$.

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot m + $\frac{T_{\text{HARQ}} + T_{\text{activtion_time}} + T_{\text{CSI_Reporting}}}{NR \, slot \, length} \text{ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.}$

A.4.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 320 ms SCell measurement cycle

A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1. The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.4.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB\ MAX} + T_{rs} + 5ms$.

A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in slot m + $\frac{\text{THARQ} + T_{\text{activition_time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot } length} \text{ as defined in clause } 8.3 \text{ provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI in slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot } m+1+\frac{T_{\text{HARQ}}}{NR \text{ slot } length} \text{ to slot } m+1+\frac{T_{\text{HARQ}}+3\text{ ms}+T_X}{NR \text{ slot } length}} + N_{\text{interruption}}, \text{ as defined in clause } 8.3, \text{ where } N_{\text{interruption}} \text{ is the interruption length given in section } 8.2. \text{ Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe } m_1+1+\frac{T_{\text{HARQ}}}{EUTRA \text{ slot } length} \text{ to subframe } m_2+1+\frac{T_{\text{HARQ}}+3\text{ ms}+T_X}{EUTRA \text{ slot } length}} + N_{\text{interruption}}, \text{ where } m_1 \text{ and } m_2 \text{ are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and } N_{\text{interruption}} \text{ is the interruption length given in TS } 36.133 \text{ [14] section } 7.32.$

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot n + $\frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot n + 1 + $\frac{T_{HARQ}}{NR \ slot \ length}$ to n + 1 + $\frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3. The starting point of any E-

UTRA PCell interruption due to the deactivation shall occur in the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, subframe \, length}$ to subframe $n_2 + 1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{EUTRA \, subframe \, length}$, where n_1 and n_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.4.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.4.5.3.3.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB_MAX} + T_{SMTC_MAX} + 2*T_{rs} + 5ms$ as defined in clause 8.3.

A.4.5.4 UE UL carrier RRC reconfiguration Delay

A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4: Void

A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell 3). For SCell, both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PSCell and SCell are given in Table A. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE. At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth,
	mode	FDD duplex mode;
		SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex
		mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth,
	mode	TDD duplex mode;

		SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode			
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode			
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode			
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode			
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode			
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode			
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode			
9	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations Note 2 The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test configuration,					

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1,2,3, 4, 5, 6, 7, 8, 9	1, 2, 3	Three radio channels are used for these two tests.
Active cell		Config 1,2,3, 4, 5, 6, 7, 8, 9	Cell 1: E-UTRAN PCell Cell 2: FR1 PSCell Cell 3: FR1 SCell	E-UTRAN PCell on RF channel number 1 FR1 PSCell on RF channel number 2 FR1 SCell on RF channel number 3
CP length		Config 1,2,3, 4, 5, 6, 7, 8, 9	Normal	
DRX		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Measurement gap pattern Id		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4, 5, 6, 7, 8, 9	0	L3 filtering is not used
T1	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T2	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T3	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

Parameter	Unit	Test 1	Test 2	

		Test Configuration	T1	T2	Т3		T1	T2	Т3	
Channel number		Conf 1, 2, 3, 4,		2				2	ı	
		5, 6, 7, 8, 9 Conf 1, 2, 3		N/A				N/A		
TDD configuration			TDD Conf.1.1					TDD Conf.1.	1	
TDD configuration		Conf 4, 5, 6	TDD Conf.2.1					TDD Conf.1.		
		Conf 7, 8, 9						Note 6	. 1	
BWchannel	MHz	Conf 1, 2, 3	Note 6				Note 6			
BVV channel	IVIHZ	Conf 4, 5, 6		Note 6						
DW	DD	Conf 7, 8, 9		Note 6 52 Note 4			Note 6 52 Note 4			
BW _{occupied}	RB	Conf 1, 2, 3		52 Note 4			52 Note 4 52 Note 4			
		Conf 4, 5, 6		106 Note 5				106 Note 5		
PDSCH reference		Conf 7, 8, 9								
		Conf 1, 2, 3		SR.1.1 FD				SR.1.1 FDE		
measurement		Conf 4, 5, 6		SR.1.1 TD	ט			SR.1.1 TDE)	
channel as defined in A.3.1.1		Conf 7, 8, 9		SR 2.1 TD				SR 2.1 TDE		
RMSI CORESET		Conf 1, 2, 3		CR.1.1 FD				CR.1.1 FDE		
reference		Conf 4, 5, 6		CR.1.1 TD	D			CR.1.1 TDE)	
measurement channel as defined in A.3.1.2		Conf 7, 8, 9		CR.2.1 TD	D			CR.2.1 TDE)	
RMC CORESET		Conf 1, 2, 3		CCR.1.1 FE	D		(CCR.1.1 FD	D	
reference		Conf 4, 5, 6		CCR.1.1 TE				CCR.1.1 TD		
measurement channel as defined in A.3.1.3		Conf 7, 8, 9		CCR.2.1 TE				CCR.2.1 TD		
OCNG Pattern Note 1		Conf 1, 2, 3, 4,		OP.1 Note 4	1			OP.1 Note 4		
		5, 6 Config 7, 8, 9		OP.1 Note 5				OP.1 Note 5		
SSB configuration		Conf 1, 2, 3, 4, 5, 6		SSB.1 FR	1		SSB.1 FR1			
COD comigaration		Conf 7, 8, 9		SSB.2 FR	1		SSB.2 FR1			
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		SMTC.1			SMTC.1			
		Conf 1		TRS.1.1 FDD			TRS.1.1 FDD		D	
		Conf 2	•	TRS.1.1 FD	D	TRS.1.1 FDD		D		
		Conf 3		TRS.1.1 FD	D	TRS.1.1 FDD		D		
		Conf 4		TRS.1.1 TD			-	TRS.1.1 TD	D	
CSI-RS for tracking		Conf 5		TRS.1.1 TD	D			TRS.1.1 TD	D	
		Conf 6		TRS.1.1 TD	D		-	TRS.1.1 TD	D	
		Conf 7	•	TRS.1.2 TD	D		-	TRS.1.2 TD	D	
		Conf 8	•	TRS.1.2 TD	D		-	TRS.1.2 TD	D	
		Conf 9	•	TRS.1.2 TD	D		-	TRS.1.2 TD	D	
DL initial BWP		Conf 1, 2, 3, 4,		DI BWD 0	4			DI DWD 0.4	1	
configuration		5, 6, 7, 8, 9		DLBWP.0.	1			DLBWP.0.1		
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		DLBWP.1.	1			DLBWP.1.1		
UL dedicated BWP		Conf 1, 2, 3, 4,								
configuration		5, 6, 7, 8, 9		ULBWP.1.	1			ULBWP.1.1		
EPRE ratio of PSS to SSS		3, 3, 1, 3, 3								
EPRE ratio of PBCH_DMRS to SSS										
EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0			0				
EPRE ratio of PDCCH to PDCCH_DMRS	1									
EPRE ratio of PDSCH_DMRS to SSS										

EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102	
$N_{oc}^{$	dBm/ SCS	Conf 1,2,3,4,5,6		-102			-102	
	303	Conf 7,8,9		-99			-99	
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
\hat{E}_{s}/I_{ot} Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
	303	Conf 7,8,9	-83	-83	-83	-83	-83	-83
	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
Io Note 3	dBm/ 38.16 MHz	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2 1 x 2					

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW $_{\rm occupied}$.
- NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, lo, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW $_{occupied}$ (i.e. 10 MHz, 52 RBs) from F $_{C,low}$, and lo is independent of the BW $_{channel}$ configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW channel.

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

Parameter	Unit	Test	Test 1				Test 2	
		Configuration	T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		3			3	
		Conf 1, 4, 7		N/A		N/A		
TDD configuration		Conf 2, 5, 8	TDDConf.1.1			TDDConf.1.1		
		Conf 3, 6, 9		TDDConf.2.	1	TDDConf.2.1		
		Conf 1, 4, 7		Note 6			Note 6	
BWchannel	MHz	Conf 2, 5, 8	Note 6			Note 6		
		Conf 3, 6, 9		Note 6			Note 6	
BW _{occupied} RB Conf 1, 4, 7		Conf 1, 4, 7	52 Note 4			52 Note 4		
		Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5			106 Note 5	

		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		G-FR1-	
			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
			A3-10	in [13]	[13]	14,71	[13]	14/71
			in [13]	[0]	[]		[.0]	
DUCCU maranastana		Conf 2, 5, 8	G-	G-FR1-	G-FR1-		G-FR1-	
PUSCH parameters			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
for NR UL carrier			A3-10	in [13]	[13]		[13]	
		Conf 3, 6, 9	in [13] G-					
		Con 3, 6, 9	FR1-	G-FR1-	G-FR1-		G-FR1-	
			A3-14	A3-14	A3-14 in	N/A	A3-14 in	N/A
			in [13]	in [13]	[13]		[13]	
		Conf 1, 4, 7	Table	Table				
		COIII 1, 4, 7	8.3.3.1	8.3.3.1.	Table			
			.2-1 in	2-1 in	8.3.3.1.2	N/A	N/A	N/A
			[13]	[13]	-1 in [13]			
		Conf 2, 5, 8	Table	Table				
PUCCH parameters		20 2, 0, 0	8.3.3.1	8.3.3.1.	Table			
For NR UL carrier			.2-1 in	2-1 in	8.3.3.1.2	N/A	N/A	N/A
			[13]	[13]	-1 in [13]			
		Conf 3, 6, 9	Table	Table				
			8.3.3.1	8.3.3.1.	Table	N1/A	N1/A	N1/A
			.2-2 in	2-2 in	8.3.3.1.2	N/A	N/A	N/A
			[13]	[13]	-2 in [13]			
		Conf 1, 4, 7		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
				in [13]		[13]	[13]	[13]
PUSCH parameters		Conf 2, 5, 8		G-FR1-		G-FR1-	G-FR1-	G-FR1-
for supplementary			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
UL				in [13]		[13]	[13]	[13]
		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
				in [13]		[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
PUCCH parameters		Conf 2, 5, 8				Table	Table	Table
for supplementary			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
UL						-1 in [13]	-1 in	-1 in [13]
		0				T-1-1-	[13]	
		Conf 3, 6, 9	NI/A	NI/A	NI/A	Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
PDSCH reference		Conf 1, 4, 7	SR.1.1 FDD		-2 in [13] -2 in [13] -2 in [13] SR.1.1 FDD			
measurement		Conf 2, 5, 8		SR.1.1 TD		SR.1.1 FDD SR.1.1 TDD		
channel as defined		Conf 3, 6, 9						
in A.3.1.1		Con 3, 6, 9		SR 2.1 TD	D		SR 2.1 TDD)
RMSI CORESET		Conf 1, 4, 7		CR.1.1 FD	D.		CR.1.1 FDD)
reference		Conf 2, 5, 8		CR.1.1 TD			CR.1.1 TDD	
measurement		Conf 3, 6, 9		J 1. 1 1 D				
channel as defined		00/11/0, 0, 0		CR.2.1 TD	D		CR.2.1 TDD)
in A.3.1.2								
RMC CORESET		Conf 1, 4, 7	(CCR.1.1 FI	OD	(CCR.1.1 FDI)
reference	1	Conf 2, 5, 8	(CCR.1.1 TI	OD	(CCR.1.1 TDI)
measurement		Conf 3, 6, 9						
channel as defined	1			CCR.2.1 TI	DD	(CCR.2.1 TDI)
in A.3.1.3								
OCNG Pattern Note 1 Cor		Conf 1, 2, 4, 5,		OP.1 Note	4		OP.1 Note 4	
2 2 2		7, 8					-	
		Conf 3, 6, 9		OP.1 Note	ບ		OP.1 Note 5	
000 "		Conf 1, 2, 4, 5,		SSB.1 FR	.1		SSB.1 FR1	
SSB configuration		7,8						
		Conf 3, 6, 9		SSB.2 FR	1		SSB.2 FR1	
SMTC configuration		Conf 1, 2, 3, 4,		SMTC.1			SMTC.1	
J		5, 6, 7, 8, 9			<u> </u>			
CSI-RS for tracking		Conf 1		TRS.1.1 FE			RS.1.1 FDI	
1	1	Conf 2	I -	TRS.1.1 T	טט	1	ΓRS.1.1 TDΙ	י

	1		_	TDO 4 6 ==	<u> </u>		FDO 1 2 == -	
		Conf 3		RS.1.2 TD			TRS.1.2 TDI	
		Conf 4		TRS.1.1 FD			TRS.1.1 FDI	
		Conf 5		RS.1.1 TD			TRS.1.1 TDI	
		Conf 6	TRS.1.2 TDD TRS.1.1 FDD			TRS.1.2 TDI		
		Conf 7				TRS.1.1 FDD TRS.1.1 TDD		
		Conf 8 Conf 9	TRS.1.1 TDD		TRS.1.1 TDD TRS.1.2 TDD			
DI initial DWD			TRS.1.2 TDD		TRS.1.2 TDD			
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1		DLBWP.0.1			
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		DLBWP.1.	1	DLBWP.1.1		
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		ULBWP.1.	1		ULBWP.1.1	
EPRE ratio of PSS		0, 0, 1, 0, 0						
to SSS								
EPRE ratio of								
PBCH_DMRS to								
SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of	1							
PDCCH_DMRS to								
EPRE ratio of								
PDCCH to PDCCH_DMRS	dB	Conf 1, 2, 3, 4,		0			0	
EPRE ratio of	ub	5, 6, 7, 8, 9		U			U	
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
EPRE ratio of								
OCNG DMRS to								
SSS								
EPRE ratio of	1							
OCNG to OCNG								
DMRS								
	dBm /	Conf 1, 2, 3, 4,		-102			-102	
N/ Note 2	15kHz	5, 6, 7, 8, 9		· •-				
N_{oc} Note 2	dBm/	Conf 1, 2, 4, 5,		-102			-102	
	SCS	7,8 Conf 3, 6, 9		-99			-99	
\hat{F} /N	15	Conf 1, 2, 3, 4,	40		40	40		4.0
\hat{E}_s/N_{oc}	dB	5, 6, 7, 8, 9	16	16	16	16	16	16
\hat{E}_{s}/I_{ot} Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
OO DODD Note 2	dBm/	Conf 1, 2, 4, 5,	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3	SCS	7,8						
		Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
	dBm/	Conf 1, 2, 4, 5,	F7 ^	F7.0	F7 ^	F7 0	F7.0	F7 ^
	9.36	7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
Io Note 3	MHz	Conf 2 6 0						
	dBm/ 38.16	Conf 3, 6, 9	_51 Q	_51 Q	_51 Q	_51 Q	_51 Q	_51 Q
	MHz		-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation	IVI□∠	Conf 1, 2, 3, 4,					1	
Condition		5, 6, 7, 8, 9		AWGN			AWGN	
Antenna		Conf 1, 2, 3, 4,						
configuration		5, 6, 7, 8, 9		1 x 2			1 x 2	
Comgaration	l	0, 0, 1, 0, 0				l .		

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW-availed.
- NOTE 3: \hat{E}_s/I_{ot} , lo, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: N_{RB,c} is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.4.5.5 Beam Failure Detection and Link recovery procedures

A.4.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.4.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.1.1-1, A.4.5.5.1.1-2, A.4.5.5.1.1-3 and A.4.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.4.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only i	required to pass in one of the supported test configurations in FR1

Table A.4.5.5.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parame	eter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCe E-UTRA RF Chann			Cell 1	
Active PSCell	ei Number		Cell 2	
RF Channel Number	2r		2	
Duplex mode	Config 1, 4		FDD	
Buplox mode	Config 2, 3,		TDD	
	5, 6			
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP	Config 1, 2,		DLBWP.0.1	
configuration	3, 4, 5, 6		51511511	
DL dedicated BWP	Config 1, 2,		DLBWP.1.1	
configuration	3, 4, 5, 6			
UL initial BWP	Config 1, 2,		ULBWP.0.1	
configuration	3, 4, 5, 6		OLDWI .O.1	
UL dedicated	Config 1, 2,		ULBWP.1.1	
BWP	3, 4, 5, 6			
configuration				
TDD	Config 1, 4		Not Applicable	
Configuration				
	Config 2, 5		TDDConf.1.1	
CORFORT	Config 3, 6		TDDConf.2.1	
CORESET Reference	Config 1, 4		CR.1.1 FDD	
Channel				
Onamie	Config 2, 5	1	CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
SSB	Config 1, 4		SSB.3 FR1	
Configuration				
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC	Config 1, 2,		SMTC.1	
Configuration	4, 5		CMTC 1	
PDSCH/PDCCH	Config 3, 6 Config 1, 2,		SMTC.1 15 KHz	
subcarrier spacing	4, 5		15 KHZ	
- Cabbannon opaoing	Config 3, 6		30 KHz	
PRACH	Config 1, 2,		Table A.3.8.2.2-	
Configuration	4, 5		1	
Comgaration	Config 3, 6		Table A.3.8.2.2-	
	, , ,		1	
SSB Index assigned	d as BFD RS		0	
(q ₀)				
SSB Index assigned	d as CBD RS		1	
(q ₁)			00.4	
OCNG parameters			OP.1	
CP length Correlation Matrix a	and Antenna	1	Normal 2x2 Low	
Configuration	ina Antellia	1	ZAZ LUW	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM	1		
	symbols	00-		
	Aggregation level	CCE	8	

	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average SSS			
	RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	ellelgy to			
	average SSS			
	RE energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size		Ü	
DRX	SIZC		OFF	
Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSyr	ncThreshold		absent	When the field is
Tillinioyne date i dy	icitiicanoid		abscrit	absent, the UE
				applies the value 0.
	•			(Table 8.1.1-1).
rsrp-	Config 1, 2,	dBm/	-98	Threshold used for
ThresholdSSB	4, 5	SCS		$Q_{in_LR_SSB}$
		kHz		
	Config 3, 6		-95	
				11 16 1
nowerControlOffset	ISS		ana	I ISEA for Aerivina
powerControlOffset	:55		db0	Used for deriving
powerControlOffset	iSS		dbU	rsrp-ThresholdCSI-
				rsrp-ThresholdCSI- RS
powerControlOffset beamFailureInstand			abu n1	rsrp-ThresholdCSI- RS see TS 38.321 [7],
beamFailureInstand	ceMaxCount		n1	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17
	ceMaxCount			rsrp-ThresholdCSI- RS see TS 38.321 [7],
beamFailureInstand	ceMaxCount		n1 pbfd4	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17
beamFailureInstand	ceMaxCount ionTimer		n1	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect	ceMaxCount		n1 pbfd4	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for	ceMaxCount ionTimer		n1 pbfd4	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect	ceMaxCount ionTimer Config 1, 4		n1 pbfd4 CSI-RS.1.1 FDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for	ceMaxCount ionTimer Config 1, 4 Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for	ceMaxCount ionTimer Config 1, 4 Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	me	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	ms	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000	rsrp-ThresholdCSI- RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000 2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	ms	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000 2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000 2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0,1 1000 2 0.2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0,1 1000 2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully synchronized to cell
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	S	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0,1 1000 2 0.2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully synchronized to cell
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1 T2 T3	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	s s s	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0,1 1000 2 0.2 0.37	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully synchronized to cell
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1 T2 T3 T4	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	s s s	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0,1 1000 2 0.2 0.2 0.37 0.24 0	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully synchronized to cell
beamFailureInstand beamFailureDetect CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigne T310 timer N310 T1 T2 T3	ceMaxCount ionTimer Config 1, 4 Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6	s s s	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0,1 1000 2 0.2 0.2	rsrp-ThresholdCSI-RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 During this time the the UE shall be fully synchronized to cell

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	er	Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB			0	•	
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM		dB					
EPRE ratio of PBCH to F	PBCH DMRS	dB					
EPRE ratio of PSS to SS	SS	dB	1				
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DN	/IRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
M	Config 1, 4	dBm/15			-98		
N_{oc}	Config 2, 5	KHz			-98		
	Config 3, 6				-98		
Propagation condition				TDL-	C 300ns 1	00Hz	
	be used such that sower spectral dens	sity is achieve	ed for all OF	DM symbo			otal

- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.1.1-4: Void

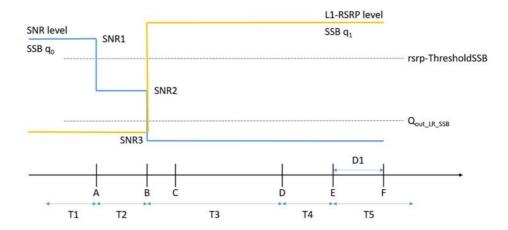


Figure A.4.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.4.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.2.1-1, A.4.5.5.2.1-2, A.4.5.5.2.1-3, A.4.5.5.2.1-4 and A.4.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q₀ in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q₁ of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	required to pass in one of the supported test configurations in FR1

Table A.4.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment	
A .:			Test 1		
Active E-UTRA PCell			Cell 1		
	E-UTRA RF Channel Number		1		
Active PSCell			Cell 2		
RF Channel Number Duplex mode	Config 1,		2 FDD		
Duplex mode	4				
	Config 2, 3, 5, 6		TDD		
BWchannel	Config 1, 4	MHz	10: NRB,c = 52		
	Config 2, 5		10: NRB,c = 52		
	Config 3,		40: NRB,c = 106		
DL initial BWP	Config 1,		DLBWP.0.1		
configuration	2, 3, 4, 5,				
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5,		DLBWP.1.1		
	6		55		
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1		
UL dedicated BWP	Config 1,		ULBWP.1.1		
configuration	2, 3, 4, 5, 6				
TDD Configuration	Config 1, 4		Not Applicable		
	Config 2, 5		TDDConf.1.1		
	Config 3,		TDDConf.2.1		
CORESET Reference Channel	Config 1,		CR.1.1 FDD		
	Config 2, 5		CR.1.1 TDD		
	Config 3,		CR.2.1 TDD		
SSB Configuration	Config 1, 4		SSB.3 FR1		
	Config 2, 5		SSB.3 FR1		
	Config 3,		SSB.4 FR1		
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1		
	Config 3,		SMTC.1		
PDSCH/PDCCH subcarrier spacing	Config 1, 2, 4, 5		15 KHz		
	Config 3,		30 KHz		
PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.2-		
	Config 3,		Table A.3.8.2.2-		
SSB Index assigned as BFD RS (q ₀)			0		
SSB Index assigned as CBD RS (q ₁)			1		
OCNG parameters			OP.1		
CP length			Normal		
Correlation Matrix and Antenna Configuration			2x2 Low		
	DCI format		1-0		

1		I		1
detection	Number of		2	
transmission	Control			
parameters	OFDM			
	symbols			
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average			
	SSS RE			
	energy			
	Ratio of	dB	0	
	hypothetical	ub.	O	
	PDCCH			
	DMRS			
	_			
	energy to			
	average			
	SSS RE			
	energy		DEO.I II	
	DMRS		REG bundle	
	precoder		size	
	granularity		_	
	REG bundle		6	
DDV	size		DDV 7	4007
DRX			DRX.7	A.3.3.7
Gap pattern ID	T		N.A.	10/1 (1 C 11:
rlmInSyncOutOfSy	nc i nresnoia		absent	When the field is
				absent, the UE
				applies the value
	Confin 4 0	dBm/SCS	00	0. (Table 8.1.1-1). Threshold used for
rsrp- ThresholdSSB	Config 1, 2,	kHz	-98	
Thresholdsob	4, 5	KHZ	05	Q _{in_LR_} SSB
0 1 10"	Config 3, 6		-95	11 16 1
powerControlOffse	เรร		db0	Used for deriving
				rsrp-
			4	ThresholdCSI-RS
beamFailureInstan	ceiviaxCount		n1	see TS 38.321 [7],
			1.614	clause 5.17
beamFailureDetect	tion I imer		pbfd4	see TS 38.321 [7],
001.00	10 " 1 1		001.00.4.4	clause 5.17
CSI-RS	Config 1, 4		CSI-RS.1.1	
configuration for			FDD	
CSI reporting	0 " 0 -		201.50 / /	
	Config 2, 5		CSI-RS.1.1	
	0 " 0 0		TDD	
	Config 3, 6		CSI-RS.2.1	
001.00.1			TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
tracking	0 " 5 -		TD0 : : ====	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
SSB Index assigned as RLM RS			0,1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time
				the the UE shall be
				fully synchronized
				to cell 1
T2		S	5.17	
T3		S	3.24	
T4		S	0	
T5		S	1.97	
D1		S	1.93	
וט				

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB		•	0		•
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to F	PBCH DMRS	dB					
EPRE ratio of PSS to SS	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	IRS to SSS	dB					
EPRE ratio of OCNG to 0	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N_{oc} Config 1, 4		dBm/15	-98				
1 oc		KHz					
	Config 2, 5		-98				
Config 3, 6					-98		
Propagation condition			TDL-C 300ns 100Hz				

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 4: Void

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.2.1-4: Void

Table A.4.5.5.2.1-5: Void

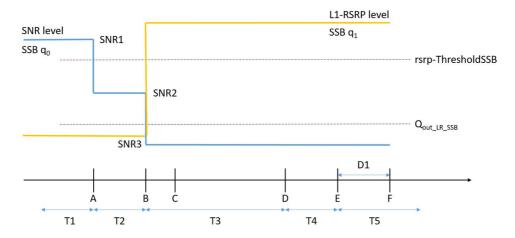


Figure A.4.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 1920 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.4.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.3.1-1, A.4.5.5.3.1-2, and A.4.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.3.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2.

The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment	
			Test 1		
Active PCell			Cell 1		
RF Channel Number			1		
Active PSCell			Cell 2		
RF Channel Number			2		
Duplex mode	Config 1, 4		FDD		
	Config 2, 3, 5,		TDD		
BWchannel	6 Config 1, 4	MHz	40: NDD - 50		
Byvchannei		IVIHZ	10: NRB,c = 52		
	Config 2, 5 Config 3, 6		10: NRB,c = 52		
DL initial BWP	Config 3, 6		40: NRB,c = 106 DLBWP.0.1		
configuration	4, 5, 6		DLBVVP.U. I		
DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1		
configuration	4, 5, 6		DLDWI .I.I		
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1		
configuration	4, 5, 6		OLDWI IO.1		
UL dedicated BWP	Config 1, 2, 3,		ULBWP.1.1		
configuration	4, 5, 6				
TDD Configuration	Config 1, 4		Not Applicable		
	Config 2, 5		TDDConf.1.1		
	Config 3, 6		TDDConf.2.1		
CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2	
Reference Channel					
	Config 2, 5		CR.1.1 TDD		
	Config 3, 6		CR.2.1 TDD		
SSB Configuration	Config 1, 4		SSB.3 FR1	A.3.10	
	Config 2, 5		SSB.3 FR1		
	Config 3, 6		SSB.4 FR1		
SMTC Configuration	Config 1, 2, 4,		SMTC.1	A.3.11	
	5 Config 3, 6		SMTC.1		
PDSCH/PDCCH	Config 1, 2, 4,		15 KHz		
subcarrier spacing	5		15 KHZ		
- cabbarrior opacing	Config 3, 6		30 KHz		
PRACH	-		FR1 PRACH	A.3.8.2	
Configuration	Config 1, 2, 4,			A.3.8.2	
Configuration	5 Config 3, 6		configuration 4 FR1 PRACH	A.3.8.2	
	Corning 5, 6		configuration 4	A.3.0.2	
csi-RS-Index assigned	d as beam failure		0		
detection RS in set q ₀					
OCNG parameters			OP.1	A.3.2.1	
CP length			Normal		
Correlation Matrix and	Antenna		2x2 Low		
Configuration					
Beam failure	DCI format		1-0		
detection	Number of		2		
transmission	Control OFDM				
parameters	symbols	005			
	Aggregation level	CCE	8		
	Ratio of	dB	0		
	hypothetical	GD.			
	PDCCH RE				
	energy to				
	average CSI-				
	RS RE energy				
	Ratio of	dB	0		
	hypothetical				
	PDCCH				
	DMRS energy				
	to average				
	CSI-RS RE				
I	energy				

1		1 1		Т
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
DDV	size		055	
DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned			1	
beam detection RS in				100 0 0 0
rlmInSyncOutOfSync	Inreshold		absent	When the field is
				absent, the UE
				applies the value 0.
TI 1 1100D	0 5 4 0 4	ID (000		(Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2, 4,	dBm/SCS	-98	Threshold used for
	5	kHz	0.5	Q _{in_LR_SSB}
0 104 104	Config 3, 6		-95	
powerControlOffsetSS	5		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInstanceI	MaxCount		n1	see TS 38.321 [7],
	_		1.614	clause 5.17
beamFailureDetection	limer		pbfd4	see TS 38.321 [7],
001.00	10 6 4 4		001 00 4 0 500	clause 5.17
CSI-RS	Config 1, 4	4 }	CSI-RS.1.2 FDD	A.3.14
configuration for q ₀	Config 2, 5	4 }	CSI-RS.1.2 TDD	_
and q ₁	Config 3, 6		CSI-RS.2.2 TDD	
CSI-RS	Config 1, 4	-	CSI-RS.1.1 FDD	A.3.14
configuration for	Config 2, 5	<u> </u>	CSI-RS.1.1 TDD	
CSI reporting	Config 3, 6		CSI-RS.2.1 TDD	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
csi-RS-Index	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
assigned as RLM	Config 2, 5		CSI-RS.1.2 TDD	
RS	Config 3, 6		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the
				the UE shall be fully
				synchronized to cell
				1
T2		S	0.18	
T3		S	0.14	
T4		S	0	
T5		S	0.08	
D1		S	0.04	
Note 1: UE-specific	PDCCH is not tra	insmitted after	T1 starts.	
1				

Table A.4.5.5.3.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB		•	0	•	•
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
CSI-RS_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N_{oc}	Config 1, 4	dBm/15			-98		
T voc		KHz					
	Config 2, 5				-98		
	Config 3, 6				-98		
Propagation condition				TDL-	·C 300ns 10	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

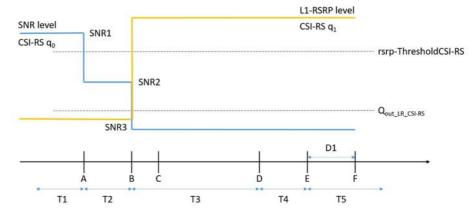


Figure A.4.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.4.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.4.1-1, A.4.5.5.4.1-2, A.4.5.5.4.1-3, and A.4.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.4.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Configuration Description 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 2 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 5 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 The UE is only required to pass in one of the supported test configurations in FR1 Note:

Table A.4.5.5.4.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Value	Comment
		Test 1	

BWchannel C BWchannel C C C C C DL initial BWP Configuration DL dedicated BWP Configuration UL initial BWP Configuration UL dedicated BWP Configuration C C C C C C C C C C C C C C C C C C	config 1, 4 config 2, 3, 5, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5	MHz	Cell 1 1 Cell 2 2 FDD TDD 10: NRB,c = 52 10: NRB,c = 106 DLBWP.0.1 DLBWP.0.1 ULBWP.1.1 ULBWP.1.1	
Active PSCell RF Channel Number Duplex mode C BWchannel C C DL initial BWP configuration DL dedicated BWP configuration UL initial BWP configuration UL dedicated BWP configuration C C C C C C C C C C C C C	config 2, 3, 5, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5	MHz	2 FDD TDD 10: NRB,c = 52 10: NRB,c = 52 40: NRB,c = 106 DLBWP.0.1 DLBWP.0.1 ULBWP.1.1	
RF Channel Number Duplex mode C BWchannel C DL initial BWP configuration DL dedicated BWP configuration UL initial BWP configuration UL dedicated BWP configuration TDD Configuration C C C C C C C C C C C C C	config 2, 3, 5, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5	MHz	2 FDD TDD 10: NRB,c = 52 10: NRB,c = 52 40: NRB,c = 106 DLBWP.0.1 DLBWP.0.1 ULBWP.1.1	
Duplex mode C BWchannel C C DL initial BWP configuration DL dedicated BWP configuration UL initial BWP configuration UL dedicated BWP configuration C C C C C C C C C C C C C	config 2, 3, 5, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5	MHz	FDD TDD 10: NRB,c = 52 10: NRB,c = 52 40: NRB,c = 106 DLBWP.0.1 DLBWP.1.1 ULBWP.1.1	
BWchannel C BWchannel C C C DL initial BWP configuration 5 DL dedicated BWP configuration 5 UL initial BWP configuration 5 UL dedicated BWP configuration 5 TDD Configuration C C CORESET Reference C Channel C SSB Configuration C C C C C C C C C C C C C	config 2, 3, 5, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5	MHz	10: NRB,c = 52 10: NRB,c = 52 40: NRB,c = 106 DLBWP.0.1 DLBWP.1.1 ULBWP.1.1	
BWchannel C C C C DL initial BWP configuration 5. DL dedicated BWP configuration 5. UL initial BWP configuration 5. UL dedicated BWP configuration 5. TDD Configuration C C CORESET Reference Channel C SSB Configuration C C C C C C C C C C C C C C C C C C C	config 1, 4 config 2, 5 config 3, 6 config 1, 2, 3, 4, , nfig 2, 5 config 3, 6 config 1, 4 config 2, 5 config 1, 4 config 2, 5	MHz	10: NRB,c = 52 40: NRB,c = 106 DLBWP.0.1 DLBWP.1.1 ULBWP.0.1	
DL initial BWP Configuration 55 DL dedicated BWP Configuration 55 UL initial BWP Configuration 55 UL dedicated BWP Configuration 55 UL dedicated BWP Configuration 55 TDD Configuration CC CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	config 3, 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5		40: NRB,c = 106 DLBWP.0.1 DLBWP.1.1 ULBWP.0.1 ULBWP.1.1	
DL initial BWP Configuration 55 DL dedicated BWP Configuration 55 UL initial BWP Configuration 55 UL dedicated BWP Configuration 55 UL dedicated BWP Configuration 55 TDD Configuration CC CC CC CC CSSB Configuration CC CC CC CC CC CC CC CC CC CC CC CC CC	config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 1, 4 config 2, 5		DLBWP.0.1 DLBWP.1.1 ULBWP.0.1 ULBWP.1.1	
configuration 5. DL dedicated BWP C configuration 5. UL initial BWP C configuration 5. UL dedicated BWP C configuration 5. TDD Configuration C C C C C C C C C C C C C C C C C C C	config 1, 2, 3, 4, 6 config 1, 2, 3, 4, 6 config 1, 2, 3, 4, 6 config 1, 2, 3, 4, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5		DLBWP.1.1 ULBWP.0.1 ULBWP.1.1	
configuration 5. UL initial BWP Configuration 5. UL dedicated BWP Configuration 5. TDD Configuration CC CC CORESET Reference CC Channel CC SSB Configuration CC CC CC CC CC CC CC CC CC CC	, 6 config 1, 2, 3, 4, , 6 config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 1, 4 config 2, 5		ULBWP.0.1 ULBWP.1.1	
configuration 5. UL dedicated BWP configuration 5. TDD Configuration C C C CORESET Reference Channel C SSB Configuration C	config 1, 2, 3, 4, , 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5		ULBWP.1.1	
configuration 5, TDD Configuration C C C C C CORESET Reference Channel C SSB Configuration C C C C C C C C C C C C C C C C C C C	, 6 config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5			
TDD Configuration C C C C C C C C C C C C C C C C C C	config 1, 4 config 2, 5 config 3, 6 config 1, 4 config 2, 5		Not Appliachla	
CORESET Reference Channel CSSB Configuration CC CC	config 2, 5 config 3, 6 config 1, 4 config 2, 5		Not Applicable	
CORESET Reference Channel C SSB Configuration C C	config 3, 6 config 1, 4 config 2, 5		TDDConf.1.1	
Channel C SSB Configuration C C	onfig 2, 5		TDDConf.2.1	
SSB Configuration C			CR.1.1 FDD	A.3.1.2
SSB Configuration C			CR.1.1 TDD	
C	onfig 3, 6		CR.2.1 TDD	
	Config 1, 4		SSB.3 FR1	A.3.10
	onfig 2, 5		SSB.3 FR1	
	onfig 3, 6		SSB.4 FR1	
	onfig 1, 2, 4, 5		SMTC.1	A.3.11
	config 3, 6		SMTC.1	
PDSCH/PDCCH C	onfig 1, 2, 4, 5		15 KHz	
subcarrier spacing C	onfig 3, 6		30 KHz	
PRACH Configuration C	onfig 1, 2, 4, 5		FR1 PRACH	A.3.8.2
· · · · · · · · · · · · · · · · · · ·	·····g ·, =, ·, ·		configuration 4	
С	onfig 3, 6		FR1 PRACH	A.3.8.2
	o .		configuration 4	
csi-RS-Index assigned as beam detection RS in set q ₀	n failure		0	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and Antenna			2x2 Low	
	CI format		1-0	
. С	lumber of control OFDM ymbols		2	
Ā	ggregation evel	CCE	8	
hṛ P ei a	tatio of ypothetical DCCH RE nergy to verage CSI-RS E energy	dB	0	
	atio of ypothetical DCCH DMRS	dB	0	
hṛ P ei a	nergy to verage CSI-RS			
hy P ei av R	verage CSI-RS E energy MRS precoder		REG bundle size	
hy P ei av R D gi	verage CSI-RS E energy MRS precoder ranularity			
h P el av R D gi R	verage CSI-RS E energy MRS precoder		6	A 2 2 7
hy P el av R D gg R	verage CSI-RS E energy MRS precoder ranularity		6 DRX.7	A.3.3.7
h P el av R D gi R	verage CSI-RS E energy MRS precoder ranularity EG bundle size		6	A.3.3.7

L L O O (O(O T)				1 10 0 0 11	
rlmInSyncOutOfSyncTh	reshold		absent	When the field is	
				absent, the UE	
				applies the value 0.	
		dBm		(Table 8.1.1-1).	
rsrp-ThresholdSSB			-98	Threshold used for	
				Q _{in_LR_SSB}	
powerControlOffsetSS			db0	Used for deriving	
				rsrp-ThresholdCSI-	
				RS	
beamFailureInstanceMa	axCount		n1	see TS 38.321 [7],	
				clause 5.17	
beamFailureDetectionT	ïmer		pbfd4	see TS 38.321 [7],	
	T			clause 5.17	
CSI-RS configuration	Config 1, 4		CSI-RS.1.2 FDD	A.3.14	
for q₀ and q₁	Config 2, 5		CSI-RS.1.2 TDD		
	Config 3, 6		CSI-RS.2.2 TDD		
CSI-RS configuration	Config 1, 4		CSI-RS.1.1 FDD	A.3.14	
for CSI reporting	Config 2, 5		CSI-RS.1.1 TDD		
	Config 3, 6		CSI-RS.2.1 TDD		
TRS configuration	Config 1, 4		TRS.1.1 FDD		
	Config 2, 5		TRS.1.1 TDD		
	Config 3, 6		TRS.1.2 TDD		
csi-RS-Index	Config 1, 4		CSI-RS.1.2 FDD	A.3.14	
assigned as RLM RS	Config 2, 5		CSI-RS.1.2 TDD		
	Config 3, 6		CSI-RS.2.2 TDD		
T310 Timer		ms	1000		
N310			2		
T1		S	1	During this time the	
				the UE shall be fully	
				synchronized to cell	
			1		
T2			8.37		
T3		S	6.44		
T4			0		
T5		S	1.97		
D1		S	1.93		
Note 1: UE-specific F	PDCCH is not transm	nitted after T	1 starts.	•	

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DM	dB		•	•	•	•	
EPRE ratio of PDCCH to I	dB						
EPRE ratio of PBCH DMR	dB						
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB			0		
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
CSI-RS_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N	N Config 1, 4				-98		
¹ oc	N_{oc}						
	Config 2, 5				-98		
	Config 3, 6				-98		
Propagation condition				TDL-	C 300ns 1	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.4.1-4: Void

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

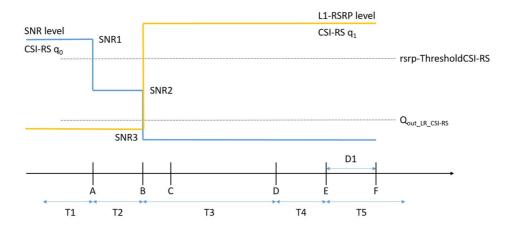


Figure A.4.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.4.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 1920 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.6 Active BWP switch

A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.4.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one PSCell (Cell 2) as given in Table A.4.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell is specified in Table A.4.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay})$.

The starting time of E-UTRA PCell (Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay})$.

The starting time of E-UTRA PCell (Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.1.1-1: DL BWP switch supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:		equired to be tested in one of the supported test configurations.
Note 2:	A UE which fulfil	s the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.

Table A.4.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uВ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uВ	9	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.4.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Paran	neter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6	1	TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
	Config 2,5	1	10 MHz: N _{RB,c} = 52
	Config 3,6	1	40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP	Config 1,4		
Configuration	Config 2,5		DLBWP.0.2 Note 4
	Config 3,6	1	
Active DL BWP-1	Config 1,4		
Configuration	Config 2,5		DLBWP.1.1 Note 4
	Config 3,6		
Active DL BWP-2	Config 1,4		
Configuration	Config 2,5		DLBWP.1.3 Note 4
	Config 3,6		
Initial UL BWP	Config 1,4		
Configuration	Config 2,5		ULBWP.0.2 Note 4
	Config 3,6	<u> </u>	
Active UL BWP-1	Config 1,4		
Configuration	Config 2,5		ULBWP.1.1 Note 4
	Config 3,6]	

Active UL BWP-2	Config 1,4	I	Γ		
Configuration	Config 1,4	-	ULBWP.1.3 Note 4		
Configuration	Corning 2,5	-	OLBWF.1.3		
	Config 3,6				
PDSCH Reference	Config 1,4		SR.1.1 FDD		
measurement channel	Config 2,5		SR.1.1 TDD		
	Config 3,6		SR.2.1 TDD		
RMSI CORESET	Config 1,4		CR.1.1 FDD		
parameters	Config 2,5		CR.1.1 TDD		
	Config 3,6		CR.2.1 TDD		
Dedicated CORESET	Config 1,4		CCR.1.2 FDD		
parameters	Config 2,5		CCR.1.2 TDD		
	Config 3,6		CCR.2.4 TDD		
OCNG Patterns			OP.1		
SSB Configuration	Config 1,2,4,5		SSB.1 FR1		
	Config 3,6		SSB.2 FR1		
SMTC Configuration			SMTC.1		
Correlation Matrix and A	ntenna		1x2 Low		
Configuration					
TRS Configuration	Config 1,4		TRS.1.1 FDD		
	Config 2,5		TRS.1.1 TDD		
	Config 3,6		TRS.1.2 TDD		
EPRE ratio of PSS to SS	S	dB	0		
EPRE ratio of PBCH DM	RS to SSS				
EPRE ratio of PBCH to F	BCH DMRS				
EPRE ratio of PDCCH D	MRS to SSS				
EPRE ratio of PDCCH to	PDCCH DMRS				
EPRE ratio of PDSCH D	MRS to SSS				
EPRE ratio of PDSCH to	PDSCH				
EPRE ratio of OCNG DM	IRS to SSS(Note				
1)					
EPRE ratio of OCNG to	OCNG DMRS				
(Note 1)					
N _{oc} Note 2	Config 1,2,4,5	dBm/SCS	-104		
	Config 3,6		-101		
Noc ^{Note 2}		dBm/15kH	-104		
	1	Z			
SS-RSRP Note 3	Config 1,2,4,5	dBm/SCS	-87		
<u> </u>	Config 3,6		-84		
Ês/lot		dB	17		
Ê _s /N _{oc}	1	dB	17		
Io ^{Note3}	Config 1,2,4,5	dBm/ 9.36MHz	-58.96		
	Config 3,6	dBm/ 38.16MHz	-52.86		
Propagation Condition	1	JU. TUIVII IZ	AWGN		
	e used such that hot	th cells are full	y allocated and a constant		
			ed for all OFDM symbols.		
			not specified in the test is		
			ne and shall be modelled as		
	ropriate power for N				
			other parameters for		
			ameters themselves.		
			an UL BWP. DLBWP.0.2 is		
linked with UL	BWP.0.2; DLBWP.1	.1 is linked wit	h ULBWP.1.1; DLBWP.1.3 is		
linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].					

A.4.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of E-UTRA PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of E-UTRA PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed E-UTRA PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations are shown in Table A.4.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one SCell (Cell 3) as given in Table A.4.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) and SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PSCell.

- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(i+T_{\rm BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than the first UL slot that occurs after the beginning of slot $(i+T_{\rm BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{\rm BWPswitchDelay})$.

E-UTRA PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{\text{BWPswitchDelay}})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCellon PSCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{\text{BWPswitchDelay}}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{\text{BWPswitchDelay}})$.

E-UTRA PCell(Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell and PSCell during BWP switch of SCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only r	equired to be tested in one of the supported test configurations
Note 2:	A UE which fulfil	s the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.
Note 3:	NR configuration	n is the same for PSCell and SCells.
Note 4:		equired to be tested in one with smallest aggregated channel bandwidth from supported ons which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test

Table A.4.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment		
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this		
Number		'	test		
NR RF Channel Number		2.2	Two NR radio channels are used for this		
		2, 3	test		
Active PCell		Cell 1	PCell on RF channel number 1.		
Active PSCell		Cell 2	PSCell on RF channel number 2.		
Active SCell		Cell 3	SCell on RF channel number 3.		
CP length		Normal			
DRX		OFF			
bwp-InactivityTimer	ms	200			
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.		
on RF channel number 1	uБ	U			
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.		
on RF channel number 2	uD	O			
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.		
on RF channel number 3	u D	O			
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC		
Cell3 timing offset to cell2	μs	3	Synchronous cells		
T1	s	0.2			
T2	S	0.2			
T3	S	0.2			

Table A.4.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 2	Cell 3	
Frequency Range			FR1		
Duplex mode	Config 1,4		FC)D	
	Config 2,3,5,6	1	TC)D	
TDD configuration	Config 1,4		Not App	olicable	
-	Config 2,5	1	TDDConf.1.1		
	Config 3,6	1	TDDConf.2.1		
BW _{channel}	Config 1,4		Not	e 7	
	Config 2,5	1	Not	e 7	
	Config 3,6] [Not		
BWoccupied	Config 1,4	RB	52 ^N		
1	Config 2,5	1	52 ^N		
	Config 3,6	1	106	Note 6	
Active BWP ID			0	1,2	
Initial BWP	Config 1,4		DLBWP.0.2	DLBWP.0.2	
Configuration	Config 2,5	1			
	Config 3,6	1			
Active BWP-0	Config 1,4		DLBWP.0.2	N.A.	
Configuration	Config 2,5]			
	Config 3,6				
Active BWP-1	Config 1,4		N.A.	DLBWP.1.3	
Configuration	Config 2,5				
	Config 3,6				
Active BWP-2	Config 1,4		N.A.	DLBWP.1.1	
Configuration	Config 2,5				
	Config 3,6				
PDSCH Reference	Config 1,4		SR.1.1	1 FDD	
measurement channel	Config 2,5] [SR.1.1 TDD		
	Config 3,6		SR2.1		
RMSI CORESET	Config 1,4		CR.1.		
parameters	Config 2,5] [CR.1.		
	Config 3,6		CR2.1		
Dedicated CORESET	Config 1,4		CCR.1.2 FDD		
parameters	Config 2,5		CCR.1.	2 TDD	

		Config 3,6			.2.4 TDD	
OCNG Pa	itterns	Config 1,2,4,5		_	P.1 Note 5	
		Config 3,6		OF	2.1 Note 6	
SSB Conf	iguration	Config 1,2,4,5		SS	3.1 FR1	
		Config 3,6		SSB.2 FR1		
SMTC Co	nfiguration			S	MTC.1	
TRS Conf	iguration	Config 1,4		TRS	.1.1 FDD	
		Config 2,5		TRS	.1.1 TDD	
		Config 3,6		TRS	.1.2 TDD	
Antenna C	Configuration				1x2	
Propagation	on Condition			A	WGN	
EPRE rati	o of PSS to S	SSS	dB	0	0	
EPRE rati	o of PBCH D	MRS to SSS				
EPRE rati	o of PBCH to	PBCH DMRS				
EPRE rati	o of PDCCH	DMRS to SSS				
EPRE rati	o of PDCCH	to PDCCH DMRS				
EPRE rati	o of PDSCH	DMRS to SSS				
	o of PDSCH					
		OMRS to SSS Note 1				
EPRE rati	o of OCNG to	OCNG DMRS Note 1				
N _{oc} Note 2			dBm/15	-104	-104	
			kHz			
SS-RSRP	Note 3		dBm/15	-87	-87	
_			kHz			
Ês/Iot			dB	17	17	
Ê _s /N _{oc}			dB	17	17	
Io ^{Note3}		Config 1,2,4,5	dBm/ 9.36MHz	-58.96	-58.96	
		Config 3,6	dBm/ 38.16MHz	-52.86	-52.86	
Note 1:		be used such that bo	•	allocated and a constant	total transmitted power	
Note 2:	Interference subcarriers a BW _{occupied} .	from other cells and rand time and shall be	noise sources no modelled as AV	ot specified in the test is a /GN of appropriate powe	assumed to be constant over for N_{oc} to be fulfilled within	
Note 3:		nd lo levels have been parameters themselve		ther parameters for inforr	nation purposes. They are	

- not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
- Note 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- Note 6: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from Fc,low, and Io is independent of the BW_{channel} configured.
- N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}. Note 7:

A.4.5.6.1.2.2 **Test Requirements**

During T1, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k_1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-Switching Delay [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed E-UTRA PCell and PSCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$, $(j+T_{BWPswitchDelay}+k_1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one PSCell (Cell 2) as given in Table A.4.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell are specified in Table A.4.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PSCell from on the first DL slot that occurs after PSCell's DL slot $i + \frac{r_{RRCprocessingDelay} + r_{BWPswitchDelayRRC}}{NR \, Slot \, length} \ as \ defined \ in \ clause \ 8.6.3 \ and \ starts \ to \ report \ valid \ ACK/NACK \ for \ the \ NR \, Slot \, length$

PSCell from the first UL slot that occurs after the beginning of DL slot i +

 $\frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}} + \text{k1. The UE shall be continuously scheduled on PSCell's BWP-1 starting}$

from the first DL slot occurs after the begining of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.4.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only red	quired to be tested in one of the supported test configurations

Table A.4.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	

Table A.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

	Paramet	er	Unit	Cell 2
Frequency	Frequency Range			FR1
Duplex mod		Config 1,4		FDD
		Config 2,3,5,6		TDD
TDD configuration		Config 1,4		Not Applicable
		Config 2,5		TDDConf.1.1
		Config 3,6		TDDConf.2.1
BW _{channel}		Config 1,4		10 MHz: N _{RB,c} = 52
		Config 2,5		10 MHz: N _{RB,c} = 52
A .: 51 5	W. D. I.D.	Config 3,6		40 MHz: N _{RB,c} = 106
Active DL B		0 " 1 1		1
Initial DL B\		Config 1,4	4	DLBWP.0.2
Configuration	on	Config 2,5	-	
Initial UL B\	MD	Config 3,6 Config 1,4		ULBWP.0.2
Configuration			-	OLBWF.0.2
Comiguration	ווע	Config 2,5 Config 3,6	-	
Initial	Active DL	Corning 3,6		DLBWP.1.3
Condition	BWP-1 Configurat	Config 1,4		DLBWF.1.3
		Config 2,5		
		Config 3,6		
	Active UL BWP-1 Configurat ion	Config 1,4		ULBWP.1.3
		Config 2,5		
		Config 3,6		
Final Condition	Active DL BWP-1 Configurat ion	Config 1,4		DLBWP.1.1
		Config 2,5	1	
		Config 3,6		
	Active UL BWP-1 Configurat ion	Config 1,4		ULBWP.1.1
		Config 2,5		
		Config 3,6		
PDSCH Re measureme		Config 1,4		SR.1.1 FDD
		Config 2,5		SR.1.1 TDD
		Config 3,6		SR.2.1 TDD
RMSI COR parameters		Config 1,4		CR.1.1 FDD
		Config 2,5	4	CR.1.1 TDD
Dadi ()	OODECET	Config 3,6		CR.2.1 TDD
Dedicated (parameters		Config 1,4		CCR.1.2 FDD
		Config 2,5 Config 3,6		CCR.1.2 TDD CCR.2.4 TDD
OCNG Patterns				OP.1
SSB Configuration		Config 1,2,4,5		SSB.1 FR1
Config 3,6				SSB.2 FR1
SMTC Configuration				SMTC.1
TRS Configuration		Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
Config 3,6				TRS.1.2 TDD
	Antenna Configuration			1x2
Propagation Condition EPRE ratio of PSS to SSS			dB	AWGN 0
	f PBCH DMRS			
EPRE ratio of PBCH to PBCH DMRS			_	

EPRE ratio	o of PDCCH DMR	S to SSS]				
EPRE ratio	o of PDCCH to PD	CCH DMRS					
EPRE ratio	o of PDSCH DMR	S to SSS]				
EPRE ratio	o of PDSCH to PD	SCH					
EPRE ratio	o of OCNG DMRS	to SSS(Note 1)					
	o of OCNG to OCN	NG DMRS (Note 1)					
Noc ^{Note 2}			dBm/15	-104			
			kHz				
SS-RSRF	Note 3		dBm/15	-87			
			kHz				
Ê _s /I _{ot}			dB	17			
Ê _s /N _{oc}			dB	17			
Io ^{Note3}		Config 1 2 4 F	dBm/	-58.96			
		Config 1,2,4,5	9.36MHz				
		Config 2 6	dBm/	-52.86			
		Config 3,6	38.16MHz				
Note 1:	OCNG shall be	e used such that bot	th cells are fully	y allocated and a constant			
	total transmitte	d power spectral de	ensity is achiev	red for all OFDM symbols.			
Note 2:	Interference from	om other cells and r	noise sources r	not specified in the test is			
assumed to be constant over subcarriers and time and shall be modelle							
as AWGN of appropriate power for N₀c to be fulfilled.							
Note 3:	SS-RSRP and	lo levels have beer	derived from	other parameters for			
information purposes. They are not settable parameters themselves.							
Note 4:	· · · · · · · · · · · · · · · · · · ·						
is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1;							
DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of							
	TS 38.213 [3].						

A.4.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant on PSCell from the first DL slot occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$, and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.7 PSCell addition and release delay

A.4.5.7.1 Addition and Release Delay of known NR PSCell

A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event A4 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap

pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event A4. Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. After receiving the Event B1, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T5.

Table A.4.5.7.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD		
2	LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD		
3	LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD		
4	LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD		
5	LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD		
6	LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter		Unit	Value	Comment	
RF Channel Number		1, 2		Two radio channels are used for this test. One	
			1, 2	for E-UTRA cell and second for NR Cell	
Initial	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.	
Final	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.	
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.	
	Threshold	dBm	-96	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in clause	
	(Config 1,2,4,5)			9.11.1 of TS 36.133 [15] into account plus	
				margin.	
	Threshold	dBm	-93	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in clause	
	(Config 3,6)			9.11.1 of TS 36.133 [15] into account plus	
				margin.	
	Time to Trigger	S	0		

DRX		OFF	Continuous monitoring of primary cell
Measurement gap pattern Id	0		Gaps are configured before T2 and released
			before T3.
PRACH configuration on cell2		FR1 PRACH	Captured in A.3.8.2.1
		configuration	
		1	
Cell-individual offset for cells on	dB	0	Individual offset for cells on primary component
RF channel number 1	ub	U	carrier.
Cell-individual offset for cells on	dB	0	Individual offset for cells on carrier frequency of
RF channel number 2	иь	0	cell2.
T1		4	During this time the PCell shall be known and
	S	1	cell2 shall be unknown.
T2		1.5	During this time the UE shall identify neighbour
	S	1.5	cell (cell2) and report event B1.
T3	S	0.5	During this time the UE adds the PSCell.
T4		0.5	During this time the UE sends CSI reports for
	S	0.5	PSCell.
T5	S	0.5	During this time the UE releases the PSCell.

Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config Test					
Parameter	Unit	Config	T1	T2	Т3	T4	T5
E-UTRA RF		1,2,3,4,5,6	1				
Channel Number		1,2,3,7,5,0	ı				
NR RF Channel		1,2,3,4,5,6			2		
Number		, , - , , - , -					
TDD		1,4	Not Applicable				
configuration		2,5			DDConf.1		
		3,6	TDDConf.2.1				
		1,4		10	$N_{RB,c} = 0$	52	
BW _{channel}	MHz	2,5		10): N _{RB,c} =	52	
		3,6		40	: N _{RB,c} = 1	06	
Initial BWP		1,2,3			DLBWP.0.		
Configuration		1,2,3			JLBWP.0.		
Dedicated BWP		1,2,3			DLBWP.1.		
Configuration			ULBWP.1.1				
PDSCH		1,4	SR.1.1 FDD				
Reference measurement		2,5	2,5 SR.1.1 TDD			D	
channel		3,6	SR.2.1 TDD				
RMSI CORESET		1,4	CR.1.1 FDD				
Reference		2,5	CR.1.1 TDD				
Channel		3,6	CR.2.1 TDD				
Dedicated		1,4		С	CR.1.1 FE	DD	
CORESET		2,5		С	CR.1.1 TE	DD	
Reference Channel		3,6			CCR.2.1 TDD		
OCNG Patterns		1,2,3,4,5,6	OP.1				
SSB		1,2,4,5		,	SSB.1 FR	1	
configuration		3,6		,	SSB.2 FR	1	
SMTC		1,2,4,5			SMTC.1		
configuration		3,6			SMTC.1		
TRS		1,4			RS.1.1 FD		
Configuration		2,5			RS.1.1 TE		<u>-</u>
_		3,6			RS.1.2 TD		
CSI-RS		1,4			I-RS.1.1 F		
configuration for		2,5			CSI-RS.1.1 TDD		
CSI reporting		3,6		CS	I-RS.2.1 T	DD	

report(Contid Lyne		1,2,3,4,5,6		periodic							
reportConfigType reportQuantity		1,2,3,4,5,6		cri-RI-PMI-CQI							
CSI reporting				5							
	slot	1,2,4,5									
periodicity		3,6		10							
CSI reporting	slot	1,2,4,5		2							
offset		3,6		4							
EPRE ratio of											
PSS to SSS											
EPRE ratio of											
PBCH DMRS to											
SSS											
EPRE ratio of											
PBCH to PBCH											
DMRS											
EPRE ratio of											
PDCCH DMRS											
to SSS											
EPRE ratio of											
PDCCH to				_							
PDCCH DMRS	dB	1,2,3,4,5,6		0							
EPRE ratio of											
PDSCH DMRS											
to SSS											
EPRE ratio of											
PDSCH to											
PDSCH											
EPRE ratio of											
OCNG DMRS to											
SSS(Note 1) EPRE ratio of											
OCNG to OCNG											
DMRS (Note 1)											
N_{oc} Note2	dBm/15 kHz	1,2,3,4,5,6	N/A	-88							
		1215	N/A	-88							
N_{oc} Note2	dBm/SCS	1,2,4,5									
		3,6	N/A	-85							
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1,2,3,4,5,6	-infinity	0							
		, , - , - , - , -	,	-							
\hat{E}_s/N_{oc}		1,2,3,4,5,6	-infinity	0							
				-							
SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-infinity	-88							
. N. c		3,6	-infinity	-85							
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	N/A	-57							
	dBm/38.1MHz	3,6	N/A	-51							
Propagation		122456		0\0/CN1							
condition		1,2,3,4,5,6		AWGN							
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total											
transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed be constant over subcarriers and time and shall be modelled as AWGN of appropria											
						power fo	power for N_{oc} to be fulfilled.				
		Note 3: SS-RSRP and lo levels have been derived from other parameters for information									
	RP and lo levels h s. They are not s										

A.4.5.7.1.2 Test Requirements

Note 4:

The UE shall transmit the PRACH to PSCell no later than 82 ms^{Note1} from the start of T3.

and noise at each receiver antenna port.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

SS-RSRP minimum requirements are specified assuming independent interference

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell no later than 20ms from the start of T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

$$T_{config}$$
 PSCell = T_{RRC} delay + $T_{processing}$ + T_{search} + T_{Δ} + T_{PSCell} DU + 2msWhere:

 $T_{RRC\ delay} = 20ms$

 $T_{processing} = 20 ms$

 $T_{search} \quad = 0$

 $T_{\Delta} = 20 ms$

 $T_{PSCell_DU} = 1*10+10 = 20ms$

A.4.6 Measurement procedure

A.4.6.1 Intra-frequency Measurements

A.4.6.1.1 EN-DC event triggered reporting tests without gap under non-DRX

A.4.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.1.2-1, A.4.6.1.1.2-2, A.4.6.1.1.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.1.2-1: Supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2			

Table A.4.6.1.1.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1, 4	SSB.1 FR1 SSB.1 FR1	
SMTC configuration		3, 6 1, 4 2, 5 3, 6	SSB.2 FR1 SMTC.2 SMTC.1	
A3-Offset	dB	1, 2, 3, 4, 5, 6	-4.5	
CP length		1, 2, 3, 4, 5, 6	Normal	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0	
Time To Trigger	S	1, 2, 3, 4, 5, 6	0	
Filter coefficient		1, 2, 3, 4, 5, 6	0	L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 4	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2, 5	3 μs	Synchronous cells
		3, 6	3 μs	Synchronous cells
T1	S	1, 2, 3, 4, 5, 6	5	
T2	S	1, 2, 3, 4, 5, 6	5	

Table A.4.6.1.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test	Cell 2		Cell 3	
		configuration	T1	T2	T1	T2
TDD		1 /				
configuration		1, 4 2, 5	N/A TDDConf.1.1		N/A TDDConf.1.1	
Corniguration		3, 6		onf.2.1		onf.2.1
PDSCH RMC		1, 4		1 FDD		/A
configuration		2, 5		1 TDD	-	,,,,
comiguration		3, 6		1 TDD		
RMSI CORESET		1, 4		1 FDD	CP 1	1 FDD
RMC		2, 5		1 TDD		1 TDD
_		3, 6		1 TDD		1 TDD
configuration Dedicated		1, 4		.1 FDD	1	
		•				.1 FDD
CORESET RMC		2, 5		.1 TDD	1	.1 TDD
configuration		3, 6		.1 TDD		.1 TDD
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1		P.1
TRS		1, 4		.1 FDD		/A
configuration		2, 5		.1 TDD		/A
		3, 6		.2 TDD		/A
Initial BWP		1, 2, 3, 4, 5, 6		VP.0.1	DLBWP.0.1	
configuration		4 0 0 4 7 0		VP.0.1	ULBWP.0.1	
Active DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.1.1		DLBWP.1.1	
Active UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1		ULBWP.1.1	
configuration						
RLM-RS		1, 2, 3, 4, 5, 6 1, 4	SS	SB	SSB	
$N_{\!oc}^{}$ Note 2	dBm/SCS	1, 4		•	-98	
		2, 5			-98	
		3, 6			-95	
$N_{\it oc}$ Note 2	dBm/15 kHz	1, 4			-98	
		2, 5				
		3, 6		1		T
$\mathbf{\hat{E}}_{\!\scriptscriptstyle \mathrm{s}}/\mathbf{I}_{\!\scriptscriptstyle \mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6				
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4
		2, 5	1			
		3, 6	<u></u>			
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		A۷	VGN	

The resources for uplink transmission are assigned to the UE prior to the start of time period Note 1:

Interference from other cells and noise sources not specified in the test is assumed to be Note 2: constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.2 EN-DC event triggered reporting tests without gap under DRX

A.4.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.2.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.2.1-1, A.4.6.1.2.1-2, A.4.6.1.2.1-3 and A.4.6.1.2.1-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Config Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note 1: The UE is only required to be tested in one of the supported test configurations Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2 Note 2:

Table A.4.6.1.2.2-1: Supported test configurations

Table A.4.6.1.2.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment
			Test 1	Test 2	

Active cell		1, 2, 3, 4,	E-UTRAN C	ell 1 and NR	
		5, 6	Ce	II 2	
Neighbour cell		1, 2, 3, 4,	NR (Cell 3	Cell to be identified.
		5, 6			
RF Channel Number		1, 2, 3, 4,	_	ell 1	
		5, 6		and Cell 3	
SSB configuration		1, 4	SSB.		
		2, 5	SSB.		
		3, 6	SSB.		
SMTC configuration		1, 4		TC.2	
		2, 5	SMT		
10.0%	i	3, 6	SMT		
A3-Offset	dB	1, 2, 3, 4,	-4	5	
OD to a sette		5, 6	NI	1	
CP length		1, 2, 3, 4, 5, 6	Nor	mal	
Hysteresis	dB	1, 2, 3, 4,	()	
, 6.6. 66.6	<u> </u>	5, 6	•		
Time To Trigger	S	1, 2, 3, 4,	()	
		5, 6			
Filter coefficient		1, 2, 3, 4,	0		L3 filtering is not used
		5, 6			
DRX		1, 2, 3, 4,	DRX.1	DRX.7	
		5, 6			
Time offset between PCell		1, 2, 3, 4,	3	μs	Synchronous EN-DC
and PSCell		5, 6	•		
Time offset between serving		1, 4	31	ms	Asynchronous cells.
and neighbour cells					The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2, 5	22		Synchronous cells
		3, 6	3 μs		Synchronous cells
T1	S	1, 2, 3, 4,	3 μs		Synchronous cens
11	5	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4,	5	10	
		5, 6			

Table A.4.6.1.2.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test	Cell 2		Cell 3			
		configuration	T1 T2		T1	T2		
TDD configuration		1, 4	N/A		N/A			
1 DD configuration		2, 5	TDDConf.1.1		TDDConf.1.1			
		3, 6		onf.2.1	TDDConf.2.1			
PDSCH RMC		1, 4		1 FDD		/A		
configuration		2, 5		1 TDD				
		3, 6		1 TDD				
RMSI CORESET		1, 4		1 FDD	CR.1.	1 FDD		
RMC		2, 5		1 TDD		1 TDD		
configuration		3, 6		1 TDD		1 TDD		
Dedicated		1, 4		.1 FDD		.1 FDD		
CORESET RMC		2, 5		.1 TDD		.1 TDD		
configuration		3, 6		.1 TDD		.1 TDD		
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1	OF			
TRS		1, 2, 3, 4, 3, 6		.1 .1 FDD		/A		
configuration		2, 5		.1 TDD		/A		
Comgaration		3, 6		.2 TDD		/A		
Initial BWP		1, 2, 3, 4, 5, 6		/P.0.1	DLBWP.0.1			
configuration		1, 2, 0, 1, 0, 0		/P.0.1	ULBWP.0.1			
Active DL BWP		1, 2, 3, 4, 5, 6		/P.1.1	DLBWP.1.1			
configuration								
Active UL BWP		1, 2, 3, 4, 5, 6	ULBW	/P.1.1	ULBWP.1.1			
configuration								
RLM-RS	ip (0.00	1, 2, 3, 4, 5, 6	SS	SB	SSB			
$N_{oc}^{}$ Note 2	dBm/SCS	1, 4		-	-98			
		2, 5			·98			
		3, 6			·95			
N_{oc} Note 2	dBm/15 kHz	1, 4			98			
		2, 5						
		3, 6						
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46		
		2, 5						
		3, 6						
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4		
		2, 5	_					
		3, 6						
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94		
		2, 5	-94	-94	-Infinity	-94		
		3, 6	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25		
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25		
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16		
Propagation		1, 2, 3, 4, 5, 6		AV	VGN			
Condition		L						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.3 EN-DC event triggered reporting tests with per-UE gaps under non-DRX

A.4.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.3.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.3.1-1 and A.4.6.1.3.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Config Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 3 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note 1: The UE is only required to be tested in one of the supported test configurations Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2

Table A.4.6.1.3.2-1: Supported test configurations

Table A.4.6.1.3.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test configur	Value	Comment
		ation		
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1, 2, 3, 4, 5, 6	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3, 4, 5, 6	40	
Measurement gap length	ms	1, 2, 3, 4, 5, 6	6	
Measurement gap offset	ms	1, 2, 3, 4, 5, 6	39	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC.2	
		2, 5	SMTC.1	
		3, 6	SMTC.1	
CSI-RS parameters		1, 4	CSI-RS.1.2 FDD resource #0	
		2, 5	CSI-RS.1.2 TDD resource #0	
		3, 6	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3, 4, 5, 6	-4.5	
CP length		1, 2, 3, 4, 5, 6	Normal	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0	
Time To Trigger	S	1, 2, 3, 4, 5, 6	0	
Filter coefficient		1, 2, 3, 4, 5, 6	0	L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 4	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2, 5	3 μs	Synchronous cells
		3, 6	3 μs	Synchronous cells
T1	S	1, 2, 3, 4, 5, 6	5	
T2	S	1, 2, 3, 4, 5, 6	5	

Table A.4.6.1.3.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test	Cell 2		Cell 3			
		configuration	T1	T2	T1	T2		
TDD		1, 4	N	/A	N/	/A		
configuration		2, 5	TDDC	onf.1.1	TDDC	onf.1.1		
· ·		3, 6		onf.2.1	TDDConf.2.1			
PDSCH RMC		1, 4	SR.1.	1 FDD	N/	/A		
configuration		2, 5	SR.1.	1 TDD	1			
· ·		3, 6		1 TDD	1			
RMSI CORESET		1, 4		1 FDD	CR.1.	1 FDD		
RMC		2, 5		1 TDD		1 TDD		
configuration		3, 6		1 TDD		1 TDD		
Dedicated		1, 4		.2 FDD		.1 FDD		
CORESET RMC		2, 5		.2 TDD		.1 TDD		
configuration		3, 6		.1 TDD		.1 TDD .1 TDD		
		·						
OCNG Patterns TRS		1, 2, 3, 4, 5, 6		P.1 .1 FDD	OF	/A		
-		1, 4		.1 FDD .1 TDD		/A /A		
configuration		2, 5						
		3, 6		.2 TDD		/A		
Initial BWP		1, 2, 3, 4, 5, 6		VP.0.1	DLBW			
configuration Active DL BWP		1 2 2 4 5 6		VP.0.1	ULBWP.0.1			
configuration		1, 2, 3, 4, 5, 6	DLBWP.1.2 DLBWP.1.		/P.I.I			
Active UL BWP		1, 2, 3, 4, 5, 6	LILBV	/P 1 2	III R\/\	/P 1 1		
configuration		1, 2, 3, 4, 3, 0	ULBWP.1.2 ULBWP.1.1			/1 .1.1		
RLM-RS		1, 2, 3, 4, 5, 6	CSI-RS SSB			SB		
N _{oc} Note 2	dBm/SCS	1, 4			.98			
		2, 5			-98			
		3, 6			·95			
Noc Note 2	dBm/15 kHz	1, 4			-98			
		2, 5						
		3, 6						
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46		
		2, 5						
		3, 6						
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4		
		2, 5						
		3, 6						
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94		
		2, 5	-94	-94	-Infinity	-94		
1-	-ID /0 00 MILL	3, 6	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25		
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25		
Dropogotica	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16		
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN					
			ed to the LIE prior to the start of time period					

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.4 EN-DC event triggered reporting tests with per-UE gaps under DRX

A.4.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.4.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.4.2-1, A.4.6.1.4.2-2, A.4.6.1.4.2-3 A.4.6.1.4.2-4 and A.4.6.1.4.2-5 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.4.2-1: Supported test configurations

Config Description						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2: Target NR Cell	3 has the same SCS, BW and duplex mode as NR serving Cell 2					

Table A.4.6.1.4.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment				
			Test 1	Test 2					
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Ce	ll 1 and NR Cell 2					
Neighbour cell		1, 2, 3, 4, 5, 6	NR	Cell 3	Cell to be identified.				
RF Channel Number		1, 2, 3, 4, 5, 6	2: Cell 2	Cell 1 and Cell 3					
Measurement gap type		1, 2, 3, 4, 5, 6		JE gaps					
Measurement gap repitition periodicity	ms	1, 2, 3, 4, 5, 6		40					
Measurement gap length	ms	1, 2, 3, 4, 5, 6		6					
Measurement gap offset	ms	1, 2, 3, 4, 5, 6		39					
SSB configuration		1, 4		.1 FR1					
		2, 5		.1 FR1					
		3, 6		.2 FR1					
SMTC configuration		1, 4		TC.2					
		2, 5		ITC.1					
		3, 6		ITC.1					
CSI-RS parameters		1, 4		DD resource #0					
		2, 5		DD resource #0					
		3, 6		DD resource #0					
A3-Offset	dB	1, 2, 3, 4, 5, 6		4.5					
CP length		1, 2, 3, 4, 5, 6		rmal					
Hysteresis	dB	1, 2, 3, 4, 5, 6		0					
Time To Trigger	S	1, 2, 3, 4, 5, 6		0					
Filter coefficient		1, 2, 3, 4, 5, 6		0	L3 filtering is not used				
DRX		1, 2, 3, 4, 5, 6	DRX.1	DRX.7					
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6	3	μs	Synchronous EN-DC				
Time offset between serving and neighbour cells		1, 4	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.				
		2, 5	3 μs		3 μs		3 μs		Synchronous cells
		3, 6	3 μs						Synchronous cells
T1	S	1, 2, 3, 4, 5, 6	5		5		-		
T2	S	1, 2, 3, 4, 5, 6	5	10					

Table A.4.6.1.4.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test configuration	Cell 2		Cell 3	
		Comiguration	T1 T2		T1	T2
TDD		1, 4	N/A		N/A	
configuration		2, 5	TDDConf.1.1		TDDConf.1.1	
		3, 6		onf.2.1		onf.2.1
PDSCH RMC		1, 4		1 FDD		/A
configuration		2, 5	SR.1.	1 TDD		
		3, 6		1 TDD		
RMSI CORESET		1, 4		1 FDD	CR.1.	1 FDD
RMC		2, 5	CR.1.	1 TDD		1 TDD
configuration		3, 6		1 TDD		1 TDD
Dedicated		1, 4		.2 FDD		.1 FDD
CORESET RMC		2, 5		.2 TDD		.1 TDD
configuration		3, 6		.1 TDD		.1 TDD
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1		P.1
TRS		1, 4		.1 FDD		/A
configuration		2, 5		.1 TDD		/A
garamen.		3, 6		.2 TDD		/A
Initial BWP		1, 2, 3, 4, 5, 6	1	/P.0.1	DLBWP.0.1	
configuration		1, 2, 0, 1, 0, 0		VP.0.1	ULBWP.0.1	
Active DL BWP		1, 2, 3, 4, 5, 6		/P.1.2	DLBWP.1.1	
configuration						
Active UL BWP		1, 2, 3, 4, 5, 6	ULBW	/P.1.2	ULBWP.1.1	
configuration						
RLM-RS	ID (0.00	1, 2, 3, 4, 5, 6	CSI	-RS	SSB	
N_{oc} Note 2	dBm/SCS	1, 4		-	-98	
		2, 5			98	
		3, 6			95	
N_{oc} Note 2	dBm/15 KHz	1, 4			.98	
		2, 5	1			
		3, 6				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5	1			
		3, 6				
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4
		2, 5	1			
		3, 6				
SS-RSRP Note 3	dBm/SCS KHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
	IB (0.5555)	3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
Dropogotica	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		AV	VGN	
CONGRETA	L	<u> </u>				

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.5 EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading

A.4.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.5.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for FDD PSCell are given in Table A.4.6.1.5.1-1 and A.4.6.1.5.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.5.2-1: Supported test configurations

Config Description					
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
Note 1: T	he UE is only re	equired to be tested in one of the supported test configurations			
Note 2: T	arget NR Cell 3	has the same SCS, BW and duplex mode as NR serving Cell 2			

Table A.4.6.1.5.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
A3-Offset	dB	1, 2	-4.5	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	N/A	OFF
Time offset between PCell and PSCell		1, 2	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 2	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.4.6.1.5.1-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Cell 2		Ce		
			T1	T2	T1	T2	
TDD configuration		1, 2 1, 2		/A	N/A		
PDSCH RMC		1, 2	SR.1.	1 FDD	N/	/A	
configuration							
RMSI CORESET		1, 2	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration		4.0	CCD 4	4 EDD	CCD 4	4 EDD	
Dedicated CORESET RMC		1, 2	CCR.1	.1 FDD	CCR.1	.1 FDD	
configuration							
OCNG Patterns		1, 2	OF	D 1	OF	P 1	
TRS configuration		1, 2		.1 FDD	OP.1 N/A		
Initial BWP		1, 2	DLBV		DLBWP.0.1		
configuration		., _	ULBV		ULBWP.0.1		
Active DL BWP		1, 2	DLBV		DLBWP.1.1		
configuration							
Active UL BWP		1, 2	ULBV	/P.1.1	ULBW	/P.1.1	
configuration							
RLM-RS		1, 2 1, 2	SS	SB		SB	
N_{oc} Note 2	dBm/SCS			-	98		
Note 2	dBm/15 kHz	1, 2		-	98		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 2	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94 -94		-Infinity	-94	
lo	dBm/9.36 MHz	1, 2			-62.25		
Propagation		1, 2		AWGN			
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.6 EN-DC event triggered reporting tests with SSB index reading with per-UE gaps

A.4.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.6.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.6.2-1 A.4.6.1.6.2-2 and A.4.6.1.6.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.4.6.1.6.2-1: Supported test configurations

	Config	Description		
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
Note 1:	The UE is only required to be tested in one of the supported test configurations			
Note 2:	Target NR Cell 3	has the same SCS, BW and duplex mode as NR serving Cell 2		

Table A.4.6.1.6.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2	E-UTRAN Cell 1 and NR Cell	
			2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 2: Cell 2 and Cell 3	
Measurement gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
CSI-RS parameters		1, 2	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1, 2	-4.5	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	N/A	OFF
Time offset between PCell and PSCell		1, 2	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 2	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.4.6.1.6.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	II 2	Се	II 3	
		configuration	T1	T2	T1	T2	
TDD configuration		1, 2	N	/A	N.	/A	
PDSCH RMC		1, 2	SR.1.	1 FDD	N.	/A	
configuration							
RMSI CORESET		1, 2	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration							
Dedicated		1, 2	CCR.1	.2 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration		4.0			0.5		
OCNG Patterns		1, 2		OP.1 TRS.1.1 FDD		OP.1	
TRS configuration		1, 2				/A	
Initial BWP		1, 2				BWP.0.1	
configuration				ULBWP.0.1		/P.0.1	
Active DL BWP		1, 2	DLBV	DLBWP.1.2		DLBWP.1.1	
configuration		4.0	111 504	/D 4 0	LII DIMD 4.4		
Active UL BWP		1, 2	ULBV	VP.1.2	ULBWP.1.1		
configuration		4.0	001	DO	000		
RLM-RS	-ID (0.00	1, 2 1, 2	CSI	-RS	SSB		
$N_{oc}^{}$ Note 2	dBm/SCS	1, 2		•	-98		
Note 2	dBm/15 kHz	1, 2	-98				
\hat{E}_{s}/I_{ot}	dB	1, 2	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	1, 2 1, 2	-64.60	-62.25	-64.60	-62.25	
Propagation		1, 2		AV	VGN		
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2 Inter-frequency Measurements

A.4.6.2.1 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

A.4.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the ENDC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.1.1-1, A.4.6.2.1.1-2, and A.4.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.1.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.1.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.1.1-1.

Table A.4.6.2.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config Description							
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode							
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note 1: The UE is only required to be tested in one of the supported test configurations							
Note 2: target NR cel	target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2						

Table A.4.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati	Test 1	Test 2	
		on			

E-UTRA RF Channel		Config		1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			is used.
NR RF Channel		Config			Two FR1 NR carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	LTE Cell 1 (PCell) and NR		LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 (PScell)	channel number 1.
					NR Cell 2 is on NR RF channel
					number 1.
Neighbour cell		Config	NR (cell 3	NR cell 3 is on NR RF channel
		1,2,3,4,5,6		1	number 2.
Gap Pattern Id		Config	0	4	As specified in clause 9.1.2-1.
		1,2,3,4,5,6		_	
Measurement gap		Config	9	9	
offset		1,2,3,4,5,6			
A3-Offset	dB	Config	-6		
		1,2,3,4,5,6			
Hysteresis	dB	Config	0		
001 11		1,2,3,4,5,6	NII		
CP length		Config	Normal		
TimesTaTricere	+	1,2,3,4,5,6		0	
TimeToTrigger	S	Config 1,2,3,4,5,6	,	J	
Filter coefficient		Config		0	L3 filtering is not used
Filler coefficient		1,2,3,4,5,6	'	J	L3 lillering is not used
DRX		Config	0	FF	DRX is not used
DKX		1,2,3,4,5,6	O O	ГГ	DRA is not used
Time offset between		Config	2	μs	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	3	μδ	Synchronous EN-DO
Time offset between	+	Config 1,4	3	ms	Asynchronous cells.
serving and neighbour		Joining 1,4			The timing of Cell 3 is 3ms later
cells					than the timing of Cell 2.
		Config	3 μs		Synchronous cells.
		2,3,5,6			Syriam enious come.
		_,-,-,-			
T1	S	Config		5	
		1,2,3,4,5,6			
T2	S	Config	1	1	
		1,2,3,4,5,6			

Table A.4.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	C	Cell 2		Cell 3		
		configuratio	T1	T2	T1	T2		
		n						
NR RF Channel Number		Config		1		2		
		1,2,3,4,5,6						
Duplex mode		Config 1,4		F	DD			
		Config		Т	DD			
		2,3,5,6						
BW _{channel}	MHz	Config 1,4		10: N _{RB,c} = 52				
		Config 2,5		10: N _{RB,c} = 52				
		Config 3,6	40: N _{RB,c} = 106					
BWP BW	MHz	Config 1,4	10: $N_{RB,c} = 52$					
		Config 2,5		10: N _{RB,c} = 52				
		Config 3,6		40: N _{RB,c} = 106				
TDD configuration		Config 2,5	TDDC	TDDConf.1.1		Conf.1.1		
		Config 3,6	TDDC	TDDConf.2.1		Conf.2.1		
Initial DL BWP		Config	DLB\	DLBWP.0.1 NA		NA		
		1,2,3,4,5,6						
Initial UL BWP		Config	ULBWP.0.1 NA		NA			
		1,2,3,4,5,6						
Dedicated DL BWP		Config	DLB\	WP.1.1		NA		
		1,2,3,4,5,6						

Dedicated UL BWP		Config	ULBV	VP.1.1	1	NA
		1,2,3,4,5,6				
TRS configuration		Config 1,4		.1 FDD		NA
		Config 2,5		.1 TDD		NA
OCNG Patterns defined in		Config 3,6		.2 TDD P.1		NA P.1
A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	O	P.1		P.1
PDSCH Reference		Config 1,4	SR.1.	1 FDD		
measurement channel		Config 2,5	SR.1.	1 TDD	1	
		Config 3,6	SR2.	1 TDD	1	
RMSI CORESET Reference		Config 1,4		1 FDD		-
Channel		Config 2,5		1 TDD		
		Config 3,6		1 TDD	1	
Dedicated CORESET Reference Channel		Config 1,4	CCR.1	.1 FDD		
		Config 2,5		.1 TDD		
		Config 3,6		2.1 TDD		
SSB parameters		Config 1,4		1 FR1		.5 FR1
		Config 2,5 Config 3,6		1 FR1 2 FR1		.5 FR1 .6 FR1
SMTC configuration defined		Config 1,4				TC.5
in A.3.11		Config 1,4	SMTC.2			
		2,3,5,6	SM	TC.1	SMTC.4	
PDSCH/PDCCH subcarrier	kHz	Config			15	
spacing		1,2,4,5 Config 3,6			30	
EPRE ratio of PSS to SSS		Corning 3,6	30			
EPRE ratio of PBCH DMRS						
to SSS						
EPRE ratio of PBCH to PBCH DMRS					0	
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config		0		
EPRE ratio of PDSCH DMRS to SSS		1,2,3,4,5,6				
EPRE ratio of PDSCH to						
PDSCH EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2 N _{oc}	dBm/15 kHz		=!	98	-	98
Note2 N _{oc}	dBm/S	Config	-	98	-	98
oc	CS	1,2,4,5				
OO DODD Note 2	IE :-	Config 3,6		95		95
SS-RSRP Note 3	dBm/S CS	Config	-94	-94	-Infinity	-91
	US	1,2,4,5 Config 3,6	-91	-91	-Infinity	-88
Ê , /I a	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6	•	•		
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9.	Config	-64.59	-64.59	-70.05	-62.26
	36MHz	1,2,4,5	E0 40	FO 40	60.04	E0 45
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config		AV	VGN	
		1,2,3,4,5,6				

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be
Note 3:	fulfilled. SS-RSRP and lo levels have been derived from other parameters for information purposes. They
	are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at
	each receiver antenna port.

A.4.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.2 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

A.4.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the ENDC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.2.1-1, A.4.6.2.2.1-2, and A.4.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.2.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.2.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.2.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

(Config Description					
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table A.4.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config		•	1		One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6					is used.
NR RF Channel		Config	1, 2			Two FR1 NR carrier frequencies is	
Number		1,2,3,4,5,6					used.
Active cell		Config	LTE (Cell 1 (F	Cell) ar	nd NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6		cell 2 (PScell)		channel number 1.
				,	•		NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config		NR (cell 3		NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	()		4	As specified in clause 9.1.2-1.
-		1,2,3,4,5,6					
Measurement gap		Config	3	9	(9	
offset		1,2,3,4,5,6					
A3-Offset	dB	Config		-	6		
		1,2,3,4,5,6					
Hysteresis	dB	Config		()		
-		1,2,3,4,5,6					
CP length		Config		Nor	mal		
		1,2,3,4,5,6					
TimeToTrigger	S	Config		()		
		1,2,3,4,5,6					
Filter coefficient		Config		()		L3 filtering is not used
		1,2,3,4,5,6					
DRX	ms	Config	DRX	DRX	DRX	DRX	As specified in clause A.3.3
		1,2,3,4,5,6	.1	.7	.1	.7	
Time offset between		Config		3	μS		Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6					
Time offset between		Config 1,4		3r	ns		Asynchronous cells.
serving and neighbour							The timing of Cell 3 is 3ms later
cells						than the timing of Cell 2.	
		Config	3µs			Synchronous cells.	
		2,3,5,6					
T1	s	Config		į	5		
		1,2,3,4,5,6					
T2	S	Config	1.1	11	1.1	11	
		1,2,3,4,5,6					

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Се	Cell 2		Cell 3		
		configuratio	T1	T2	T1	T2		
		n						

NR RF Channel Number		Config	1	2
NR RF Channel Number		1,2,3,4,5,6	ļ	2
Duplex mode		Config 1,4	F	-DD
Dapiex mode		Config		TDD
		2,3,5,6		
BWchannel	MHz	Config 1,4		RB,c = 52
		Config 2,5		RB,c = 52
		Config 3,6		RB,c = 106
BWP BW	MHz	Config 1,4	10: N	RB,c = 52
		Config 2,5		RB,c = 52
TDD configuration		Config 3,6		RB,c = 106
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.1.1
		Config 3,6	TDDConf.2.1	TDDConf.2.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config	ULBWP.0.1	NA
		1,2,3,4,5,6		
Dedicated DL BWP		Config	DLBWP.1.1	NA
		1,2,3,4,5,6		
Dedicated UL BWP		Config	ULBWP.1.1	NA
		1,2,3,4,5,6		
TRS configuration		Config 1,4	TRS.1.1 FDD	NA
		Config 2,5	TRS.1.1 TDD	NA
		Config 3,6	TRS.1.2 TDD	NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	OP.1	OP.1
PDSCH Reference		Config 1,4	SR.1.1 FDD	
measurement channel		Config 2,5	SR.1.1 TDD	
		Config 3,6	SR2.1 TDD	
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD	_
Channel		Config 2,5	CR.1.1 TDD	
		Config 2,5	CR2.1 TDD	
		Config 1,4	CCR.1.1 FDD	
Dedicated CORESET				
Reference Channel		Config 2,5	CCR.1.1 TDD	
		Config 3,6	CCR.2.1 TDD	
SSB parameters		Config 1,4	SSB.1 FR1	SSB.5 FR1
		Config 2,5	SSB.1 FR1	SSB.5 FR1
		Config 3,6	SSB.2 FR1	SSB.6 FR1
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.5
		Config 2,3,5,6	SMTC.1	SMTC.4
PDSCH/PDCCH subcarrier	kHz	Config		15
spacing		1,2,4,5		
EDDE water of DOO: 000		Config 3,6		30
EPRE ratio of PSS to SSS]		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to		Config 1,2,3,4,5,6	0	0
PDCCH DMRS EPRE ratio of PDSCH DMRS		1		
to SSS		_		
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				

EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Note2	dBm/15 kHz		-98		-98		
Note2 N _{oc}	dBm/S CS	Config 1,2,4,5	-(-98		-98	
		Config 3,6	-6	95		-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-91	-91	-Infinity	-88	
Ê s /I ot	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26	
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3,4,5,6	AWGN				

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{cc}}$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.3 Void

A.4.6.2.4 Void

A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description					
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex r							
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2						

Table A.4.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment	
		configurati	Test 1	Test 2		
		on				

E-UTRA RF Channel		Config		1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR (cell 3	NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9	9	
A3-Offset	dB	Config 1,2,3,4,5,6	-6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	0	FF	DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6		5	
T2	S	Config 1,2,3,4,5,6	1.1	1	

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
NR RF Channel Number		Config 1,2,3,4,5,6	,	1		2	
Duplex mode		Config 1,4			FDD		
		Config 2,3,5,6	TDD				
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52				
		Config 2,5		10: N	√RB,c = 52		
		Config 3,6	40: N _{RB,c} = 106				
BWP BW	MHz	Config 1,4	10: $N_{RB,c} = 52$				
		Config 2,5	10: N _{RB,c} = 52				
		Config 3,6	40: N _{RB,c} = 106				
TDD configuration		Config 2,5	TDDConf.1.1 TDDC		onf.1.1		
		Config 3,6	TDDConf.2.1 TDDCo		onf.2.1		
Initial DL BWP		Config 1,2,3,4,5,6	DLBV	/P.0.1	N	IA.	
Initial UL BWP		Config 1,2,3,4,5,6	ULBV	/P.0.1	N	NA .	

	1				1	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBV	VP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBV	VP.1.1		NA
TRS configuration		Config 1,4	TRS 1	.1 FDD		NA
TNO configuration		Config 2,5		.1 TDD		NA
		Config 3,6		.1 TDD .2 TDD		NA NA
OCNG Patterns defined in		Config		2.100 2.1)P.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				JF.1
PDSCH Reference		Config 1,4	SR.1.	1 FDD		
measurement channel		Config 2,5	SR.1.	1 TDD		
		Config 3,6	SR2.	1 TDD		
RMSI CORESET Reference		Config 1,4	CR 1	1 FDD		-
Channel		Config 2,5	_	1 TDD	-	
		Config 3,6		1 TDD	-	
		Config 1,4		.1 FDD		
Dedicated CORESET			CCR.1	.ו רטט		
Reference Channel		Config 2,5		.1 TDD		
		Config 3,6		.1 TDD		
SSB parameters		Config 1,4		1 FR1		3.5 FR1
		Config 2,5	SSB.	1 FR1		3.5 FR1
OMTO C		Config 3,6	SSB.	2 FR1	SSE	3.6 FR1
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SN	MTC.5
		Config 2,3,5,6	SM	TC.1	SMTC.4	
PDSCH/PDCCH subcarrier	kHz	Config				
spacing		1,2,4,5 Config 3,6	15 30			
EPRE ratio of PSS to SSS		Coming 5,0				
EPRE ratio of PBCH DMRS						
to SSS						
EPRE ratio of PBCH to PBCH						
DMRS					0	
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to		o "				
PDCCH DMRS		Config		0		
EPRE ratio of PDSCH DMRS		1,2,3,4,5,6				
to SSS						
EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2 N_{oc}	dBm/15 kHz		-98			-98
Note2 N_{oc}	dBm/S	Config	-9	98		-98
N_{oc}	CS	1,2,4,5	`			
		Config 3,6	_(-95 -95		-95
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91
	CS	1,2,4,5	5-7	J-1		
		Config 3,6	-91	-91	-Infinity	-88
Ê , /I ot	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6				
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9.	1,2,3,4,5,6 Config	-64.59	-64.59	-70.05	-62.26
10	36MHz		-04.59	-04.59	-70.05	-02.20
	dBm/38	1,2,4,5 Config 3,6	-58.49	-58.49	-63.94	-56.15
	.16MHz					
Propagation Condition		Config 1,2,3,4,5,6		A	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
Nata O	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
	fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at
	each receiver antenna port.

A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.6 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

A.4.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.6.1-1, A.4.6.2.6.1-2, and A.4.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description					
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mod							
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz ban		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	ote 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2						

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value Test Test Test 1 2 3 4			Comment
		configurati on					
E-UTRA RF Channel Number		Config 1,2,3,4,5,6			1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6		1,	, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE		PCell) ar PScell)	nd NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6		NR (cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	()	4	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	Ç	9	(9	
A3-Offset	dB	Config 1,2,3,4,5,6		-	6		
Hysteresis	dB	Config 1,2,3,4,5,6			0		
CP length		Config 1,2,3,4,5,6		Nor	mal		
TimeToTrigger	S	Config 1,2,3,4,5,6		(0		
Filter coefficient		Config 1,2,3,4,5,6		(0		L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6			μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms			Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.	
		Config 2,3,5,6	3µs			Synchronous cells.	
T1	S	Config 1,2,3,4,5,6			5		
T2	S	Config 1,2,3,4,5,6	1.3	13.5	1.3	13.5	

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio	T1	T2	T1	T2	
		n					

Duplex mode		1,2,3,4,5,6		
		Config 1,4	F	-DD
		Config		TDD
		2,3,5,6		
BW _{channel}	MHz	Config 1,4	10: N	RB,c = 52
		Config 2,5	10: N	RB,c = 52
		Config 3,6	40: N _F	RB,c = 106
BWP BW	MHz	Config 1,4		RB,c = 52
		Config 2,5		RB,c = 52
		Config 3,6		RB,c = 106
OCNG Patterns defined in		Config	OP.1	OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6		
PDSCH Reference		Config 1,4	SR.1.1 FDD	-
measurement channel		Config 2,5	SR.1.1 TDD	
		Config 3,6	SR.2.1 TDD	
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD	-
Channel		Config 2,5	CR.1.1 TDD	
		Config 3,6	CR.2.1 TDD	
		Config 1,4	CCR.1.1 FDD	
Dedicated CORESET		•		
Reference Channel		Config 2,5	CCR.1.1 TDD	
		Config 3,6	CCR.2.1 TDD	
TDD configuration		Confin 0.5	TDD	Conf.1.1
-		Config 2,5		
		Config 3,6	TDD0	Conf.2.1
Initial DL BWP		Config	DLB	WP.0.1
		1,2,3,4,5,6		
TRS configuration			TRS.1.1 FDD	N/A
3			TRS.1.1 TDD	N/A
				N/A
Initial UL BWP		Config		WP.0.1
Dedicated DL BWP		Config	DLB	WP.1.1
Dedicated UL BWP		Config	ULB	WP.1.1
SSB parameters		Config 1,4	SSB.1 FR1	SSB.5 FR1
		Config 2,5	SSB.1 FR1	SSB.5 FR1
		Config 3,6	SSB.2 FR1	SSB.6 FR1
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.5
		Config	SMTC.1	SMTC.4
DD0011/DD0011	111			
	KHZ			15
spacing				30
EPRE ratio of PSS to SSS		Corning 3,0		00
		<u> </u>		
to SSS				
DMRS		Config	0	0
		1,2,3,4,5,6	U	U
EPRE ratio of PDCCH DMRS		i l		
to SSS				
Dedicated DL BWP Dedicated UL BWP SSB parameters SMTC configuration defined in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	1,2,3,4,5,6 Config 1,2,3,4,5,6 Config 1,2,3,4,5,6 Config 1,4 Config 2,5 Config 3,6 Config 1,4 Config 2,3,5,6 Config 1,2,4,5 Config 3,6 Config 1,2,4,5 Config 3,6 Config	TRS.1.1 TDD TRS.1.2 TDD ULB ULB SSB.1 FR1 SSB.1 FR1 SSB.2 FR1 SMTC.2 SMTC.1	N/A N/A WP.0.1 WP.1.1 WP.1.1 SSB.5 FR1 SSB.6 FR1 SMTC.5

EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N_{oc} Note2	dBm/15 kHz		-(98		-98
N_{oc} Note2	dBm/S CS	Config 1,2,4,5	-98		-98	
		Config 3,6	-6	95		-95
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91
		Config 3,6	-91	-91	-Infinity	-88
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3,4,5,6		A	WGN	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.7 Void

A.4.6.2.8 Void

A.4.6.3 Void

A.4.6.4 L1-RSRP measurement for beam reporting

A.4.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.4.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.1.1-1.

Table A.4.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only	The UE is only required to be tested in one of the supported test configurations				

A.4.6.4.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.1.2-1 and Table A.4.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BWchannel	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Chaine	3,6		SR.2.1 TDD

RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
Channel	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
	2,5		CCR.1.1 TDD
Channel	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD
DRX configuration	1~6		Off
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1~6	dB	0
Propagation condition	1~6		AWGN

Table A.4.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config	Onit	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~6	dBm/15kHz	-94.65			
N_{oc} Note2	1,2,4,5	dBm/SSB SCS	-94.65			
TV _{oc}	3,6	dbiii/33b 3C3	-91.65			
$\hat{\mathtt{E}}_{\scriptscriptstyle \mathrm{s}}/\mathtt{I}_{\scriptscriptstyle \mathrm{ot}}$	1~6	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
OOD NON	3,6	dbiii/oob ooo	-91.65	-91.65	-Infinity	-88.65
lo Note3	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93

		3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{oc}		1~6	dB	0	0	-Infinity	3
Note 1:	The res	sources for uplink	transmission are assigne	d to the UE	prior to the	start of tin	ne period
Note 2:	T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for						
	N_{oc} to be fulfilled.						
Note 3:						ırposes.	

A.4.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.4.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.2.1-1.

 Config
 Description

 1
 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

 2
 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

 3
 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

 4
 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

 5
 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

 6
 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

 Note:
 The UE is only required to be tested in one of the supported test configurations

Table A.4.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

A.4.6.4.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.2.2-1 and Table A.4.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
Duplex mode	1,4		FDD
Duplex mode	2,5		TDD

	2.6		TDD
	3,6		N/A
TDD Configuration	1,4		TDDConf.1.1
TDD Configuration	2,5 3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
	•		
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
onarii o	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
G.1.6.11.10.	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD
00D	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
0010 5 "	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1
			ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~6		SMTC.1
Civil o configuration	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
The comparation	3,6		TRS.1.2 TDD
DRX configuration	1~6		DRX.3
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS	11-0	3	'
EPRE ratio of PBCH DMRS to SSS	1		
EPRE ratio of PBCH to PBCH	-		
DMRS			
EPRE ratio of PDCCH DMRS to	-		
SSS			
EPRE ratio of PDCCH to PDCCH	-		
DMRS			
EPRE ratio of PDSCH DMRS to	1~6	dB	0
SSS			
EPRE ratio of PDSCH to PDSCH	1		
DMRS			
EPRE ratio of OCNG DMRS to	1		
SSSNote 1			
EPRE ratio of OCNG to OCNG	1		
DMRS Note 1			
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such	_	<i> </i>	_

Parameter	Config	Unit	SS	B#0	SSB#1	
Parameter	Config	Unit	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~6	dBm/15kHz		-94.65		
λ/ Note2	1,2,4,5	dBm/SSB SCS	-94.65			
$N_{oc}^{ m Note2}$	3,6	UBIII/55B 5C5		-91	.65	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~6	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
SSB KSKI	3,6	ubiii/33b 303	-91.65	-91.65	-Infinity	-88.65
lo ^{Note3}	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_{s}/N_{cc}	1~6	dB	0	0	-Infinity	3

Table A.4.6.4.2.2-2: SSB specific test parameters

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.4.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.3.1-1.

Table A.4.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only re	equired to be tested in one of the supported test configurations	

A.4.6.4.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.3.2-1 and Table A.4.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Chamie	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
Dedicated CORECET Reference	1,4		CCR.1.1 FDD
Dedicated CORESET Reference Channel	2,5		CCR.1.1 TDD
Channel	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
	1,4		CSI-RS 1.3 FDD
CSI-RS configuration	2,5		CSI-RS 1.3 TDD
-	3,6		CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
-	3,6		TRS.1.2 TDD
Initial DWD Configuration	1.0		DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
Dedicated DMD configuration	1.6		DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		Off
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
qcl-Info	1~6		SSB#0 for resource#0 SSB#1 for resource#1

1~6	S	
	•	5
1~6	dB	0
1~6		AWGN
		1~6

Table A.4.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit CSI-RS#0		CSI-RS#1		
N_{oc} Note1	1~6	dBm/15kHz	-94.65			
$N_{oc}^{ m Note1}$	1,2,4,5	dBm/SSB SCS	-94	.65		
TV _{oc}	3,6	UBIII/33B 3C3	-91.65			
\hat{E}_{s}/I_{ot}	1~6	dB	0	3		
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65		
Note2	3,6	dbiii/00b 000	-91.65	-88.65		
lo Note2	1,2,4,5	dBm/9.36 MHz	-63.69	-61.93		
10	3,6	dBm/38.16 MHz	-57.59	-55.84		
\hat{E}_s/N_{oc}	1~6	dB	0	3		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.4.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.1-1.

Table A.4.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Co	nfig	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
;	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
:	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Th	ne UE is only re	equired to be tested in one of the supported test configurations

A.4.6.4.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.4.2-1 and Table A.4.6.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value		
SSB GSCN	1~6		freq1		
	1,4		FDD		
Duplex mode	2,5		TDD		
	3,6		TDD		
	1,4		N/A		
TDD Configuration	2,5		TDDConf.1.1		
	3,6		TDDConf.2.1		
	1,4		10: N _{RB,c} = 52		
BWchannel	2,5	MHz	10: N _{RB,c} = 52		
	3,6		40: N _{RB,c} = 106		
PDSCH Reference measurement	1,4		SR.1.1 FDD		
channel	2,5		SR.1.1 TDD		
Granici	3,6		SR.2.1 TDD		
	1,4		CR.1.1 FDD		
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD		
	3,6		CR.2.1 TDD		
Dedicated CORESET Reference	1,4		CCR.1.1 FDD		
Channel	2,5		CCR.1.1 TDD		
	3,6		CCR.2.1 TDD		
00D	1,4		SSB.3 FR1		
SSB configuration	2,5		SSB.3 FR1		
	3,6		SSB.4 FR1		
001.00	1,4		CSI-RS 1.3 FDD		
CSI-RS configuration	2,5		CSI-RS 1.3 TDD		
00N0 P-#	3,6		CSI-RS 2.3 TDD		
OCNG Patterns	1~6 1,4		OP.1		
TDC Configuration	2,5		TRS.1.1 FDD TRS.1.1 TDD		
TRS Configuration	3,6		TRS.1.1 TDD		
			DLBWP.0.1		
Initial BWP Configuration	1~6		ULBWP.0.1		
Dedicated BWP configuration	1~6		DLBWP.1.1 ULBWP.1.1		
SMTC configuration	1~6		SMTC.1		
DRX configuration	1~6		DRX.3		
reportConfigType	1~6		aperiodic		
reportQuantity	1~6		cri-RSRP		
Number of reported RS	1~6		2		
·	4.6		SSB#0 for resource#0		
qcl-Info	1~6		SSB#1 for resource#1		
reportSlotOffsetList	1~6	slots	8		
T1	1~6	S	5		
EPRE ratio of PSS to SSS	<u> </u>				
EPRE ratio of PBCH DMRS to SSS	<u> </u>				
EPRE ratio of PBCH to PBCH DMRS	<u> </u>				
EPRE ratio of PDCCH DMRS to SSS	1				
EPRE ratio of PDCCH to PDCCH					
DMRS	1 1	ID.			
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0		
EPRE ratio of PDSCH to PDSCH					
DMRS EPRE ratio of OCNG DMRS to	1				
SSS ^{Note 1}					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation condition	1~6		AWGN		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant					

3

CSI-RS#0 CSI-RS#1 **Parameter** Config Unit $N_{oc}^{
m Note1}$ 1~6 dBm/15kHz -94.65 1,2,4,5 -94.65 $N_{oc}^{\rm Note1}$ dBm/SSB SCS 3,6 -91.65 \hat{E}_{s}/I_{ot} 1~6 0 3 dB 1,2,4,5 -94.65 -91.65 CSI-RS RSRP dBm/SSB SCS 3,6 -91.65 -88.65 1,2,4,5 dBm/9.36 MHz -61.93 -63.69lo Note2 3,6 dBm/38.16 MHz -57.59 -55.84

Table A.4.6.4.4.2-2: CSI-RS specific test parameters

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information

0

dB

purposes. They are not settable parameters themselves.

A.4.6.4.4.3 Test Requirements

 \hat{E}_{c}/N_{oc}

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

1~6

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.4.7.1 SS-RSRP

A.4.7.1.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

422

A.4.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.4.7.1.1.2 Test parameters

In this set of test cases all NR cells are on the same carrier frequency. Supported test configurations are shown in table A.4.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.1.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1 In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only require	ed to be tested in one of the supported test configurations for each supported band

Table A.4.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		1114	Te	st 1	Te	st 2	Test 3		
		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
Physical cell ID			489	0	489	0	489	0	
SSB ARFCN			fr	eq1	fre	q1	fre	q1	
Dupley made	Config 1,4				FD	D			
Duplex mode	Config 2,3,5,6				TD	D			
	Config 1,4				Not App				
TDD configuration	Config 2,5				TDDCc	nf.1.1			
	Config 3,6				TDDCc	nf.2.1			
	Config 1,4		10: N _{RB,c} = 52 10: N _{RB,c} = 52 40: N _{RB,c} = 106						
BW _{channel}	Config 2,5	MHz							
	Config 3,6								
Downlink initial BWP cor	figuration				DLBW	P.0.1			
Downlink dedicated BWF	configuration				DLBW	P.1.1			
Uplink initial BWP configuration				ULBWP.0.1					
Uplink dedicated BWP co	onfiguration			ULBWP.1.1					
	Config 1,4		TRS.1. 1 FDD	NA	TRS.1.1 FDD	NA	TRS.1. 1 FDD	NA	
TRS configuration	Config 2,5		TRS.1. 1 TDD	NA	TRS.1.1 TDD	NA	TRS.1. 1 TDD	NA	
	Config 3,6		TRS.1. 2 TDD	NA	TRS.1.2 TDD	NA	TRS.1. 2 TDD	NA	
DRX Cycle		ms			Not App	licable	•		
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD		
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1	-	CR.1.1 TDD	-	
Reference Charmer	Config 3,6		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD		

		Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Control Cha	nnel RMC	Config 2,5	-	CCR.1.	_	CCR.1.	_	CCR.1.	-	
			-	1 TDD CCR2.1		1 TDD CCR2.		1 TDD CCR2.1		
		Config 3,6		TDD		1 TDD		TDD		
		Config 1,4		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	
SSB configu	ıration	Config 2,5		SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	SSB.1	
002 0090		_		FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	FR1 SSB.2	
		Config 3,6		FR1	FR1	FR1	FR1	FR1	FR1	
Time offset	with Cell 2	Config 1,4 Config 2,3,5,6	ms µs	-	3	-	3	-	3	
SMTC confi	guration	Config 1,4	μο			SMT				
OCNG Patte		Config 2,3,5,6				SMT OP				
PDSCH/PD	CCH	Config 1,2,4,5	kHz			15 k	Ήz			
subcarrier s	pacing of PSS to SSS	Config 3,6	IXI IZ			30k	Hz T			
EPRE ratio	of PBCH DMR	S to SSS								
	of PBCH to PE of PDCCH DM		1							
EPRE ratio	of PDCCH to F	PDCCH DMRS	dB	0	0	0	0	0	0	
EPRE ratio	of PDSCH DM of PDSCH to F	RS to SSS								
EPRE ratio	of OCNG DMF	RS to SSS(Note 1)								
EPRE ratio	of OCNG to O	CNG DMRS (Note 1)								
		NR_FDD_FR1_A, NR_TDD_FR1_A								
		NR_FDD_FR1_B	-						-114 -113.5	
		NR_TDD_FR1_C						-113.5 -113		
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D		-1	-106		-88		-112.5	
		NR_FDD_FR1_E,							2.5	
		NR_TDD_FR1_E						-112 -111		
λ/ νο		NR_FDD_FR1_G NR_FDD_FR1_H	-dD/4.51/b.7					-111 -110.5		
$N_{oc}^{ m Note2}$		NR_FDD_FR1_A,	dBm/15KhZ							
		NR_TDD_FR1_A NOTE 6						-114		
		NR_FDD_FR1_B NR_TDD_FR1_C	1					-113.5 -113		
	Config 3,6	NR_FDD_FR1_D,		Not appl	icable ^{Note 5}	-6	-94			
		NR_TDD_FR1_D NR_FDD_FR1_E,						-11	2.5	
		NR_TDD_FR1_E						-1	12	
		NR_FDD_FR1_G NR FDD FR1 H	-					-1 -11	11 0.5	
	Config 1,2,4,			1	06		38	Sam	e as	
	Joining 1,2,4,	NR_FDD_FR1_A,	-	-1					5kHz 11	
		NR_TDD_FR1_A NOTE								
		NR_FDD_FR1_B						-11	0.5	
N_{oc} Note2		NR_TDD_FR1_C	dBm/SCS					-1	10	
	Config 3,6	NR_FDD_FR1_D, NR_TDD_FR1_D		Not appl	icable ^{Note 5}	-(91	-10	9.5	
		NR_FDD_FR1_E,	-					-1	09	
		NR_TDD_FR1_E NR_FDD_FR1_G	-					_1	08	
		NR_FDD_FR1_H			T		_	-10	7.5	
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$		dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76		
\hat{E}_s/N_{oc}		dB	6	1	6	1	3	0		
3, 00		NR_FDD_FR1_A,						-111.00	-114.00	
		NR_TDD_FR1_A								
SS- RSRP ^{Note3}	Config 1,2,4,5	NR_FDD_FR1_B	dBm/SCS	-100	-105	5 -82	-87	-110.50	-113.50	
T.CINI	1,2,7,0	NR_TDD_FR1_C NR_FDD_FR1_D,						-110.00 -109.50	-113.00 -112.50	
		NR_TDD_FR1_D						100.00	112.00	

-109.00 -112.00

NR_FDD_FR1_E,

		ND TDD FD4 F						-103.00	-112.00
		NR_TDD_FR1_E	4					400.00	444.00
		NR_FDD_FR1_G NR_FDD_FR1_H	4					-108.00 -107.50	-111.00
		NR FDD FR1 A,	-					-107.50	-110.50 -111.00
		NR_TDD_FR1_A,						-106.00	-111.00
		NOTE 6							1
		NR FDD FR1 B	1					-107.50	-110.50
		NR TDD FR1 C		- Not	Not			-107.00	-110.00
	Config 3,6	NR FDD FR1 D,	1	applicab	applicabl	-85	-90	-106.50	-109.50
		NR_TDD_FR1_D		le ^{Note 5}	e ^{Note 5}				
		NR_FDD_FR1_E,						-106.00	-109.00
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-105.00	-108.00
		NR_FDD_FR1_H						-104.50	-107.50
		NR_FDD_FR1_A,						-80	.03
		NR_TDD_FR1_A							
		NR_FDD_FR1_B	-					-70	.53
		NR_TDD_FR1_C	1						0.03
	Config	NR_FDD_FR1_D,	dBm/	-70	0.09	-52.09			3.53
	1,2,4,5	NR_TDD_FR1_D	9.36MHz	70.00		32.03		-70	.55
		NR FDD FR1 E,	1					-78	3.03
		NR_TDD_FR1_E							
		NR_FDD_FR1_G						-77	.03
Io ^{Note3}		NR_FDD_FR1_H						-76	5.53
10110100		NR_FDD_FR1_A,						-73	.94
		NR_TDD_FR1_A							
		NOTE 6							
		NR_FDD_FR1_B						-73.44	
		NR_TDD_FR1_C	dBm/		Note 5				.94
	Config 3,6	NR_FDD_FR1_D,	38.16MHz	Not appl	icable ^{Note 5}	-51	.99	-72	44
		NR_TDD_FR1_D NR FDD FR1 E,	4					74	0.4
		NR_TDD_FR1_E,						-71	.94
		NR FDD FR1 G	1					-70	.94
		NR FDD FR1 H	1).44
Propagatio	n condition	11117. 227.1117.	_			AW	GN	1 10	
	onfiguration					1x	_		
Note 1:		be used such that both	n cells are fully	allocated	and a cons			d power sr	pectral
		nieved for all OFDM sy							
Note 2:				ot specifie	d in the test	is assum	ed to be o	constant ov	∕er
	**								
	subcarriers and time and shall be modelled as AWGN of appropriate power for N , to be fulfilled								

- subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- SS-RSRP minimum requirements are specified assuming independent interference and noise at each Note 4: receiver antenna port.
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS
- The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this Note 6: release of the specification

A.4.7.1.1.3 **Test Requirements**

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

EN-DC inter-frequency measurement accuracy with FR1 serving cell and A.4.7.1.2 FR1 target cell

A.4.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations in Table A.4.7.1.2.1-1.

425

Table A.4.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is o	only required to be tested in one of the supported test configurations on each supported band

A.4.7.1.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.4.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Confic	Test 1 Test 2		Test 1		t 2
	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N _{RB,0}	10: N _{RB,c} = 52		,c = 52
BWchannel	2,5	MHz	10: N _{RB,0}		10: N _{RB} ,	
	3,6		40: N _{RB,c}	= 106	40: N _{RB,0}	= 106
Gap pattern ID			0		0	
	1,4		FDI		FD	
Duplex mode	2,5		TDI		TD	
	3,6		TDI		TD	
	1,4		N/A		N/A	
TDD configuration	2,5		TDDCor		TDDCo	
	3,6		TDDCor	nf.2.1	TDDCo	nf.2.1
	1,4		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-
	3,6		SR.2.1 FDD		SR.2.1 FDD	
	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-
	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-
	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Dedicated CORESET Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1,4		SSB.1		SSB.1	
SSB configuration	2,5			SSB.1 FR1		FR1
	3,6		SSB.2 FR1		SSB.2	
OCNG Patterns	1~6		OP.		OP	
	1,4		TRS.1.1 FDD		TRS.1.1 FD	
TRS configuration	2,5		TRS.1.1 TDD		TRS.1.1 TD	
	3,6		TRS.1.2 TDD)	TRS.1.2 TDD	

Initial BWP Configuration		1~6		DLBWI ULBWI		DLBW ULBW	
Dedicated E	BWP configuration	1~6		DLBWI ULBWI	P.1.1	DLBW ULBW	P.1.1
Time a effect	with Call O	1,4	ms	-	3	-	3
Time offset	with Cell 2	2,3,5,6	μs	-	3	-	3
SMTC conf	iguration	1,4		SMT	0.2	SMT	C.2
SIVITO CONI	iguration	2,3,5,6		SMT	C.1	SMT	C.1
	of PSS to SSS of PBCH DMRS to	-					
SSS		-					
DMRS	of PBCH to PBCH						
EPRE ratio o	f PDCCH DMRS to						
EPRE ratio o	f PDCCH to PDCCH	1~6	dB	0	0	0	0
	f PDSCH DMRS to		d B	Ü			
DMRS	f PDSCH to PDSCH						
EPRE ratio o	of OCNG DMRS to						
EPRE ratio o	f OCNG to OCNG						
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,						-115
	NR_FDD_FR1_B					λī	-114.5
N_{oc} Note2	NR_TDD_FR1_C NR_FDD_FR1_D,	1~6	dBm/15	-94.6	65	$(N_{oc} \text{ for})$	-114
	NR_TDD_FR1_D	=	kHz			Cell 3 +8dB)	-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113
	NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,						-115
	·	-					444.5
	NR_FDD_FR1_B NR_TDD_FR1_C			-94.6	65	$(N_{oc})_{for}$	-114.5 -114
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5				Cell 3	-113.5
	NR_FDD_FR1_E, NR_TDD_FR1_E	-				+8dB)	-113
N_{oc} Note2	NR_FDD_FR1_G		dBm/SS				-112
IV oc	NR_FDD_FR1_H NR_FDD_FR1_A,		B SCS				-111.5 -112.00
	NR_TDD_FR1_A						112.00
	NR_FDD_FR1_B NR_TDD_FR1_C						-111.50 -111.00
	NR_FDD_FR1_D,	3,6		-91.6	65	$N_{oc \text{ for}}$	-110.50
	NR_TDD_FR1_D NR_FDD_FR1_E,	-				C 3 +8dB)	-110.00
	NR_TDD_FR1_E NR_FDD_FR1_G						-109.00
	NR_FDD_FR1_H				ı		-108.50
	\hat{E}_{s}/I_{ot}	1~6	dB	10	10	13	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5_						-118.00
SS-	NR_FDD_FR1_B	1045	dBm/SC	04.4	25	(RSRP for	-117.50
RSRP ^{Note3}	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5	S	-84.6	00	Cell 3 +25dB)	-117.00
	NR_TDD_FR1_D NR_FDD_FR1_E,	-					-116.50
	NR_TDD_FR1_E						-116.00

	110 EDD ED		ı				445.00
	NR_FDD_FR1_G						-115.00
	NR_FDD_FR1_H NR_FDD_FR1_A,					+	-114.50
	NR_TDD_FR1_A						-115.00
	NOTE 5,						
	110 500 501 0					44450	
	NR_FDD_FR1_B					(RSRP for	-114.50
	NR_TDD_FR1_C NR_FDD_FR1_D,	3,6		-81.6	65	Cell 3	-114.00
	NR_TDD_FR1_D					+25dB)	-113.50
	NR_FDD_FR1_E,						-113.00
	NR_TDD_FR1_E						
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
	NR_FDD_FR1_A, NR_TDD_FR1_A						-85.28
	NOTE 6,						
							0.4.=0
	NR_FDD_FR1_B		dBm/			(Io for	-84.78
	NR_TDD_FR1_C	1,2,4,5	9.36MH	-56.2	28	Channel 3	-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,1,0	Z	00.2		+19.75dB)	-83.78
	NR FDD FR1 E,	1_5			•	-83.28	
	NR_TDD_FR1_E						03.20
	NR_FDD_FR1_G						-82.28
Io ^{Note3}	NR_FDD_FR1_H						-81.78
10	NR_FDD_FR1_A,						-79.19
	NR_TDD_FR1_A NOTE 6						
	,						
	NR_FDD_FR1_B						-78.69
	NR_TDD_FR1_C		dBm/		_	(Io for	-78.19
	NR_FDD_FR1_D,	3,6	38.16M	-50.1	9	Channel 3 +19.75dB)	-77.69
	NR_TDD_FR1_D		Hz			+19.73 ub)	
	NR_FDD_FR1_E, NR_TDD_FR1_E						-77.19
	NR_FDD_FR1_G						-76.19
	NR_FDD_FR1_H						-75.69
-	\hat{E}_s/N_{oc}	1~6	dB	10	10	13	-3
Propag	gation condition	1~6	-	AWG	iN	AWO	3N
	na configuration			1x2		1x:	2
	OCNG shall be used s						
t	transmitted power spectral density is achieved for all OFDM symbols.						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

RSRP and lo levels have been derived from other parameters for information purposes. Note 3: They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

The test configuration excludes support for band n51 and it is not required to run this test Note 5 on band n51 in this release of the specification

A.4.7.1.2.3 **Test Requirements**

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.1.1 and Relative requirement in clause 10.1.4.1.2.

A.4.7.1.3 Void

A.4.7.2 SS-RSRQ

A.4.7.2.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.4.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.4.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
			Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1		fre	freq1		freq1	
Duploy mode	Config 1,4		FDD						
Duplex mode	Config 2,3,5,6		TDD						
	Config 1,4				Not Ap	plicable			
TDD configuration	Config 2,5		TDDConf.1.1						
	Config 3,6		TDDCc				onf.2.1		
	Config 1,4		10: N _{RB,c} = 52						
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52						
	Config 3,6		40: N _{RB,c} = 106						
	Initial DL BWP		DLBWP.0.1						
	Dedicated DL	DLBWP.1.1							
BWP configuration	BWP		DLDWF.1.1						
DVVI Corniguration	Initial UL BWP				ULBV	VP.0.1			
	Dedicated UL		ULBWP.1.1						
	BWP								
DRX Cycle	Γ	ms	Not Applicable						
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference	0 " 0 "		SR.1.1		SR.1.1		SR.1.1		
measurement	Config 2,5		TDD	-	TDD	-	TDD	-	
channel	Config 3,6		SR2.1		SR2.1		SR2.1		
	Corning 5,6		TDD		TDD		TDD		
RMSI CORESET Reference Channel	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
	-		CR.1.1	-	CR.1.1	-	CR.1.1		
Reference Chairner	Config 2,5		TDD		TDD		TDD		

		Config 3,6		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD		
		Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1.1 FDD		
Control Channel RMC		Config 2,5	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1.1 TDD	-	
		Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2.1 TDD		
TRS con	figuration	Config 1,4		TRS.1. 1 FDD	-	TRS.1.1 FDD	-	TRS.1.1 FDD	-	
		Config 2,5		TRS.1. 1 TDD		TRS.1.1 TDD		TRS.1.1 TDD		
20112		Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD		
OCNG F						OF				
	I-Measureme				Not Applicable					
Time offs	set with	Config 1,4	ms	-	3	-	3	-	3	
Cell 2		Config 2,3,5,6	μs	-	3	-	3	-	3	
SMTC		Config 1,4				SM	TC.2			
configura	ation	Config 2,3,5,6		SMTC.1						
Ť		Config 1,2,4,5					1 FR1			
SSB cor	nfiguration	Config 3,6								
DDCCLL	(DDCCL)						2 FR1			
PDSCH/		Config 1,2,4,5	kHz				kHz			
	er spacing	Config 3,6			ı	301	кНz	1		
	io of PSS to S		1							
	io of PBCH DN									
EPRE rat	io of PBCH to	PBCH DMRS								
EPRE rat	io of PDCCH [DMRS to SSS	dB	0		0	0		0	
EPRE rat	io of PDCCH t	o PDCCH DMRS			0			0		
EPRE rat	io of PDSCH [DMRS to SSS								
	io of PDSCH t									
	EPRE ratio of OCNG DMRS to SSS(Note 1)		1							
	EPRE ratio of OCNG to OCNG DMRS (Note 1)									
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7				•		-114		
	Config	NR_FDD_FR1_B						-113.5		
		NR_TDD_FR1_C				}		-113		
		NR_FDD_FR1_D,		-85		-101		-110		
	1,2,4,5							-11	2.5	
		NR_TDD_FR1_D						-112		
		NR_FDD_FR1_E,								
		NR_TDD_FR1_E							-	
		NR_FDD_FR1_G	dBm/15k					-111		
N_{oc}		NR_FDD_FR1_H						-110.5		
		NR_FDD_FR1_A,	Hz							
Note2		NR_TDD_FR1_A	П2	-91				-114		
		NR_FDD_FR1_B	1					-113.5		
		NR_TDD_FR1_C				-		-113		
	Config 3,6	NR_FDD_FR1_D, NR_TDD_FR1_D	-					-112.5		
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112		
		NR_FDD_FR1_G	-					4.	11	
								-111		
		NR_FDD_FR1_H						-110.5		
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7	_					-114		
		NR_FDD_FR1_B						-113.5		
N_{oc}	Config	NR_TDD_FR1_C	dBm/SC					-1 ⁻		
Note2	1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D	S S	-85		-101		-112.5		
		NR_FDD_FR1_E, NR_TDD_FR1_E						-112		
		NR_FDD_FR1_G						-111		

		NR_FDD_FR1_H						-11	0.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D			-88		-		-111	
								-110.5 -110	
								-109.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_G							08
<u> </u>		NR_FDD_FR1_H						-107.5	
$E_{\rm s}/I_{\rm ot}$	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	-1.76		-4.7		-5.46	-5.46
\hat{E}_s/N_c	ос		dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-118	-118
		NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SC S	-82		-103.9	-103.9	-117.5 -117	-117.5 -117
	Config 1,2,4,5	NR_FDD_FR1_D, NR_TDD_FR1_D			-82			-116.5	-117
		NR_FDD_FR1_E, NR_TDD_FR1_E						-116	-116
SS-		NR_FDD_FR1_G						-115	-115
RSRP Note3	Config 3,6	NR_FDD_FR1_H NR_FDD_FR1_A,		-85	-85	-	-	-114.5	-114.5
Notes		NR_TDD_FR1_A NOTE 7						-115	-115
		NR_FDD_FR1_B NR_TDD_FR1_C						-114.5 -114	-114.5 -114
		NR_FDD_FR1_D,						-113.5	-113.5
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_TDD_FR1_E	 - 					-113	-113
		NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5	-112 -111.5
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7			-14.77	-16.76	-16.76		
	Q Note3	NR_FDD_FR1_B							
00 000		NR_TDD_FR1_C							
55-R5R		NR_FDD_FR1_D, NR_TDD_FR1_D	dB	-14.77				-17.34	-17.34
		NR_FDD_FR1_E,							
		NR_TDD_FR1_E NR_FDD_FR1_G							
	1	NR_FDD_FR1_H							
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7	- dBm/ 9.36MHz	-50		-70		-83.5	
	Config 1,2,4,5	NR_FDD_FR1_B						-83	
Io ^{Note3}		NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D						-82.5 -82	
		NR_FDD_FR1_E,						-81.5	
		NR_TDD_FR1_E NR_FDD_FR1_G						-80.5	
		NR_FDD_FR1_H	1					-80	

		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7						-77.4	
		NR_FDD_FR1_B						-76.9	
	Config	NR_TDD_FR1_C	dBm/					-76.4	
Config 3,6		NR_FDD_FR1_D,	38.16M	-50		-		-75.9	
		NR_TDD_FR1_D	Hz					-73.9	
		NR_FDD_FR1_E,						-75	5.4
		NR_TDD_FR1_E						-10). 4
		NR_FDD_FR1_G						-74	1.4
		NR_FDD_FR1_H						-73	3.9
Propaga	Propagation condition		-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration			1x2	1x2	1x2	1x2	1x2	1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2. Note 6: Subtest 2 is not used when testing with 30kHz SSB SCS.
- Note 7: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.4.7.2.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter frequency measurement.

A.4.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.2.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.4.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Darame	Parameter		Test 1							
		Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3		
SSB ARFCN	Config 1,4		treq1	treq2			freq1	treq2		
Duplex mode	Config 2,3,5,6									
	Config 1,4				Not App	licable				
TDD configuration	Config 2,5				TDDCo	nf.1.1				
	Config 3,6				TDDCo	nf.2.1				
	Config 1,4		10: N _{RB,c} = 52							
BWchannel	Config 2,5	MHz			10: N _{RB}	,c = 52				
	Config 3,6				40: N _{RB,0}	= 106				
	Config 1,4				10: N _{RB}	,c = 52				
BWP BW	Config 2,5	MHz	Cell 2 Cell 3 Cell 2 Cell 3 Cell 4 Cell 3 Cell 4 Cell 4							
	Config 3,6		Cell 2 Cell 3 Cell 2 Cell 3 freq1 freq2 freq1 freq2 FDD							
DRX Cycle		ms			Not App	licable				
	Config 1,4						SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2,5			-		-	SR.1.1 TDD	-		
	Config 3,6						SR.2.1 TDD			
	Config 1,4						CR.1.1 FDD			
RMSI CORESET Reference Channel	Config 2,5			-		-	CR.1.1 TDD	-		
	Config 3,6						CR.2.1 TDD			
	Config 1,4						CCR.1 .1 FDD			
Dedicated CORESET Reference Channel	Config 2,5			-		-	CCR.1 .1 TDD	-		
	Config 3,6						CCR.2 .1 TDD			
TRS configuration	Config 1,4			-		-	TRS.1. 1 FDD	-		
	Config 2,5				_		TRS.1. 1 TDD			
	Config 3,6						TRS.1. 2 TDD			
OCNG Patterns	T			-	OCNG pa	attern 1	·			
Time offset with Cell 2	Config 1,4	ms	-	3	-	3	-	3		
Time office with Oell 2	Config 2,3,5,6	μs	-	3	-	3	-	3		
SMTC configuration	Config 1,4									
	Config 2,3,5,6 Config 1,2,4,5			C				R.1.1 DD R.1.1 DD R.2.1 DD CR.1 FDD CR.2 TDD RS.1. FDD R		
SSB configuration	Config 1,2,4,5				•					
PDSCH/PDCCH	Config 1,2,4,5									
subcarrier spacing	Config 3,6	kHz			30 k	Hz				
EPRE ratio of PSS to SSS										
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC		-	_	_	_	_	_	_		
EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to P	RS to SSS	dB	0	0	0	0	0	0		
EPRE ratio of PDSCH DMF							<u> </u>			

FPRF ratio	of PDSCH to P	DSCH	1			<u> </u>		<u> </u>	
		S to SSS(Note 1)	1						
		NG DMRS (Note 1)							
Note2	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-80.18	-80.18	-106	-106	-116 -115.5 -115 -114.5 -114 -113 -112.5	-116 -115.5 -115 -114.5 -114 -113 -112.5
N _{oc}	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-86.27	-86.27	-113	-113	-116 -115.5 -115 -114.5 -114 -113 -112.5	-116 -115.5 -115 -114.5 -114 -113 -112.5
Note2	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H		-80.18	-80.18	-106	-106	-116 -115.5 -115 -114.5 -114 -113 -112.5	-116 -115.5 -115 -114.5 -114 -113 -112.5
N _{oc}	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-83.27	-83.27	-110	-110	-113 -112.5 -112 -111.5 -111 -110 -109.5	-113 -112.5 -112 -111.5 -111 -110 -109.5
Ê , /I ,	<u> </u>	1410_1 BB_1 1(1_11	dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
\hat{E}_{s}/N_{oc}			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75
SS- RSRP ^{Note3}	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G	dBm/SCS	-81.93	-81.93	-107.75	-107.75	-113 -112.5 -112 -111.5 -111 -110	117.75 - 117.25 - 116.75 - 116.25 - 115.75 - 114.75
		NR_FDD_FR1_H						-109.5	114.25
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B		-85.02	-85.02	-111.75	-111.75	-110 -109.5	- 114.75 - 114.25
		NR_TDD_FR1_C						-109	113.75
		NR_FDD_FR1_D NR_TDD_FR1_D						-108.5	113.25

		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.75
		NR_FDD_FR1_G						-107	- 111.75
		NR_FDD_FR1_H	1					-106.5	- 111.25
SS-RSRQ N	ote3	NR_FDD_FR1_A NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_D	dB	-14.77	-14.77	-40.59	-40.59	-12.56	-14.76
		NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	-						
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-83.28	-85.83
		NR_FDD_FR1_B						-82.78	-85.33
	Config 1,2,4,5	NR_TDD_FR1_C	dBm/	50	50	75.00	75.00	-82.28	-84.83
		NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz	-50	-50	-75.83	-75.83	-81.78	-84.33
		NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	-83.83
Io ^{Note3}		NR_FDD_FR1_G NR_FDD_FR1_H]					-80.28 -79.78	-82.83 -82.33
Ю		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A						-77.19	-79.73
		NR_FDD_FR1_B						-76.69	-79.23
	Config 3,6	NR_TDD_FR1_C NR_FDD_FR1_D	dBm/ 38.16MHz	-50	-50	-76.73	-76.73	-76.19 -75.69	-78.73 -78.23
		NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	-77.73
		NR_FDD_FR1_G						-74.19	-76.73
		NR_FDD_FR1_H						-73.69 AWG	-76.53 AWG
Propagation	n condition			AWGN	AWGN	AWGN	AWGN	N	N
	density is acl	be used such that both nieved for all OFDM sy	mbols.						

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{\perp} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in Section 3.5.2.

A.4.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 10.1.9.1.1 and 10.1.9.1.2.

A.4.7.3 SS-SINR

A.4.7.3.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.4.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.3.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations

Table A.4.7.3.1.2-2: SS-SINR Intra frequency test parameters

Dorom	otor	Unit	Tes		Test 2			
Parame	eter	Unit	Cell 2	Cell 3	Cell 2	Cell 3		
SSB ARFCN			fre		free	q1		
Duplex mode	Config 1,4			FDD				
Duplex mode	Config 2,3,5,6			TDD				
	Config 1,4				plicable			
TDD configuration	Config 2,5				onf.1.1			
	Config 3,6				onf.2.1			
Downlink initial BWP cor				VP.0.1				
Downlink dedicated BW					VP.1.1			
Uplink initial BWP config					VP.0.1			
Uplink dedicated BWP c					VP.1.1			
DRX Cycle configuration		ms	<u> </u>	Not Ap	plicable	T		
TRS Configuration	Config 1,4		TRS.1.1 FDD		TRS.1.1 FDD			
	Config 2,5		TRS.1.1		TRS.1.1			
	201g 2,0		TDD	=	TDD	-		
	Config 3,6		TRS.1.2		TRS.1.2			
			TDD		TDD			
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD			
PDSCH Reference			SR.1.1		SR.1.1			
measurement channel	Config 2,5		TDD	-	TDD	-		
	Config 3,6		SR.2.1		SR2.1			
			CR.1.1		TDD CR.1.1			
	Config 1,4		FDD		FDD			
RMSI CORESET	0		CR.1.1		CR.1.1			
Reference Channel	Config 2,5		TDD	=	TDD			
	Config 3,6		CR.2.1		CR.2.1			
			TDD CCR.1.		TDD CCR.1.1			
	Config 1,4		1 FDD		FDD			
Dedicated CORESET	0		CCR.1.		CCR.1.1			
Reference Channel	Config 2,5		1 TDD	=	TDD	-		
	Config 3,6		CCR.2.		CCR.2.1			
OCNC Dottoring	- 59 5,0		1 TDD		TDD			
OCNG Patterns SS-RSSI-Measurement		-			P.1 plicable			
30-N301-ivieasureinent	Config 1,4	ms	-	3	pilcable	3		
Time offset with Cell 2	Config 1,4 Config 2,3,5,6	+		3	- -	3		
	Config 1,4	μs	-	_	TC.2	<u> </u>		
SMTC configuration	Config 2,3,5,6				TC.1			
	Config 1,2,4,5				1 FR1			
SSB configuration	Config 3,6	=		SSR	2 FR1			
PDSCH/PDCCH	Config 1,2,4,5			SSB.2 FR1 15				
subcarrier spacing	Config 3,6	kHz			30			
outcome spacing	Corning 5,6			,	,,			

EPRE ratio			1				
	of PSS to SSS						
EPRE ratio	of PBCH DMRS	S to SSS					
	of PBCH to PB						
	of PDCCH DMF						
			dB	0	_	0	0
	of PDCCH to P		UD	0	0	0	0
	of PDSCH DMF						
	of PDSCH to Pl						
		S to SSS(Note 1)					
EPRE ratio	of OCNG to OC	NG DMRS (Note 1)					
		NR_FDD_FR1_A,				-11	6
		NR TDD FR1 A					•
		NOTE 6					
		NR_FDD_FR1_B				-11	5.5
		NR_TDD_FR1_C				-11	5
N_{oc} Note2		NR_FDD_FR1_D,	dBm/15kH		93	-114	
1V oc			Z	-:	93	-112	+.0
		NR_TDD_FR1_D					
		NR_FDD_FR1_E,				-11	4
		NR TDD FR1 E					
1		NR_FDD_FR1_G				-11	3
1							
<u> </u>	T	NR_FDD_FR1_H				-112	
1	Config 1,2,4	5		(93	Same as	Noc for
1	Joining 1,2,4	,0		-:		15k	Hz
1		NR FDD FR1 A,]				
1		NR_TDD_FR1_A				-11	3
1		NOTE 6				-11	J
1							
λ7		NR_FDD_FR1_B				-112	2.5
N_{oc}		NR_TDD_FR1_C	dBm/SCS			-11	2
Note2	Config 3,6	NR_FDD_FR1_D,			90		
	Corning 3,6			-:	90	-11°	1.5
		NR_TDD_FR1_D					
		NR_FDD_FR1_E,				-11	1
		NR_TDD_FR1_E				-11	1
	NR_FDD_FR1_G					-11	n
	Ī	NR_FDD_FR1_H			Г	-109	ງ.ບ
\hat{E}_{s}/I_{ot}			dB	0	-3.19	-5.46	-5.46
\hat{E}_s/N_{oc}			dB	4.54	2.66	-4	-4
					I	I	i
1		ND EDD ED1 A					
		NR_FDD_FR1_A,				400	400
		NR_TDD_FR1_A				-120	-120
						-120	-120
		NR_TDD_FR1_A				-120 -119.5	-120 -119.5
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B				-119.5	-119.5
	Config	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C		00 46	00.24		
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		-88.46	-90.34	-119.5 -119	-119.5
	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D		-88.46	-90.34	-119.5	-119.5 -119
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		-88.46	-90.34	-119.5 -119 -118.5	-119.5 -119 -118.5
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,		-88.46	-90.34	-119.5 -119	-119.5 -119
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E		-88.46	-90.34	-119.5 -119 -118.5 -118	-119.5 -119 -118.5 -118
SS-		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G		-88.46	-90.34	-119.5 -119 -118.5 -118 -117	-119.5 -119 -118.5 -118 -117
SS- RSRP ^{Not}		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118	-119.5 -119 -118.5 -118
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A,	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117	-119.5 -119 -118.5 -118 -117
RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117	-119.5 -119 -118.5 -118 -117
RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A,	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117 -116.5	-119.5 -119 -118.5 -118 -117 -116.5
RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117 -116.5 -117	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117 -116.5 -117	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_C	dBm/SCS	-88.46	-90.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dBm/SCS	-88.46 -85.46	-90.34 -87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_D, NR_FDD_FR1_D,	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_H NR_FDD_FR1_A NT_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116	-119.5 -119 -118.5 -118 -117 -116.5 -117
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_H NR_FDD_FR1_A NT_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_A, NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B		-85.46	-87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
RSRPNot	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C	dBm/SCS			-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115
RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		-85.46	-87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D		-85.46	-87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,		-85.46	-87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
RSRP ^{Not} e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D		-85.46	-87.34	-119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5 -115 -114 -113.5	-119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5

		NR_FDD_FR1_G						
		NR_FDD_FR1_H						
		NR_FDD_FR1_A, NR_TDD_FR1_A				-85.	51	
		NOTE 6						
		NR_FDD_FR1_B				-85.	01	
	Config 1,2,4,5	NR_TDD_FR1_C	dBm/			-84.	51	
		NR_FDD_FR1_D,	9.36MHz	-57.5		-84.	01	
		NR_TDD_FR1_D	9.30IVIT2					
		NR_FDD_FR1_E,		-83.	51			
		NR_TDD_FR1_E				-85.51 -85.01 -84.51 -84.51 -84.01 -83.51 -82.51 -82.01 -79.41 -78.91 -78.41 -77.91 -77.41 -76.41 -75.91 VGN		
		NR_FDD_FR1_G				-85.01 -84.51 -84.01 -83.51 -82.51 -82.01 -79.41 -78.91 -78.41 -77.91 -77.41 -76.41 -75.91 /GN		
IoNote3		NR_FDD_FR1_H				-82.	.01	
10		NR_FDD_FR1_A,				-79.	41	
		NR_TDD_FR1_A						
		NOTE 6						
		NR_FDD_FR1_B				-79.41 -78.91		
		NR_TDD_FR1_C	dBm/					
	Config 3,6	NR_FDD_FR1_D,	38.16MHz	-51	.41	-77.	91	
		NR_TDD_FR1_D	00. TOWN 12					
		NR_FDD_FR1_E,				-77.	41	
		NR_TDD_FR1_E						
		NR_FDD_FR1_G						
		NR_FDD_FR1_H					91	
Propagatio	n condition		-		AV	/GN		
Antenna co	nfiguration		-		1	x2		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.4.7.3.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.14.1.1 and 10.1.14.1.2 for interfrequency measurement.

A.4.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.3.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations

Table A.4.7.3.2.2-2: SS-SINR Inter frequency test parameters

439

D	2404	He!	Test 1 Test 2 Test					st 3	
Paramo	eter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	Config 1 4		freq1	freq2	freq1	freq2 DD	freq1	freq2	
Duplex mode	Config 1,4 Config 2,3,5,6	-				DD DD			
	Config 1,4					plicable			
TDD configuration	Config 2,5				TDDC	onf.1.1			
	Config 3,6				TDDC	onf.2.1			
Downlink initial BWP cor	Downlink initial BWP configuration				DLBV	VP.0.1			
Downlink dedicated BW	P configuration		DLBWP.1.1						
Uplink initial BWP config	uration				ULBV	VP.0.1			
Uplink dedicated BWP c	onfiguration				ULBV	VP.1.1			
DRX Cycle configuration	1	ms			Not Ap	plicable			
Gap pattern ID			0	-	0	-	0	-	
TRS Configuration	Config 1,4		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1.1 FDD		
	Config 2,5		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1.1 TDD	-	
	Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD		
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD		
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-	
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD		
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	
	Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2. 1 TDD		
OCNG Patterns						P.1			
SS-RSSI-Measurement						plicable			
SMTC configruation	1			T	SM	TC.1	1		
Time offset with Cell 2	Config 1,4	ms	-	3	-	3	-	3	
	Config 2,3,5,6	μs	-	3	-	3	-	3	
SMTC configruation	Config 1,4					TC.2			
Config 2,3,5,6						TC.1			
SSB configuration	Config 1,2,4,5	_				.1 FR1			
	Config 3,6				SSB.	2 FR1			
PDSCH/PDCCH subcarrier spacing						15 30			
EPRE ratio of PSS to SSS						-			
EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBG	CH DMRS	dB	0	0	0	0	0	0	
EPRE ratio of PDCCH DMF	KS to SSS			<u> </u>	<u> </u>	<u> </u>	<u> </u>		

EPRE ratio	of PDCCH to Pl	DCCH DMRS					
EPRE ratio	of PDSCH DMF	RS to SSS					
EPRE ratio	of PDSCH to PI	DSCH					
		S to SSS(Note 1) NG DMRS (Note 1)					
LFKL Idilo	or ocive to oc	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-119.5	
N_{oc}		NR_FDD_FR1_B NR_TDD_FR1_C	dBm/15k	-88	-108.5	-119 -118.5	
Note2	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E	Hz			-118 -117.5	
		NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H				-116.5 -116	
	Config 1,2,4			-88	-108.5	Same as Noc for	
		NR_FDD_FR1_A				15kHz	
		NR_TDD_FR1_A NOTE 6				-116.5	
N_{oc}			NR_FDD_FR1_B	dBm/SC			-116
Note2		NR_TDD_FR1_C NR_FDD_FR1_D	S	-85	-105.5	-115.5	
		NR_TDD_FR1_D NR_FDD_FR1_E				-115 -114.5	
		NR_TDD_FR1_E NR_FDD_FR1_G				-114.5	
		NR_FDD_FR1_H				-114.5	
\hat{E}_{s}/I_{ot}		1	dB	-1.75	20	-4.0	
\hat{E}_{s}/N_{oc}			dB	-1.75	20	-4.0	
\$ 7 00		NR_FDD_FR1_A					
		NR_TDD_FR1_A				-123.5	
		NR_FDD_FR1_B				-123	
	Config	NR_TDD_FR1_C		-89.75	-88.5	-122.5	
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D		30.70	00.0	-122	
		NR_FDD_FR1_E NR_TDD_FR1_E				-121.5	
SS-		NR_FDD_FR1_G	dD/CC			-120.5	
RSRPNot		NR_FDD_FR1_H NR_FDD_FR1_A	dBm/SC S			-120	
e3		NR_TDD_FR1_A NOTE 6				-120.5	
		NR_FDD_FR1_B				-120	
	Config 3,6	NR_TDD_FR1_C NR_FDD_FR1_D		-86.75	-85.5	-119.5	
		NR_TDD_FR1_D				-119	
		NR_FDD_FR1_E				-118.5	
		NR_TDD_FR1_E				-117.5	
		NR_FDD_FR1_G NR_FDD_FR1_H				-117.5	
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6					
SS-SINR N	ote3	NR_FDD_FR1_B	dB	-1.75	20	-4.0	
		NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D					
L		D D _	l		I	1	

		NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H				
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-90.09
	Config 1,2,4,5	NR_FDD_FR1_B	1	57.00	-60.5	-89.59
		NR_TDD_FR1_C	dBm/ 9.36MHz			-89.09
		NR_FDD_FR1_D NR_TDD_FR1_D		-57.83	-60.5	-88.59
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09
		NR_FDD_FR1_G				-87.09
Io ^{Note3}		NR_FDD_FR1_H				-86.59
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-84
		NR_FDD_FR1_B	1			-83.5
	Confin 2.0	NR_TDD_FR1_C	dBm/	F4 70	54.44	-83
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MH z	-51.73	-54.41	-82.5
		NR_FDD_FR1_E				-82
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				-81
D		NR_FDD_FR1_H			AVAZONI	-80.5
	on condition		-		AWGN	
Antenna co	onfiguration		-		1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.4.7.4 L1-RSRP measurement for beam reporting

A.4.7.4.1 SSB based L1-RSRP measurement

A.4.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.4.7.4.1.1-1.

Table A.4.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.4.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.4.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
-	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
-	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3,6		SR.2.1 TDD	SR.2.1 TDD
DMCI CODECET Deference	1,4		CR.1.1 FDD	CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD	CR.1.1 TDD
Channel	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.3 FR1	SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1	SSB.3 FR1
	3,6		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial DWD Configuration	1~6		DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1	ULBWP.0.1
Dedicated PMP configuration	1~6		DLBWP.1.1	DLBWP.1.1
Dedicated BWP configuration	1~0		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~6		SMTC.1	SMTC.1
reportConfigType	1~6		periodic	periodic
reportQuantity	1~6		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~6		2	2

L1-RSRF	reporting period	1~6		slot80	slot80
EPRE ratio	of PSS to SSS				
	of PBCH DMRS to SSS				
	EPRE ratio of PBCH to PBCH DMRS				
	of PDCCH DMRS to SSS				
	EPRE ratio of PDCCH to PDCCH				
DMRS	o of PDSCH DMRS to SSS	1~6	dB	0	0
	o of PDSCH to PDSCH	1~0	uБ	U	U
DMRS	0011 0001110 1 00011				
	of OCNG DMRS to				
SSS ^{Note 1}					
EPRE ration	of OCNG to OCNG				
DMRS					
	NR_FDD_FR1_A,				447
	NR_TDD_FR1_A				-117
					11C F
N 7	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C	4.0	dD /4 Eld I=	04.05	-116
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-94.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				444
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				447
	NR_TDD_FR1_A				-117
		1,2,4,5		-94.65	440.5
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,				-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E NR_FDD_FR1_G				-114
λī	NR_FDD_FR1_H		dBm/SSB		-113.5
N_{oc}	NR_FDD_FR1_A,		SCS		-113.3
Note2	NR_TDD_FR1_A,				-114
	NOTE 5				-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C			-91.65	-114
	NR_FDD_FR1_D,	3,6			117
	NR_TDD_FR1_D	3,0			-112.5
	NR FDD FR1 E,				
	NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR FDD FR1 H				-110.5
Ê/I		1.0	40	40	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	T	1~6	dB	10	-3
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-120
	NOTE 5				
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C	1,2,4,5			-119
	NR_FDD_FR1_D,			-84.65	-118.5
SSB	NR_TDD_FR1_D				110.0
RSRP	NR_FDD_FR1_E,		dBm/SSB		-118
Note3	NR_TDD_FR1_E		SCS		
	NR_FDD_FR1_G				-117
	NR_FDD_FR1_H		ļ		-116.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
		3,6		-81.65	440.5
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116

-115.5

NR_FDD_FR1_D,

NR_TDD_FR1_D					-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-87.28
	NOTE 5				
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C		dBm/9.36		-86.28
	NR_FDD_FR1_D,	1,2,4,5	MHz	-56.28	-85.78
	NR_TDD_FR1_D		IVII IZ		-00.70
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
10	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		ID (00.40		-80.19
	NR_FDD_FR1_D,	3,6	dBm/38.16	-50.19	70.00
	NR_TDD_FR1_D		MHz		-79.69
	NR_FDD_FR1_E,				-79.19
	NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}		1~6	dB	10	-3
Propagation condition		1~6		AWGN	AWGN
Antenna	Antenna configuration 1~6 1x2 1x2				1x2
Note 1:	OCNG shall be used s	such that bot	h cells are fully :	allocated and a cons	tant total
transmitted power spectral density is achieved for all OFDM symbols.					
Note 2:	· · · · · · · · · · · · · · · · · · ·				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.4.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.4.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.4.7.4.2.1-1.

Table A.4.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description			
	1	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode			
	2	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode			
	3	LTE FDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode			
	4	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode			
	5	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode			
	6	LTE TDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations in each supported band				

A.4.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.4.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3,6		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD	CR.1.1 FDD
Channel	2,5		CR.1.1 TDD	CR.1.1 TDD
Channel	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Reference Charmer	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.3 FR1	SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1	SSB.3 FR1
	3,6		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1	DLBWP.0.1
Illitial BVVF Cornigulation	1~0		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
	1~0		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~6		SMTC.1	SMTC.1
	1,4		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2,5		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
	3,6		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD

Image: Critical Content of the Con	reportCo	nfigType	1~6		periodic	periodic
L1-RSRP reporting period			1~6			<u> </u>
EPRE attato of PSS to SSS EPRE attato of PBCH DMRS to SSS EPRE attato of PBCH DMRS to SSS EPRE attato of PBCH DMRS to SSS EPRE attato of PDCH DMRS to SSS EPRE attato of PDSCH DMRS to SSS EPRE attator of PDSCH DMRS to SS EPRE attator of PDSCH DM	Number of reported RS		1~6		2	2
EPRE atato of PECH DMRS to SSS EPRE atato of PDCCH DMRS to SSS EPRE atato of PDCCH DMRS to SSS EPRE atato of PDCCH DMRS to SSS EPRE atato of PDSCH DMRS to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to SHAPE to S	L1-RSRF	-			slot80	slot80
EPRE ratio of POCCH DMRS to SSS EPRE ratio of POCCH to POCCH DMRS to SSS EPRE ratio of POCCH DMRS to SSS EPRE ratio of POSCH to POSCH DMRS to SSS EPRE ratio of POSCH DMRS to SSS EPRE ratio of POSCH DMRS to SSS EPRE ratio of POSCH DMRS to SSS EPRE ratio of POSCH DMRS to SSS EPRE ratio of POSCH DMRS to SSS EPRE ratio of CNG DMRS to SSS EPRE ratio of CNG DMRS to SSS NR TDD_FR1_A NR TDD_FR1_A NR TDD_FR1_B NR TDD_FR1_B NR TDD_FR1_B NR TDD_FR1_B NR TDD_FR1_B NR FDD_FR1_B NR F						
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DDRS to PDSCH DMRS to SSS EPRE ratio of PDSCH DDRS to SSS EPRE ratio of COKIG to CNG EPRE rat			•			
EPRE ratio of PDCCH to PDCCH DMRS to SSS						
DMRS						
EPRE ratio of PDSCH to PDSCH DMRS to DMRS to SSSSIM***		7011 20011101 20011				
DMRS EPRE ratio of CONG DMRS to SSSNess			1~6	dB	0	0
PPE ratio of OCNG DMRS to SSSNess		of PDSCH to PDSCH				
SSSM=1		of OCNG DMRS to				
NR FDD FR1 A NR FDD FR1 A NR FDD FR1 A NR FDD FR1 B		O O O O O DIVINO 10				
NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_F						
NR TDD_FR1_B	DMRS Note					
Note						
NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_B NR_F						-117
NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_						
NR_FDD_FR1_D	1					
NR_TDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A -1113.5 NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B -1112.5 NR_FDD_FR1_B NR_FDD_FR1_B -1110.5 NR_FDD_FR1_B -	N_{oc}					-116
NR_FDD_FR1_E, NR_FDD_FR1_E -115	Note2		1~6	dBm/15kHz	-94.65	-115.5
NR_TDD_FR1_E NR_FDD_FR1_G -1114						110.0
NR_FDD_FR1_B -114 -113.5 NR_FDD_FR1_A -113.5 NR_FDD_FR1_A -116.5 -116.5 NR_FDD_FR1_B -116.5 -116.5 NR_FDD_FR1_D -116.5 -116.5 NR_FDD_FR1_D -116.5 -116 NR_FDD_FR1_D -116.5 -116 NR_FDD_FR1_D -116.5 -116 NR_FDD_FR1_B -115.5 NR_FDD_FR1_B -114 -113.5 NR_FDD_FR1_A -114 -113.5 NR_FDD_FR1_B -114 -113.5 NR_FDD_FR1_B -114 -113.5 NR_FDD_FR1_B -114 -110.5 NR_FDD_FR1_B -112.5 -112 NR_FDD_FR1_B -112.5 NR_FDD_FR1_B -112.5 NR_FDD_FR1_B -110.5						-115
NR_FDD_FR1_H -113.5 NR_FDD_FR1_A NR_FDD_FR1_B -116.5 NR_FDD_FR1_B NR_TDD_FR1_C -116.5 NR_FDD_FR1_D NR_FDD_FR1_E -115.5 NR_FDD_FR1_E NR_TDD_FR1_E -114 NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B -112.5 NR_FDD_FR1_B NR_TDD_FR1_B -112.5 NR_FDD_FR1_B NR_FDD_FR1_B -110.5 NR_FDD_FR1_B NR_FDD_FR1_B -110.5 NR_FDD_FR1_B NR_FDD_FR1_B -110.5						
NR_FDD_FR1_A NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B						
NR_TDD_FR1_A NOTE 5						-113.5
NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_B NOTE						
NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_F						-117
NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_F						
NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_E, NR_FDD_FR1_B, NR_FDD_FR1_B, NR_FDD_FR1_A, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B, NR_FDD_FR1_B, NR_TDD_FR1_B, NR_TDD_FR1_B						
NR_TDD_FR1_D						-116
NR_IDD_FR1_E			1,2,4,5		-94.65	-115.5
NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B						
NR_FDD_FR1_E NR_FDD_FR1_B NR_F						-115
NR_FDD_FR1_H NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E						
NR_FDD_FR1_A, NR_TDD_FR1_B -113.5 -114 -114 -113.5 -114 -114 -114 -114 -114 -110.5 -112.5 -113	3.7					
$\begin{array}{c} NR_TDD_FR1_A \\ NRTES \\ NR_FDD_FR1_B \\ NR_TDD_FR1_C \\ NR_FDD_FR1_D \\ NR_FDD_FR1_D \\ NR_FDD_FR1_E \\ NR_FDD_FR1_E \\ NR_FDD_FR1_B \\ NR_FDD_FR1_H \\ \end{array} \\ \begin{array}{c} 3,6 \\ -91.65 \\ \hline -112.5 \\ \hline -113.5 \\ \hline -113.5 \\ \hline -110.5 \\ \hline -110.5 \\ \hline -120$	N_{oc}					-113.5
NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_C	Note2			SCS		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						-114
NR_TDD_FR1_C						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					24.0-	-114
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			3,6		-91.65	-112.5
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						-112
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						111
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
CSI-RS RSRP Note3 NR_FDD_FR1_A, NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_FDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G -120 -120 -119.5 -119.5 -119 -84.65 -118.5 -118 -117	<u> </u>	ואל_רטט_רג'ו_ח				
NR_TDD_FR1_A	$E_{\rm s}/I_{\rm ot}$		1~6	dB	10	10
NR_TDD_FR1_A		NR_FDD_FR1_A,				
CSI-RS RSRP Note3 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G -119 -84.65 -84.65 -118.5 -118 -117						-120
CSI-RS RSRP Note3 NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G dBm/CSI-RS SCS -84.65 -118.5 -118 -117						
RSRP NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G -117		NR_FDD_FR1_B				-119.5
RSRP NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G -117	CSI-RS	NR_TDD_FR1_C		4D/COL DC		
Note3 NR_TDD_FR1_D SCS -118.5 NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G -117			1,2,4,5		-84.65	440.5
NR_FDD_FR1_E,	Note3	· ·		505		-118.5
NR_TDD_FR1_E NR_FDD_FR1_G -117						440
NR_FDD_FR1_G -117						-118
NR_FDD_FR1_H -116.5		NR_FDD_FR1_G				-117
		NR_FDD_FR1_H	<u> </u>			-116.5

	T	1			
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	NR_FDD_FR1_B	1			-116.5
	NR_TDD_FR1_C	1			-116
	NR_FDD_FR1_D,	3,6		-81.65	445.5
	NR_TDD_FR1_D	,			-115.5
	NR_FDD_FR1_E,				445
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-87.28
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C		dBm/9.36 MHz		-86.28
	NR_FDD_FR1_D,	1,2,4,5		-56.28	05.70
	NR_TDD_FR1_D				-85.78
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
10	NR_FDD_FR1_A, NR_TDD_FR1_A				-81.19
	NOTE 5				-01.13
	NR_FDD_FR1_B]			-80.69
	NR_TDD_FR1_C]	dBm/38.16		-80.19
	NR_FDD_FR1_D,	3,6	MHz	-50.19	-79.69
	NR_TDD_FR1_D	ļ	IVII IZ		-13.03
	NR_FDD_FR1_E,				-79.19
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
	\hat{E}_s/N_{oc}		dB	10	-3
Propagat	tion condition	1~6		AWGN	AWGN
Antenna	configuration	1~6		1x2	1x2
N	00110 1 111	1 41 41 4			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.2.

A.4.7.5 SFTD accuracy

A.4.7.5.1 SFTD accuracy

A.4.7.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for EN-DC SFTD measurements.

A.4.7.5.1.2 Test Parameters

Supported test configurations are shown in Table A.4.7.5.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is NR FR1 PSCell. The test parameters of cell 1 are given in clause A.3.7.2.1. The test parameters of cell 2 are given in Table A.4.7.5.1.2-2. The SFTD between PCell and PSCell shall be set by the test equipment to one of the time differences in Table A.4.7.5.1.2-3.

Table A.4.7.5.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description			
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD			
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD			
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD			
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD			
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD			
6 NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD				
Note: The UE is	e UE is only required to be tested in one of the supported test configurations			

Table A.4.7.5.1.2-2: Test parameters for SFTD accuracy

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
	1,4		SR.1.1 FDD
PDSCH Reference measurement channel	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference Channel	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
	1,4		CCR.1.1 FDD
RMC CORESET Reference Channel	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD
	1,4		SSB.1 FR1
SSB configuration	2,5		SSB.1 FR1
	3,6		SSB.2 FR1

SMTC aggregation	uuration	1 6		SMTC 4
SMTC config DL BWP cor		1~6 1~6	1	SMTC.1 DLBWP.1.1
		1~6		ULBWP.1.1
UL BWP configuration		1,4		TRS.1.1 FDD
COLDS for	tracking			TRS.1.1 TDD
CSI-RS for	tracking	2,5		
OONO Datta		3,6		TRS.1.2 TDD
OCNG Patte		1~6		OP.1
	of PSS to SSS	1		
	of PBCH DMRS to SSS	1		
	of PBCH to PBCH DMRS	_		
	of PDCCH DMRS to SSS			
	of PDCCH to PDCCH DMRS	1~6	dB	0
	of PDSCH DMRS to SSS			
	of PDSCH to PDSCH DMRS			
	of OCNG DMRS to SSSNote 1			
EPRE ratio o	of OCNG to OCNG DMRS Note 1			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5	_		
	NR_FDD_FR1_B	_		
	NR_TDD_FR1_C			
N_{oc} Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
oc	NR_TDD_FR1_D NR FDD FR1 E,	-		
	NR_FDD_FR1_E, NR_TDD_FR1_E			
	NR_FDD_FR1_G	†		
	NR FDD FR1 H	-		
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	1		
	NR_FDD_FR1_D,	1,2,4,5		404
	NR_TDD_FR1_D			-104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
N_{oc} Note2	NR_FDD_FR1_H		dBm/SSB SCS	
- · oc	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	_		
	NR_TDD_FR1_C	+		
	NR_FDD_FR1_D,	1		
	NR_TDD_FR1_D	3,6		-101
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR FDD FR1 G	1		
	NR_FDD_FR1_H	1		
Ê/T		4.0	10	2
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1~6	dB	-3
\hat{E}_s/N_{oc}		1~6	dB	-3
s/1 oc	LAID EDD ED:	1.15	QD	<u> </u>
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5	-		
	NR_FDD_FR1_B	-		
	NR_TDD_FR1_C	4		
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		-107
	NR FDD FR1 E,	, , , , -		
	NR_TDD_FR1_E,			
	NR_FDD_FR1_G			
SS-RSRP	NR_FDD_FR1_H	1		
Note3	NR FDD FR1 A.	†	dBm/SCS	
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
NR_TDD_FR1_C	NR_TDD_FR1_C	1		
	NR_FDD_FR1_D,	3,6		-104
	NR_TDD_FR1_D			104
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E NR FDD FR1 G	1		
	NR_FDD_FR1_H	1		
	1417 DD	1	1	İ

NR_FDD_FR1_A,	1,2,4,5	dBm/9.36 MHz	-74.28
Io Note3 NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	3,6	dBm/38.16 MHz	-68.18
Propagation condition	1~6		AWGN
Antenna configuration	1~6		1x2

451

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.4.7.5.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.4.7.5.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and PSCell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.4.7.5.2 Void

A.4.7.5.3 Void

A.4.8 Void

A.4A NE-DC test with all NR cells in FR1

A.4A.1 Signaling characteristics

A.4A.1.1 E-UTRAN PSCell addition

A.4A.1.1.1 Test purpose and environment

The purpose of this test is to verify that the LTE PSCell addition/release delay and interruption under NE-DC are within the requirements stated in clause 8.8 and clause 8.2.3.2.3 for the case when the PSCell is known by the UE at the time of addition.

452

Supported test configurations are shown in A.4A.1.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1.

The test parameters for NR cell are given in Tables A.4A.1.1.1-2 and cell-specific parameters in A.4A.1.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (NR PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (E-UTRAN PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. After receiving the Event B1, the test system shall send a RRC message to the UE to release the measurement gaps.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T2, after the measurement gaps are released by the test system. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T3.

The test system shall observe the periodic reporting of CSI for PSCell during T4. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T4.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T4, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T5.

Table A.4A.1.1.1-1: Applicable E-UTRA and NR configurations for NE-DC PSCell addition and Release test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Th	e UE is only required to be tested in one of the supported test configurations

Table A.4A.1.1.1-2: General Test Parameters for PSCell Addition and Release

Par	ameter	Unit	Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One
				for NR cell and second for E-UTRAN Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold RSRP	dBm	-96	Actual RSRP threshold for event B1.
	(Config 1,2,4,5)			
	Threshold RSRP (Config 3,6)	dBm	-93	Actual RSRP threshold for event B1.
	Time to Trigger	S	0	
DRX	1		OFF	Continuous monitoring of primary cell
Measurement	gap pattern Id		0	Gaps are configured before T2 and released before T3.
Cell-individual RF channel nu	offset for cells on Imber 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individual RF channel nu	offset for cells on Imber 2	dB	0	Individual offset for cells on carrier frequency of cell2.
T1		S	1	During this time the PCell shall be known and cell2 shall be unknown.
T2		S	1	During this time the UE shall identify neighbour cell (cell2) and report event B1.
T3		S	0.5	During this time the UE adds the PSCell.
T4		S	0.5	During this time the UE sends CSI reports for PSCell.
T5		S	0.5	During this time the UE releases the PSCell.

Table A.4A.1.1.1-3: NR Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test

NR RF Channel Number		1,2,3,4,5,6	1
E-UTRA RF Channel Number		1,2,3,4,5,6	2
TDD		1,4	Not Applicable
configuration		2,5	TDDConf.1.1
3		3,6	TDDConf.2.1
BWchannel	MHz	1,4	10: N _{RB,c} = 52
2 · · · · · · · · · · · · · · · · · · ·		2,5	10: N _{RB,c} = 52
		3,6	40: N _{RB,c} = 106
Initial BWP Configuration		1,2,3	DLBWP.0.1
Illida BWI Comiguration		1,2,0	ULBWP.0.1
Dedicated BWP Configuration		1,2,3	DLBWP.1.1
3		, ,-	ULBWP.1.1
PDSCH Reference		1,4	SR.1.1 FDD
measurement		2,5	SR.1.1 TDD
channel		3,6	SR.2.1 TDD
RMSI CORESET Reference		1,4	CR.1.1 FDD
Channel		2,5	CR.1.1 TDD
		3,6	CR.2.1 TDD
Dedicated CORESET Reference		1,4	CCR.1.1 FDD
Channel		2,5	CCR.1.1 TDD
		3,6	CCR.2.1 TDD
OCNG Patterns		1,2,3,4,5,6	OP.1
SSB configuration		1,2,4,5	SSB.1 FR1
		3,6	SSB.2 FR1
SMTC configuration		1,2,4,5	SMTC.1
3		3,6	SMTC.1
TRS Configuration		1,4	TRS.1.1 FDD
3		2,5	TRS.1.1 TDD
		3,6	TRS.1.2 TDD
CSI-RS configuration for CSI		1.4	CSI-RS.1.1 FDD
reporting		1,4	C3I-K3.1.1 FDD
		2,5	CSI-RS.1.1 TDD
		3,6	CSI-RS.2.1 TDD
reportConfigType		1,2,3,4,5,6	periodic
reportQuantity		1,2,3,4,5,6	cri-RI-PMI-CQI
CSI reporting periodicity	slot	1,2,4,5	5
001 " " 1		3,6	10
CSI reporting offset	slot	1,2,4,5	2
EDDE ratio of DSS to SSS		3,6	4
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to			
SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH	dB	1,2,3,4,5,6	0
DMRS			
EPRE ratio of PDSCH DMRS to			
SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to			
SSS(Note 1) EPRE ratio of OCNG to OCNG			
DMRS (Note 1)			
	dBm/15 kHz	1,2,3,4,5,6	-88
$N_{oc}^{}$ Note2	GD111/10 KHZ	.,_,0,,1,0,0	
		1,2,4,5	-88
M Nete2	dBm/SCS	1,2,1,0	
$N_{oc}^{}$ Note2	dBm/SCS		
N_{oc} Note2	dBm/SCS	3,6	-85
	dBm/SCS		
N_{oc} Note2 $\hat{ extbf{E}}_{s}/ extbf{I}_{ ext{ot}} \ \hat{ extbf{E}}_{s}/N_{oc}$	dBm/SCS	3,6	-85

SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-88
		3,6	-85
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	-57
	dBm/38.1MHz	3,6	-51
Propagation condition		1,2,3,4,5,6	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.4A.1.1.1-4: E-UTRAN cell specific test parameters for PSCell Addition and Release tests

Parameter	Unit	E-UTRAN Cell				
		T1	T2	T3	T4	T5
Duplex mode			F	DD or TDI)	
TDD special subframe configuration ^{Note1}				6		
TDD uplink-downlink configuration ^{Note1}				1		
BW _{channel}			5 M	IHz: N _{RB,c} =	= 25	
				/IHz: N _{RB,c} :		
				IHz: N _{RB,c} =		
PDSCH parameters:				//Hz: R.7 F		
DL Reference Measurement Channel ^{Note2}			_	MHz: R.3 F		
			_	MHz: R.6 F		
			_	//Hz: R.4 T		
			_	MHz: R.0 T		
				MHz: R.3 T		
PCFICH/PDCCH/PHICH parameters:				Hz: R.11 F		
DL Reference Measurement Channel ^{Note2}				MHz: R.6 F		
			_	//Hz: R.10		
			_	Hz: R.11 T		
			_	MHz: R.6 T		
OCNG Patterns ^{Note2}				//Hz: R.10 Hz: OP.20		
OCNG Palleris.			_	¬z. ОР.20 Hz: ОР.10		
			_	Hz: OP.10		
			_	_		
		5 MHz: OP.9 TDD 10 MHz: OP.1 TDD				
				20 MHz: OP.7 TDD		
PBCH_RA	dB					
PBCH_RB	dB					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB	1				
PHICH_RA	dB					
PHICH_RB	dB]		0		
PDCCH_RA	dB]				
PDCCH_RB	dB]				
PDSCH_RA	dB]				
PDSCH_RB	dB]				
OCNG_RA ^{Note3}	dB]				
OCNG_RB ^{Note3}	dB					
N _{oc} Note4	dBm/15 kHz	N/A		-1	04	
Ê _s /N _{oc}	dB	-infinite		1		<u></u>
Ê _s /I _{ot}	dB	-infinite		1		
RSRP Note5	dBm/15 kHz	-infinite		3-	37	
SCH_RP Note5	dBm/15 kHz	-infinite		3-	37	
lo ^{Note5}	dBm/Ch BW	N/A	-:	59.13+10lc	g(N _{RB,c} /5	50)
Propagation Condition				AWGN		

Antenna	Configuration		1x2		
Note 1:	Special subframe and uplink-down	link configurations	are specified in table 4.2-1 in TS 36.211.		
Note 2:	DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.				
Note 3:	OCNG shall be used such that all cells are fully allocated and a constant total transmitted power				
	spectral density is achieved for all	OFDM symbols.			
Note 4:			specified in the test is assumed to be constant		
	over subcarriers and time and sha	Il be modelled as i	AWGN of appropriate power for N _{oc} to be		
	fulfilled.				
Note 5:	E _s /I _{ot} , RSRP, SCH_RP and Io leve	els have been deriv	ved from other parameters for information		
	purposes. They are not settable pa	arameters themsel	ves.		

A.4A.1.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 120 ms^{Note1} into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 20ms into T5.

Interruption on PCell during PSCell addition and release shall not exceed the values specified for NE-DC in Clause 8.2.3.2.3.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 8.8 [15]:

 $T_{config_EUTRAN-PSCell} = 20ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{E-UTRAN-PSCell_DU}$

Where:

 $T_{activation_time} = 20ms$

 $T_{PSCell\ DU} = 0ms$

 $T_{\text{E-UTRAN-PSCell_DU}} = 30 \text{ms}$

A.4A.1.2 Active BWP switch

A.4A.1.2.1 E-UTRAN PSCell – NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-DRX in synchronous NE-DC

A.4A.1.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.36.2.6. Supported test configurations are shown in Table A.4A.1.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1), and one E-UTRA PSCell (Cell 2) as given in Table A.4A.1.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.4A.1.2.1.1-3. below, and cell-specific parameters of E-UTRA PSCell are specified in Table A.3.7.2.1-1.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts.

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 starting from the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay})$.

The starting time of PSCell(Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell at latest at the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on PCell's BWP-1 starting from the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay})$.

The starting time of PSCell(Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of PCell, respectively.

Table A.4A.1.2.1.1-1: DL BWP switch supported test configuration	Table A.4A.1.2.1.1	: DL BWP switch	supported test	t configurations
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Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1: The UE is only required to be tested in one of the supported test configurations.					

Table A.4A.1.2.1.1-2: General test parameters for DL BWP switch in synchronous NE-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
E-UTRA RF Channel Number		2	One E-UTRA radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous NE-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.4A.1.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous NE-DC

Frequency Range	Paramete	er	Unit	Cell 1
Duplex mode	Frequency Range			FR1
TDD configuration		Config 1,4		FDD
TDD configuration	•	Config 2,3,5,6		TDD
Config 2.5 TDDConfl.1.1	TDD configuration			Not Applicable
Config 1,4	<u> </u>			
BWchammel Config 1.4 Config 2.5 Config 3.6 Active BWP ID Config 3.6 Config 3.6 Config 3.6 Active DL BWP-1 Config 1.4 Configuration Config 3.6 Config				
Config 2.5 Config 3.6 Active BWP ID	BW _{channel}			10 MHz: N _{RB,c} = 52
Config 3,6		Config 2,5		
Active BWP ID				
Initial DL BWP	Active BWP ID	,		
Configuration	Initial DL BWP	Config 1,4		
Config 3.6	Configuration			
Active DL BWP-1 Config 2,5 Config 3,6	9			
Config y a	Active DL BWP-1			DLBWP.1.1 Note 4
Config 3.6	Configuration			
Active DL BWP-2 Config 2,5 Config 3,6 Initial UL BWP Config 3,6 Config 2,5 Config 3,6 Active UL BWP-1 Config 3,6 Active UL BWP-1 Config 3,6 Active UL BWP-2 Config 3,6 Active UL BWP-1 Note 4 Active UL BWP-1 Note 4 ULBWP.1.1 Note 4 UL	3			
Config 2.5 Config 3.6	Active DL BWP-2			DLBWP.1.3 Note 4
Initial UL BWP				
Initial UL BWP	garanon			
Configuration	Initial UL BWP			ULBWP.0.2 Note 4
Config 3,6				
Active UL BWP-1 Config 1.4 Configuration Config 2.5 Config 3.6	- January Comments			
Configuration	Active UL BWP-1			UI BWP 1 1 Note 4
Config 3,6 Config 1,4 Config 1,4 Config 2,5 Config 3,6				
Active UL BWP-2	Comigulation			
Configuration Config 2,5 Config 3,6 SR.1.1 FDD PDSCH Reference measurement channel Config 1,4 SR.1.1 TDD SR.1.1 TDD RMSI CORESET config 1,4 parameters Config 2,5 Config 2,5 Config 3,6 CR.2.1 TDD CR.1.1 FDD Dedicated CORESET config 1,4 parameters Config 2,5 Config 3,6 CCR.2.1 TDD CCR.1.1 FDD Dedicated CORESET config 1,4 parameters Config 3,6 CCR.2.3 TDD CCR.1.1 TDD OCNG Patterns Config 3,6 CCR.2.3 TDD OCR.2.3 TDD SSB Configuration config 1,2,4,5 Config 3,6 SSB.2 FR1 SSB.1 FR1 SMTC Configuration configuration configuration SMTC.1 Correlation Matrix and Antenna configuration 1x2 Low TRS Configuration config 1,4 Config 2,5 Config 3,6 TRS.1.1 FDD TRS.1.1 FDD Config 3,6 TRS.1.2 TDD TRS.1.2 TDD EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS GRAPA to Antenna to PDCCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS(Note 1) GRAPA to Antenna to	Active III RWP-2			III R\MP 1 3 Note 4
PDSCH Reference				OLDWI .1.5
PDSCH Reference measurement channel Config 1,4	Comigulation			
measurement channel Config 2,5 SR.1.1 TDD RMSI CORESET Config 3,6 SR.2.1 TDD parameters Config 1,4 CR.1.1 FDD Dedicated CORESET Config 3,6 CR.2.1 TDD Dedicated CORESET parameters Config 1,4 CCR.1.1 FDD CONG Patterns Config 2,5 CCR.1.1 TDD OCNG Patterns OP.1 SSB.1 FR1 SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC Configuration SMTC.1 SSB.2 FR1 SMTC Configuration SMTC.1 TRS.1.1 FDD Correlation Matrix and Antenna SMTC.1 TRS.1.1 FDD Config 2,5 TRS.1.1 FDD TRS.1.1 FDD Config 2,5 TRS.1.1 FDD TRS.1.2 TDD EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS GB EPRE ratio of OCNG DMRS to SSS(Note 1) GB 0 EPRE ratio of OCNG DMRS to SSS(Note 1) GCONG TO CONG TO	PDSCH Pafaranca			SP 1 1 FDD
Config 3,6 SR.2.1 TDD				
RMSI CORESET	measurement channel			
Dedicated CORESET	DMSI CODESET			
Config 3,6 CR.2.1 TDD				
Dedicated CORESET	parameters			
Description Config 2,5	Dodinated CORESET			
Config 3,6 CCR.2.3 TDD				
OCNG Patterns SSB Configuration Config 1,2,4,5 SSB.1 FR1	parameters	Config 2,5		
SSB Configuration	OCNC Pottorno	Corning 3,6		
Config 3,6 SSB.2 FR1		Config 1 2 4 5		
SMTC Configuration	33B Configuration			
Correlation Matrix and Antenna Configuration	CMTC Configuration	Cornig 3,6		
Configuration Configuration Config 1,4 TRS.1.1 FDD Config 2,5 TRS.1.1 TDD TRS.1.2 TDD EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) Legal ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) Config 1,2,4,5 dBm/SCS [-104] [-101] Noc.Note 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 dBm/SCS [-87] [-90] Ég/lot dB M/SCS [-87] [-90]		otoppo		
Config 1,4		ileilia		TXZ LOW
Config 2,5		Config 1 4		TPS 1.1 EDD
Config 3,6	110 Comiguration			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) I) EPRE ratio of OCNG to OCNG DMRS (Note 1) Noc Note 2 Config 1,2,4,5 Config 3,6 Config 3,6 GBm/15kHz Config 1,2,4,5 Config 3,6 E _S /I _{Ot} Config 3,6				
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) I) EPRE ratio of OCNG DMRS (Note 1) I) Config 1,2,4,5 (Config 3,6) I Config 1,2,4,5 (Double 2) I Config 1,2,4,5 (Double 3) I Config 1,2,4,5 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3) I Config 3,6 (Double 3)	EDDE ratio of DCC to CC			11.0.1.2 100
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) I) EPRE ratio of OCNG to OCNG DMRS (Note 1) Noc Note 2 Config 1,2,4,5 Config 3,6 [-104] [-101] Noc Note 2 Config 1,2,4,5 (Bm/SCS) [-87] [-90] Es/lot Config 3,6 [-90]				
EPRE ratio of PDCCH DMRS to SSS dB 0 EPRE ratio of PDCCH to PDCCH DMRS dB 0 EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH 0 EPRE ratio of OCNG DMRS to SSS(Note 1) 0 0 EPRE ratio of OCNG to OCNG DMRS (Note 1) 0 0 Noc Note 2 Config 1,2,4,5 (Config 3,6) Config 1-2,4,5 (Bm/SCS) [-104] SS-RSRP Note 3 Config 1,2,4,5 (Config 3,6) Config 3,6 Config 3,6 Ê _s /I _{ot} dB 17				
EPRE ratio of PDCCH to PDCCH DMRS DRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) NocNote 2 Config 1,2,4,5 Config 3,6 [-104] [-101] NocNote 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 Config 3,6 GBm/SCS [-87] [-90] Ês/lot dB 17			٩D	
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) NocNote 2 Config 1,2,4,5 Config 3,6 [-104] [-101] NocNote 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 Config 3,6 GBm/SCS [-87] [-90] Ês/lot dB 17			uD	0
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) Noc Note 2 Config 1,2,4,5 Config 3,6 Config 3,6 Config 1,2,4,5 Gonfig 1,2,4,5 Config 1,2,4,5 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6				
1) EPRE ratio of OCNG to OCNG DMRS (Note 1) Noc Note 2 Config 1,2,4,5 Config 3,6 Config 3,6 Config 1,2,4,5 Config 1,2,4,5 Config 1,2,4,5 Config 1,2,4,5 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6 Config 3,6	EDDE ratio of OCNO DA	IDS to SSS(Nigto		
PRE ratio of OCNG to OCNG DMRS (Note 1)		1179 IO 333(11016		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		JONG DMDS		
NocNote 2 Config 1,2,4,5 dBm/SCS [-104] NocNote 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 dBm/SCS [-87] Config 3,6 [-90] Ês/lot dB 17		SOUND DIVING		
Config 3,6 [-101] N _{oc} Note 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 dBm/SCS [-87] Config 3,6 [-90]	No. Note 2	Config 1 2 4 5	dRm/SCS	[-104]
Noc Note 2 dBm/15kHz -104 SS-RSRP Note 3 Config 1,2,4,5 dBm/SCS [-87] Config 3,6 [-90] Ês/lot dB 17	1 40C		UDITI/OCO	
SS-RSRP Note 3 Config 1,2,4,5 dBm/SCS [-87] Config 3,6 [-90] Ês/Iot dB 17	NI Note 2	Coning 3,6	dD c= /4 F1-1 1-	
		Confi = 4 0 4 5		
\hat{E}_s/I_{ot} dB 17	33-K3KP 10003		aBm/SCS	
	^ //	Config 3,6	-ID	
E _s /N _{oc} dB 17				
	Es/Noc		aв	<u> 17</u>

Io ^{Note3}		Config 1,2,4,5	dBm/9.36MHz	[-59]		
		Config 3,6	dBm/38.16MHz	[-61.9]		
Propagat	tion Condition			AWGN		
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.					
Note 2:	Interference from other cells and noise sources not specified in the test is					
	assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.					
Note 3:	SS-RSRP and lo levels have been derived from other parameters for					
	information purposes. They are not settable parameters themselves.					
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is					
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 i					
	linked with UL	BWP.1.3 defined i	n clause 12 of TS 3	8.213 [3].		

A.4A.1.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-Switching Delay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of PSCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PSCell interruption of during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.36.2.6.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+k1)$, $(j+T_{BWPswitchDelay}+k1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.4A.2 Measurement performance

A.4A.2.1 SFTD accuracy

A.4A.2.1.1 SFTD accuracy

A.4A.2.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 10.21.1.1 for NE-DC SFTD measurements.

A.4A.2.1.1.2 Test Environment

Supported test configurations are shown in Table A.4A.2.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is NR FR1 PCell and Cell 2 is E-UTRAN target cell. The test parameters of cell 1 are given in clause A.4A.2.1.1.2-2. The test parameters of cell 2 are given in Table A.3.7.2.1. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.4A.2.1.1.2-3.

Table A.4A.2.1.1.2-1: Supported test configurations for SFTD accuracy

Config	juration	Description	
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD	
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD	
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD	
	4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD	
	5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD	
	6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD	
Note 1:	e 1: The UE is only required to be tested in one of the supported test configurations		
Note 2:	Note 2: A UE which fulfils the requirements in test case A.4A.1.1 can skip the test cases in A.4.7.5.1		

Table A.4A.2.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
Duplex mode	1,4		FDD
	2,5		TDD
	3,6	}	TDD
TDD Configuration	1,4		N/A
	2,5	!	TDDConf.1.1
	3,6	1	TDDConf.2.1
BWchannel	1,4	MHz	10: N _{RB,c} = 52
	2,5	}	10: N _{RB,c} = 52
	3,6	!	40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	1,1		011.11.11.00
ona mor	2,5	1	SR.1.1 TDD
	3,6		SR.2.1 TDD
RMSI CORESET Reference Chan			CR.1.1 FDD
Tambi Gorege Treference Offan	2,5		CR.1.1 TDD
	3,6	1	CR.2.1 TDD
RMC CORESET Reference Chan			CCR.1.1 FDD
TAMO GOREGET Reference onam	2,5	}	CCR.1.1 TDD
	3,6	-	CCR.2.1 TDD
SSB configuration	1,4		SSB.1 FR1
33B configuration	2,5		SSB.1 FR1
	3,6	-	SSB.2 FR1
SMTC configuration	1~6		SMTC.1
DL BWP configuration	1~6		DLBWP.1.1
UL BWP configuration	1~6		ULBWP.1.1
OCNG Patterns	1~6		OP.1
EPRE ratio of PSS to SSS	1~6	dB	0
EPRE ratio of PBCH DMRS to SS	_	QD	U
EPRE ratio of PBCH to PBCH DM			
EPRE ratio of PDCCH DMRS to S			
EPRE ratio of PDCCH to PDCCH	133		
DMRS			
EPRE ratio of PDSCH DMRS to S	99		
EPRE ratio of PDSCH to PDSCH	33		
DMRS			
EPRE ratio of OCNG DMRS to SS	SNote		
1			
EPRE ratio of OCNG to OCNG DN	MRS		
Note 1 Noce 1 NR_FDD_FR1_A, NR_FDD_FR1_A NOTE	1~6	dBm/15kHz	-104
N_{oc} NR_TDD_FR1_A NOT		GDIII, IONI IZ	107
NR_FDD_FR1_B			
NR_TDD_FR1_C			
NR_FDD_FR1_D,			
NR_TDD_FR1_D			
NR_FDD_FR1_E,			
NR_TDD_FR1_E			
NR_FDD_FR1_F			
NR_FDD_FR1_G			
NR_FDD_FR1_H			

	T	1	T := :====	
$N_{oc}^{ m Note2}$	NR_FDD_FR1_A,	1,2,4,5	dBm/SSB SCS	-104
oc	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR FDD FR1 F	1		
	NR_FDD_FR1_G	-		
	NR_FDD_FR1_H			101
	NR_FDD_FR1_A,	3,6		-101
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,	1		
	NR_TDD_FR1_E			
	NR_FDD_FR1_F	1		
	NR_FDD_FR1_G	1		
	NR_FDD_FR1_G NR_FDD_FR1_H	1		
\hat{E}_{s}/I_{ot}	ואע"בחח"בעו"ע	1~6	dB	-3
\hat{E}_{s}/I_{ot} \hat{E}_{s}/N_{oc}		1~6	dB	-3
	ND EDD ED4 A			
SS-RSRP Note3	NR_FDD_FR1_A,	1,2,4,5	dBm/SCS	-107
INOIGO	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,]		
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR FDD FR1 G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,	3,6	_	-104
	NR_TDD_FR1_A NOTE 5	3,0		-10 4
		1		
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G	1		
	NR_FDD_FR1_H	1		
lo Note3	NR FDD FR1 A.	1,2,4,5	dBm/9.36 MHz	-74.28
"	NR_TDD_FR1_A NOTE 5	,_,,,,	3.2 5.00 1111 12	20
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
		-		
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G]		
	NR_FDD_FR1_H			

	NR_FDD_FR1_A,	3,6	dBm/38.16	-68.18
	NR_TDD_FR1_A NOTE 5		MHz	
	NR_FDD_FR1_B			
NR_TDD_FR1_C				
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagat	Propagation condition			AWGN
Antenna	Antenna configuration			1x2
Note 1:	OCNG shall be used such that	t both cells are	fully allocated and	l a constant total
	transmitted power spectral de	nsity is achieve	d for all OFDM syr	mbols.
Note 2:	Interference from other cells a	nd noise sourc	es not specified in	the test is assumed to
be constant over subcarriers and time and shall be modelled as AWGN of appropr				s AWGN of appropriate
	power for N_{oc} to be fulfilled.			
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information			
	purposes. They are not settable parameters themselves.			
Note 4:	· · · · · · · · · · · · · · · · · · ·			
	and noise at each receiver and	tenna port.		
Note 5:	Note 5: The test configuration excludes support for band n51 and it is not required to run this			
	test on band n51 in this releas	e of the specific	cation	

Table A.4A.2.1.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.4A.2.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and E-UTRAN target cell. The reported SFTD accuracy shall fulfil the requirement in clause 10.1.21.1.

A.5 EN-DC tests with one or more NR cells in FR2

- A.5.1 Void
- A.5.2 Void
- A.5.3 RRC_CONNECTED state mobility
- A.5.3.1 Void
- A.5.3.2 RRC Connection Mobility Control
- A.5.3.2.1 Void
- A.5.3.2.2 Random Access
- A.5.3.2.2.1 Contention based random access test in FR2 for PSCell/SCell in EN-DC
- A.5.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.1.1-1. UE capable of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.1.1-2 and Table A.5.3.2.2.1.1-3.

Table A.5.3.2.2.1.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Config Description				
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	ı	mode		
2		LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	2	mode		
Note:	The UE is only required to be tested in one of the supported test configurations depending on UE			
	capability			

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1,2		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1,2		TRS.2.1 TDD	
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1,2		SR.3.1 TDD	As defined in A.3.1.1.
RMSI CORESET	Config 1,2		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
Dedicated CORESET	Config 1,2		CCR.3.1 TDD	
Reference Channel				
NR RF Channel Number	,		1	
EPRE ratio of PSS to SS	SS	dB		
EPRE ratio of PBCH_DM	MRS to SSS	dB		
EPRE ratio of PBCH to F	PBCH_DMRS	dB		
EPRE ratio of PDCCH_D	MRS to SSS	dB	0	
EPRE ratio of PDCCH to	PDCCH_DMRS	dB		
EPRE ratio of PDSCH_D	MRS to SSS	dB		
EPRE ratio of PDSCH to	PDSCH_DMRS	dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δ _U L	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process
Configured UE transmitted power (dBm	maximum value configurable	As defined in clause
$P_{ m CMAX, f,c}$)			for certain power class	6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +ΔDL	RSRP_69 corresponds to -88dBm. Δ _{DL} is derived from the downlink calibration process Note 4
preambleReceivedTarge	tPower	dBm	-100	As defined in TS 38.331 [2].

- Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
- Note 3: The Δ_{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The Δ_{DL} value is calculated as (RSRP_REP RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.5.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

	Parameter	Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	
SSB with	Es Note1	dBm/SCS	-80.6	Power of SSB with index
	SSB_RP	dBm/SCS	-80.6	0 is set to be above configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	
	lo	dBm/95.04 MHz	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
SSB with	SSB_RP	dBm/SCS	-95.0	1 is set to be below configured rsrp- ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	
	lo	dBm/95.04 MHz	-70.41	lo in symbols containing SSB index 1
Propagation	Condition	-	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: Void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.5.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.5.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.5.3.2.2.1.2.5 Void

A.5.3.2.2.1.2.6 Void

A.5.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.5.3.2.2.2 Non-contention based random access test in FR2 for PSCell/SCell in EN-DC

A.5.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.2.1-1. UE capable of EN-DC withPSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.2.1-2 and Table A.5.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.5.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Config		Description	
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex	
	1	mode	
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex	
	2	mode	
Note:	The UE is only required to be tested in one of the supported test configurations depending on UE		

Table A.5.3.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

CSI-RS Config 1,2 N/A CSI-RS.3.1 As de Configuration TDD TRS.2.1 TDD TRS.2.1 TDD TRS.2.1 TDD TDD TDD TDD TDD TDD TDD TDD TDD TD	fined in A.3.10 fined in A.3.1.4 ined in A.3.2.1. ined in A.3.2.1.
ConfigurationTDDCSI-RS for trackingConfig 1,2TRS.2.1 TDDTRS.2.1 TDDDuplex Mode for Cell 2Config 1,2TDDTDDTDD ConfigurationConfig 1,2TDDConf.3.1TDDConf.3.1	ined in A.3.2.1. ined in A.3.1.1.
CSI-RS for tracking Config 1,2 TRS.2.1 TDD TRS.2.1 TDD Duplex Mode for Config 1,2 TDD TDD Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1	ined in A.3.1.1.
Duplex Mode for Cell 2 Config 1,2 TDD TDD TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1	ined in A.3.1.1.
Cell 2 TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1	ined in A.3.1.1.
TDD Configuration Config 1,2 TDDConf.3.1 TDDConf.3.1	ined in A.3.1.1.
	ined in A.3.1.1.
DW Config.1.2 MHz 400: N 04 400: N 04	ined in A.3.1.1.
BW _{channel} Config 1,2 MHz 100: N _{RB,c} = 24 100: N _{RB,c} = 24	ined in A.3.1.1.
Channel Note 2	
	fined in A.3.1.2
Reference Channel	
Dedicated Config 1,2 CCR.3.1 TDD CCR.3.1 TDD	
CORESET	
Reference Channel	
NR RF Channel Number 1 1	
EPRE ratio of PSS to SSS dB	
EPRE ratio of PBCH_DMRS to SSS	
EPRE ratio of PBCH to dB	
PBCH_DMRS	
EPRE ratio of PDCCH_DMRS to dB	
SSS 0 0 0	
EPRE ratio of PDCCH to dB	
PDCCH_DMRS	
EPRE ratio of PDSCH_DMRS to SSS	
EPRE ratio of PDSCH to dB	
PDSCH_DMRS	
	defined in TS
	8.331 [2].
	derived from the
	nk calibration
pr	ocess Note 3
	fined in clause
	in TS 38.101-2
certain power certain power	[19]
class class	
PRACH Configuration FR2 PRACH FR2 PRACH As def	ined in A.3.8.3,
configuration 2 configuration 3 with	exceptions as
de	fined below
	69 corresponds
	8dBm. Δ _{DL} is
	ved from the
down	link calibration
	ocess Note 4
	defined in TS
Note 4. CONO de all berne de colo the transport to the formation of the fo	38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: The Δ_{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.

Note 4: The Δ_{DL} value is calculated as (RSRP_REP - RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

472

Table A.5.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parameter		Unit	Test-1	Test-2	Comments
AoA setup	AoA setup		Setup 1	Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below
SSB with	SSB_RP	dBm/SC S	-95.0	-95.0	configured rsrp- ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	lo in symbols containing SSB index 1
Propagation	Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.5.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.5.3.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.3 Void

A.5.4 Timing

A.5.4.1 UE transmit timing

A.5.4.1.1 NR UE Transmit Timing Test for FR2

A.5.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 5.4.1.1.1-1.

Table A.5.4.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description	
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.1.1-2 and A.5.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.1.1-3.

Table A.5.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2	Freq1	Freq1	
Duplex Mode		1,2	TI	DD	
TDD configuration		1,2	TDDConf.3.1		
BW _{channel}	MHz	1,2	100: N _{RB,c} = 66		
Data RBs allocated		1,2	6	66	
Leitiel DMD Configuration		4.0	DLBV	VP.0.1	
Initial BWP Configuration		1,2	ULBV	VP.0.1	
Dedicated BWP		1.0	DLBV	VP.1.1	
Configuration		1,2		VP.1.1	
TRS Configuration		1,2	TRS.2	.1 TDD	
PDSCH/PDCCH TCI		4.0	TOLO	state.2	
state		1,2	101.8		
DRx Cycle	ms	1,2	N/A	DRX.8 ^{Note5}	
PDSCH Reference		1.0	CD 2	3 TDD	
measurement channel		1,2	SR.3.	3 100	
RMSI CORESET		1,2	CD 2	2 TDD	
Reference Channel		1,2	CK.S.	עטו צ	
Dedicated CORESET		1,2	CCB3	7 TDD	
Reference Channel			CCR.3.7 TDD		
OCNG Patterns		1,2	OP.1		
SSB Configuration		1,2		SSB.4 FR2	
SMTC Configuration		1,2	SMTC.1		
PDSCH/PDCCH	kHz	1,2	120		
subcarrier spacing	KI IZ		14	20	
EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH					
DMRS to SSS					
EPRE ratio of PBCH to					
PBCH DMRS					
EPRE ratio of PDCCH					
DMRS to SSS					
EPRE ratio of PDCCH to	dB	1,2	0	0	
PDCCH DMRS		,			
EPRE ratio of PDSCH					
DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH EPRE ratio of OCNG					
DMRS to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
Propagation condition		1.2	Λ\Λ.	I /GN	
SRS Config		1,2	SRSConf.1 ^{Note6}		
Note 1: OCNC shall be					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void

Note 4: Void

Note 5:

Note 6:

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-2A: OTA related test parameters

Parameter		Unit	Test 1	Test 2
Angle of arrival configuration			Setup 1 according to clause A.3.15.	
Assumption for UE beams ^{Note}			Fi	ne
$N_{oc}^{ m Note1}$		dBm/15kHz ^{Note4}	-1	12
$N_{oc}^{ m Note1}$		dBm/SCS ^{Note3}	-100	
\hat{E}_{s}/N_{oc}		dB	4	
SSB_RPNo	te2	dBm/SCS Note4	-96	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB		4
Io ^{Note2}		dBm/95.04 MHz Note4	-6	8.5
	ote 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.			
Note 2: SSB_RP and lo levels have been derived from other parameters for information purpose They are not settable parameters themselves. Note 3: Void				formation purposes.
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				of the quiet zone

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

Information about types of UE beam is given in B.2.1.3, and does not limit UE

As observed with 0dBi gain antenna at the centre of the quiet zone

implementation or test system implementation

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping	0	0	
	startPosition			
	resourceMapping	n1	n1	
	nrofSymbols			
	resourceMapping	n1	n1	
	repetitionFactor			
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping	17	17	Matches N _{RB,c}
	c-SRS			
	freqHopping	0	0	
	b-SRS			
	freqHopping	0	0	
	b-hop			
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1,0	sl2560,4	Offset to align with
				DRx periodicity

sequenceld	0	0	Any 10 bit number

Table A.5.4.1.1.1-4: Void

A.5.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.2-1 and setup NR PSCell according to parameters given in Table A.5.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.1.2-1

Table A.5.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
240	+8*64T _c	+4*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.5.4.2 UE timer accuracy

A.5.4.3 Timing advance

A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

A.5.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.5.4.3.1.2-3, are sent from the UE and received by the test

equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.5.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations

Table A.5.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_old for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS N _{TA_new} = N _{TA_old} + 1024*T _c (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	s	5	

Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1		
Faranietei	Unit	T1	T2	

Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}	MHz	100: $N_{RB,c} = 66$
BWP BW	MHz	$100: N_{RB,c} = 66$
DRx Cycle	ms	Not Applicable
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET Reference Channel		CR.3.1 TDD
Dedicated CORESET Reference Channel		CCR.3.1 TDD
TRS configuration		TRS.2.1 TDD
PDSCH/PDCCH TCI state		TCI.State.2
OCNG Patterns		OCNG pattern 1
SMTC configuration		SMTC.1 FR2
SSB configuration		SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz
EPRE ratio of PSS to SSS		
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS	dB	0
EPRE ratio of PDSCH DMRS to SSS	uБ	l °
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation condition	-	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	Test 1				
			T1 T2				
Angle of a	arrival configuration		Setup 1 according	to clause A.3.15.1			
Assumpti 6	on for UE beams ^{Note}		Fine				
N_{oc} Note1		dBm/15kHz ^{Note4}	n/15kHz ^{Note4} -112				
$N_{\!oc}$ Note1		dBm/SCS ^{Note3}	-103				
\hat{E}_s/N_{oc}		dB	4				
SS-RSRF	Note2	dBm/SCS Note4 -99					
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$		dB	4				
Io ^{Note2}		dBm/95.04 MHz ^{Note4} -68.5					
Note 1:	1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power						
	for N_{oc} to be fulfilled.						
Note 2:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 3:							
Note 4:	Equivalent power rec	eived by an antenna with 0d	Bi gain at the centre of	of the quiet zone			
Note 5:		Bi gain antenna at the centre					
Note 6:		bes of UE beam is given in Book strate in Book strates implementation	.2.1.3, and does not li	mit UE			

Field Value Comment c-SRS 16 Frequency hopping is disabled 0 b-SRS b-hop 0 freqDomainPosition 0 Frequency domain position of SRS freqDomainShift 0 groupOrSequenceHopping neither No group or sequence hopping SRS-PeriodicityAndOffset sl5=4 Once every 5 slots SSB #0 is used for SRS path loss pathlossReferenceRS ssb-Index=0 estimation Codebook based UL transmission Codebook usage startPosition resourceMapping setting. SRS on last nrofSymbols symbol of slot, and 1symbols for SRS n1 repetitionFactor n1 without repetition. combOffset-n2 0 transmissionComb setting cyclicShift-n2 0 nrofSRS-Ports Number of antenna ports used for SRS port1 transmission

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

A.5.4.3.1.3 Test Requirements

Note:

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k = 11.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

For further information see clause 6.3.2 in TS 38.331 [2].

A.5.5 Signaling characteristics

A.5.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.5.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.1.1-1. The test parameters are given in Tables A.5.5.1.1.1-2, A.5.5.1.1.1-3, and A. 5.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration

T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.5.5.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description					
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2 TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex m					
Note: The UE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

	Parameter			Value		
				Test 1		
Active E-UTRA PCell				Cell 1		
E-UTRA RF Ch				1		
Active PSCell				Cell 2		
RF Channel Nu	mber			2		
Duplex mode		Config 1, 2		TDD		
BWchannel		Config 1, 2		100: N _{RB,c} = 66		
Data RBs alloca	ated Config 1, 2			24		
DL initial BWP	configuration	Config 1, 2		DLBWP.0.1		
DL dedicated B		Config 1, 2		DLBWP.1.1		
configuration						
UL initial BWP	configuration	Config 1, 2		ULBWP.0.1		
UL dedicated B	WP	Config 1, 2		ULBWP.1.1		
configuration						
TDD Configurat		Config 1, 2		TDDConf.3.1		
RMSI CORESE	T Reference	Config 1, 2		CR.3.1 TDD		
Channel						
Dedicated COR	_	Config 1, 2		CCR.3.4 TDD		
Reference Char						
SSB Configurat		Config 1, 2		SSB.1 FR2		
SMTC Configur		Config 1, 2		SMTC.1		
PDSCH/PDCCI	-l subcarrier	Config 1, 2		120 KHz		
spacing						
PRACH Configu		Config 1, 2		Table A.3.8.3.4		
SSB index assi RS	gned as RLM	Config 1, 2		0,1		
OCNG paramet	ters			OP.5		
CP length				Normal		
Out of sync	DCI format			1-0		
transmission		ntrol OFDM symbols		2		
parameters	Aggregation le		CCE	8		
		hetical PDCCH RE	dB	4		
		age SSS RE energy				
	Ratio of hypot	hetical PDCCH	dB	4		
	DMRS energy	to average SSS RE				
	energy					
	DMRS precod			REG bundle size		
	REG bundle s	ize		6		
DRX				OFF		
Gap pattern ID				gp0		
Layer 3 filtering				Enabled		
T310 timer			ms	0		
T311 timer			ms	1000		
N310				1		
N311		T = "		1		
CSI-RS for CSI reporting Config 1, 2				CSI-RS.3.1 TDD		
TCI states for PDCCH/PDSCH				TCI.State.2		
CSI-RS for trac	king	Config 1, 2		TRS.2.1 TDD		
T1			S	0.2		
			S	9.68		
T2				9.68		
			S S	9.64		

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

	Paran	neter	Unit	Test 1					
				T1 T2 T3			T1	T2	T3
AoA setup					Setu	up 3 defii	ned in A.3	3.15	
				AoA1				AoA2	
Assumption for	r UE bea	ams ^{Note 5}			Rough			Rough	
EPRE ratio of	PDCCH	DMRS to SSS	dB		4				
EPRE ratio of	PDCCH	to PDCCH DMRS	dB						
EPRE ratio of	PBCH D	MRS to SSS	dB						
		PBCH DMRS	dB						
EPRE ratio of	PSS to 3	SSS	dB		0			Not sent	
EPRE ratio of	PDSCH	DMRS to SSS	dB		U			NOL SELL	
EPRE ratio of	PDSCH	to PDSCH DMRS	dB						
EPRE ratio of	OCNG [DMRS to SSS	dB						
EPRE ratio of	OCNG t	o OCNG DMRS	dB						
ssb-Index 0 S	NR	Config 1, 2	dB	2 ^{Note 6} -6 ^{Note 6} -15					
ssb-Index 1 S	NR	Config 1, 2		Not sent 2 ^{Note 6}				-15	-15
N_{oc}		Config 1, 2	dBm/ 15kHz		-92.1			-92.1	
		a danualiale	TOKITZ						
Time multiplex transmissions				Defined in Figure A.5.5.1.1.1-2					
		CITAUA		<u> </u>					75 U ¬
Propagation c Note 1: OC		I ha waad ayah that a a	onetent te	TDL-A 30ns 75Hz TDL-A 30ns 75Hz					_
	e 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.					vea ioi			
	,								
							-or		
		UE which supports 4R							
		about types of UE bea						plementa	tion or
		implementation	-						
Note 6: This	s value a	allows up to 1dB degra	dation fro	m applied	d SNR to L	JE baseb	and		

Table A.5.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

	Field	Test 1	
Fleid		Value	
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCell are SFN- synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).		

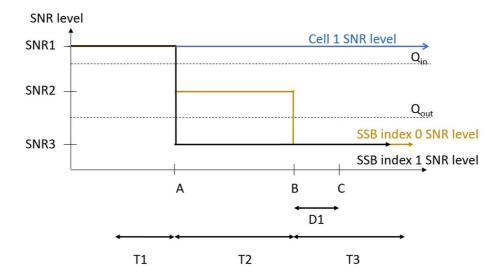


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

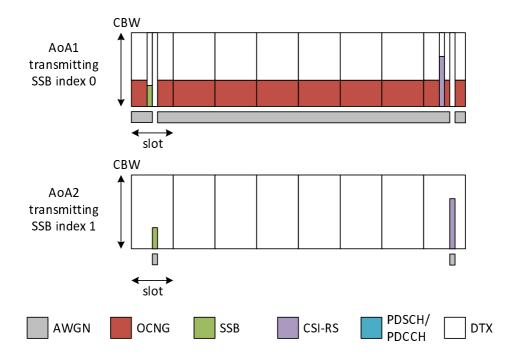


Figure A.5.5.1.1.1-2: Time multiplexed downlink transmissions

A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

Configuration Description				
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2 TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mo				
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

	Paramete	ſ	Unit	Value
				Test 1
Active E-UTRA PCell			Ce1l 1	
E-UTRA RF Ch	annel Number			1
Active PSCell				Cell 2
RF Channel Nu	mber			2
Duplex mode		Config 1, 2		TDD
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66
Data RBs alloca	ated	Config 1, 2		24
DL initial BWP of	configuration	Config 1, 2		DLBWP.0.1
DL dedicated B' configuration		Config 1, 2		DLBWP.1.1
UL initial BWP of	configuration	Config 1, 2		ULBWP.0.1
UL dedicated B		Config 1, 2		ULBWP.1.1
configuration	VVI	Comig 1, 2		OLDWI .I.I
TDD Configurat	ion	Config 1, 2		TDDConf.3.1
RMSI CORESE		Config 1, 2		CR.3.1 TDD
Channel				
Dedicated COR Reference Char		Config 1, 2		CCR.3.1 TDD
SSB Configurat		Config 1, 2		SSB.1 FR2
SMTC Configura		Config 1, 2		SMTC.3
PDSCH/PDCCH		Config 1, 2		120 KHz
spacing				
PRACH Configuration		Config 1, 2		Table A.3.8.3.4
SSB index assigned as RLM Conf		Config 1, 2		0,1
OCNG parameters			OP.5	
CP length				Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le	vel	CCE	4

	• •	etical PDCCH RE	dB	0
	Ratio of hypoth	ge SSS RE energy etical PDCCH DMRS	dB	0
		ige SSS RE energy		
	DMRS precode			REG bundle size
	REG bundle siz	e		6
Out of sync	DCI format			1-0
transmission	Number of Con	trol OFDM symbols		2
parameters	Aggregation lev		CCE	8
		etical PDCCH RE	dB	4
		ige SSS RE energy		
		etical PDCCH DMRS	dB	4
		ige SSS RE energy		
	DMRS precode			REG bundle size
	REG bundle siz	:e		6
DRX				OFF
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CSI		Config 1, 2		CSI-RS.3.1 TDD
TCI states for P	TCI states for PDCCH/PDSCH			TCI.State.2
CSI-RS for tracking Config 1, 2				TRS.2.1 TDD
T1			S	0.2
T2			S	0.2
T3	T3			1.88
T4			S	0.2
T5			S	3.84
D1			S	3.8

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. E-UTRAN is in non-DRX mode under test. Note 1:

Note 2:

Note 3:

Test 1

Parameter

Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Unit

			T1	T2	Т3	T4	T5	T1	T2	T3	
AoA setup						Se	tup 3 defi	ned in A.3	3.15		
			AoA1					AoA2			
Assumption for UE b	eams ^{Note 5}				Rough					Rough	
EPRE ratio of PDCC	H DMRS to SSS	dB			0						
EPRE ratio of PDCC	H to PDCCH DMRS	dB									
EPRE ratio of PBCH	DMRS to SSS	dB									
EPRE ratio of PBCH	to PBCH DMRS	dB									
EPRE ratio of PSS to	SSS	dB			^					Nataont	
EPRE ratio of PDSC	H DMRS to SSS	dB	- 0						Not sent		
EPRE ratio of PDSC	H to PDSCH DMRS	dB									
EPRE ratio of OCNG	DMRS to SSS	dB									
EPRE ratio of OCNG	to OCNG DMRS	dB									
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note 6}	-6 ^{Note 6}	-15	-4.5	2 ^{Note 6}				
ssb-Index 1 SNR	Config 1, 2				Not sent			2 ^{Note 6}	-15	-15	
λI	Config 1, 2	dBm/			00.4					00.4	
N_{oc}		15kHz	-92.1 -92				-92.1				
Time multiplexing of	the downlink					Defin	adia Fian	\ 1	242		
transmissions from e	ach AoA		Defined in Figure A.5.5.1.2.1-2								
Propagation conditio	n		TDL-A 30ns 75Hz TDL-A 30ns				L-A 30ns 7				
	all be used such that a							ved for all	OFDM	symbols.	
Note 2. The signs	Loontaine DDCCH for	III-c othor	than tha c	LOVICO LINC	iar tact ac	nart at (M .MIC 7				

- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 2RX on at least one band. For testing of a UE which supports 2RX on at least one band. For testing of a UE which supports 2RX on at least one band. For testing of a UE which supports 2RX on at least one band.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implement
- Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.2.1-4: Void

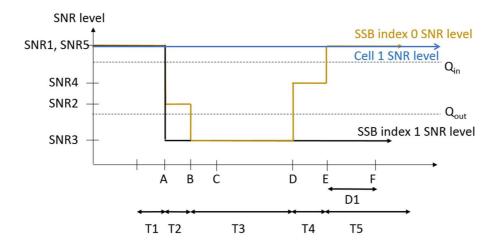


Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

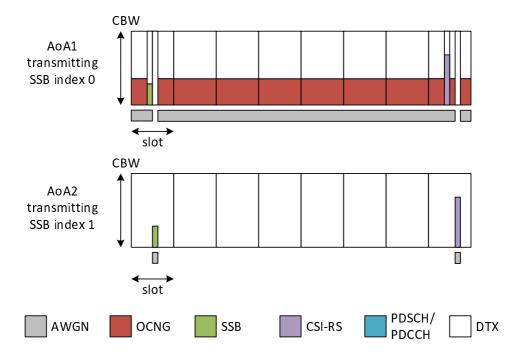


Figure A.5.5.1.2.1-2: Time multiplexed downlink transmissions

A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration Description				
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

	Parameter	•	Unit	Value
A -45 E LITDA	DO-II			Test 1
Active E-UTRA	PCell			Cell 1
E-UTRA RF Channel Number				1
Active PSCell RF Channel Number				Cell 2
	mber	Config 1 2		2 TDD
Duplex mode		Config 1, 2		
BW _{channel} Data RBs alloca	-1- d	Config 1, 2		100: N _{RB,c} = 66
		Config 1, 2		66
DL initial BWP		Config 1, 2		DLBWP.0.1
DL dedicated B	WP	Config 1, 2		DLBWP.1.1
configuration		Confin 4 0		LILDWD O 4
UL initial BWP		Config 1, 2		ULBWP.0.1
UL dedicated B	WP	Config 1, 2		ULBWP.1.1
configuration		Confin 4 0		TDDC==4.2.4
TDD Configurat		Config 1, 2		TDDConf.3.1
RMSI CORESE	Reference	Config 1, 2		CR.3.1 TDD
Channel	FOFT	0 " 1 0		000 0 4 TDD
Dedicated COR		Config 1, 2		CCR.3.4 TDD
Reference Char		0 " 1 0		000 4 500
SSB Configurat		Config 1, 2		SSB.1 FR2
SMTC Configur		Config 1, 2		SMTC.1
PDSCH/PDCCH	H subcarrier	Config 1, 2		120 KHz
spacing		0 " 1 0		T.I. A.O.O.A
PRACH Configu		Config 1, 2		Table A.3.8.3.4
SSB index assignment	gned as RLM	Config 1, 2		0,1
RS				05.
OCNG paramet	ers			OP.1
CP length	DOI:			Normal
Out of sync	DCI format			1-0
transmission	Number of Cor	ntrol OFDM symbols	205	2
parameters	Aggregation le		CCE	8
		netical PDCCH RE	dB	4
	energy to aver	age SSS RE energy	ID.	
	Ratio of hypoth		dB	4
		to average SSS RE		
	energy			DEC houselle sins
	DMRS precode REG bundle si	er granularity		REG bundle size
DDV O fi		ze		6
DRX Configurat	lion			DRX.3
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311			1	
CSI-RS for CSI reporting Config 1, 2			ļ <u>I</u>	CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH		ļ <u>I</u>	TCI.State.2	
CSI-RS for tracking Config 1, 2			TRS.2.1 TDD	
T1		S	0.2	
T2			S	14.48
T3			S	14.48
D1			S	14.44
		assigned to the UE pr		of time period T1.
Note 2: UE-s	pecific PDCCH i	s not transmitted after	T1 starts.	

Note 2: Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

Paramete	er	Unit		Test 1	
			T1	T2	T3
AoA setup		Setu	p 1 defined in A.	3.15	
Assumption for UE beams	lote 5			Rough	
EPRE ratio of PDCCH DM	RS to SSS	dB		4	
EPRE ratio of PDCCH to P	DCCH DMRS	dB		0	
EPRE ratio of PBCH DMR	S to SSS	dB			
EPRE ratio of PBCH to PB	CH DMRS	dB			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PDSCH DMI	RS to SSS	dB	0		
EPRE ratio of PDSCH to P	DSCH DMRS	dB			
EPRE ratio of OCNG DMR	EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OC	CNG DMRS	dB			
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note 6}	-6 ^{Note 6}	-15
ssb-Index 1 SNR	Config 1, 2		2 ^{Note 6} -15 -15		
N_{oc}	Config 1, 2	dBm/15K Hz		-104.7dBm	
Propagation condition	<u> </u>		TDL-A 30ns 75Hz		
	used such that the r	esources in (•		
	er spectral density i				notant total
	ins PDCCH for UE				CNG.
		o over the SSS F			
			RX on at least on	e band. For	
		, the SNR during			
Note 5: Information about types of UE beam		n is given in E	3.2.1.3, and does	s not limit UE imp	olementation
or test system in	nplementation				
Note 6: This value allow	s up to 1dB degrada	ation from ap	plied SNR to UE	baseband	

Table A.5.5.1.3.1-4: Void

Table A.5.5.1.3.1-5: Void

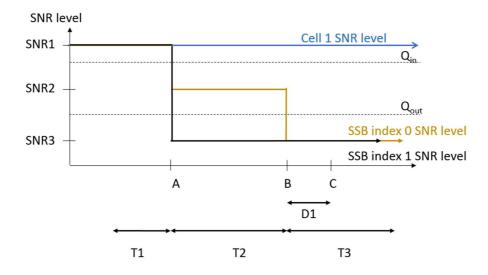


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration Description		
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2 TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mod		
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Paramete	r	Unit	Value
			Test 1
			0.11.4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	UL dedicated BWP Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration Config 1, 2			TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel	-		

Dedicated COR	ECET	Config 1, 2		CCR.3.1 TDD
Reference Channel		Corning 1, 2		CCR.3.1 TDD
	SSB Configuration Config 1, 2			SSB.1 FR2
				SMTC.3
PDSCH/PDCCH		Config 1, 2 Config 1, 2		120 KHz
spacing	i subcarrier	Cornig 1, 2		120 KHZ
PRACH Configu	ıration	Config 1, 2		Table A.3.8.3.4
SSB index assignment		Config 1, 2		0,1
RS	gried as KLIVI	Cornig 1, 2		0,1
OCNG paramet	ers			OP.1
CP length	010			Normal
In sync	DCI format			1-0
transmission		trol OFDM symbols		2
parameters	Aggregation lev		CCE	4
paramotoro		etical PDCCH RE	dB	0
		ge SSS RE energy	uБ	O
		etical PDCCH DMRS	dB	0
		ge SSS RE energy	uБ	U
	DMRS precode	r granularity		REG bundle size
	REG bundle siz			6
Out of sync	DCI format			1-0
transmission	Number of Control OFDM symbols			2
parameters	Aggregation lev		CCE	8
paramotors	Ratio of hypothetical PDCCH RE		dB	4
	energy to average SSS RE energy		uБ	4
		etical PDCCH DMRS	dB	4
		ge SSS RE energy	45	•
	DMRS precode			REG bundle size
	REG bundle siz			6
DRX Configurat				DRX.11
Gap pattern ID	-			N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CSI reporting Config 1, 2			CSI-RS.3.1 TDD	
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking Config 1, 2			TRS.2.1 TDD	
T1		s	0.2	
T2			S	0.2
T3			S	2.8
T4				0.2
T5				3.88
D1			S S	3.84
	onfigurations are	assigned to the UE prid		

Note 1: Note 2: All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring test in DRX mode

Par	ameter	Unit		Test 1				
				T2	Т3	T4	T5	
AoA setup			Setup 1	defined	in A.3.1	15		
Assumption for UE be					Rough			
EPRE ratio of PDCCH	I DMRS to SSS	dB			0			
EPRE ratio of PDCCH	I to PDCCH DMRS	dB			0			
EPRE ratio of PBCH [DMRS to SSS	dB						
EPRE ratio of PBCH t	o PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB						
EPRE ratio of PDSCH	DMRS to SSS	dB			0			
EPRE ratio of PDSCH	to PDSCH DMRS	dB						
EPRE ratio of OCNG	DMRS to SSS	dB						
EPRE ratio of OCNG	to OCNG DMRS	dB						
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note}	-	-15	-4.5	2 ^{Note 6}	
			6	6 ^{Note}				
			- Note	6				
ssb-Index 1 SNR	Config 1, 2		2 ^{Note}	-15	-15	-15	-15	
N_{oc}	Config 1, 2	dBm/1 5KHz	104.7dBm					
Propagation condition				TDL	-A 30ns	75Hz		
Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of								
OCNG.3 Note 3: SNR levels correspond to the signal to no					5-			
					-41			
Note 4: The SNR v band. For to A.3.6.	orts 4RX o	n all bar	nds, the	SNR du	ıring T3			
Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation								
Note 6: This value	allows up to 1dB degrada	tion from ap	oplied S	NR to U	E baseb	and		

Table A.5.5.1.4.1-4: Void

Table A.5.5.1.4.1-5: Void

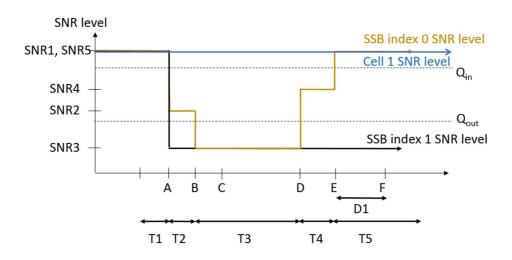


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

A.5.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.5.1-1, A.5.5.1.5.1-2, A.5.5.1.5.1-3 and A.5.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Configuration Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only r	equired to pass in one of the supported test configurations in FR2			

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel I	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex Mode			TDD
TDD Configuration	Config 1		TDDConf.3.1
	Config 2		TDDConf.3.1
DL initial BWP	Config 1, 2		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD
	Config 2		CR.3.1 TDD
	Config 1		CCR.3.4 TDD

Dedicated CORESET			CCR.3.6 TDD
Reference Channel	Config 2		CCR.3.4 TDD
	Coming 2		CCR.3.6 TDD
SSB Configuration	Config 1		SSB.1 FR2
COD Comigaration	Config 2		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
	Config 2		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
- caboarrior opaomig	Config 2		120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration	•		TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for PI	DCCH#1/PDSCH		TCI.State.2
TCI configuration for PI			TCI.State.3
OCNG parameters	30011112		OP.2
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
•	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
T1		S	0.2
T2		S	0.35
T3		S	0.35
D1		S	0.31
Note 1. LIE enceifie!	DDCCH is not transmitted after T1	atarta.	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.5.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Param	neter	Unit	Test 1					
				T1	T2	T3	T1	T2	T3
AoA setu	р				Setup 3 defir		ned in A.3.15		
					AoA1		AoA2		
	on for UE bea				Rough			Rough	
		DMRS to SSS	dB		4				
EPRE rat	io of PDCCH	to PDCCH DMRS	dB						
EPRE rat	io of PBCH D	MRS to SSS	dB						
EPRE rat	io of PBCH to	PBCH DMRS	dB						
EPRE rat	io of PSS to S	SSS	dB						
EPRE rat	io of PDSCH	DMRS to SSS	dB		0			Not sent	
EPRE rat	io of PDSCH	to PDSCH DMRS	dB	Į					
EPRE rat	io of OCNG E	OMRS to SSS	dB						
EPRE rat	io of OCNG to	OCNG DMRS	dB						
SNR on F	RLM-RS1	Config 1, 2	dB	2 ^{Note 11} -6 ^{Note} -15					
SNR on F	RLM-RS2	Config 1, 2			Not sent		2 ^{Note 11}	-14	-15
N_{oc}		Config 1, 2	dBm/ 15kHz		-92.1			-92.1	
Propagati	ion condition			TDL	-A 30ns 7	'5Hz	TDL	-A 30ns 7	'5Hz
Note 1:		be used such that the	resource	s in Cell 2	2 are fully	allocated	and a co	onstant to	tal
		power spectral density							
Note 2:		esources for CSI repor							
Note 3:		S resource set configu	ration for	CSI repor	ting are a	issigned t	o the UE	prior to th	ne start
	of time perio								
Note 4:		nt gap configuration is							aariad
Note 5:	The timers a	and layer 3 filtering rela	ateo parai	meters ar	e conligui	rea prior i	o the star	t of time p	Denoa
Note 6:		contains PDCCH for U					part of C	CNG.	
Note 7:									
Note 8: The SNR in time periods T1, T2 and T			nd T3 is d	lenoted as	s SNR1, S	SNR2 and	l SNR3 re	espectivel	y in
	figure A.5.5.1.5.1-1.								
Note 9:	Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For				or				
testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or									
Note 10:			m is give	n in B.2.1	.ತ, and do	oes not lin	nit UE im	piementai	ion or
Note 11		implementation	dation fra	m applica	I CNID to I	IE booch	and		
Note 11.	Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband								

Table A.5.5.1.5.1-3A: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field	Test 1
	Field	
	gapOffset	0
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is

Table A.5.5.1.5.1-4: Void

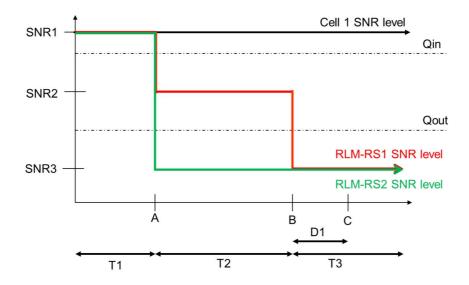


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.6.1-1, A.5.5.1.6.1-2, and A.5.5.1.6.1-3 below. There are two cells, cell 1 which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Configuration	Configuration Description			
1 LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mod				
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.6.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

P	arameter	Unit	Value
	arameter	O.III	Test 1
			10011
Active E-UTRA PO			Cell 1
E-UTRA RF Chan	nel Number		1
Active PSCell			Cell 2
RF Channel Numb	per		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2		TDDConf.3.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration RMSI CORESET Reference	Config 1		CR.3.1 TDD
Channel	Config 2	-	CR.3.1 TDD
Dedicated	Config 1		CCR.3.1 TDD
CORESET	Coming		CCR.3.3 TDD
Reference	Config 2		CCR.3.1 TDD
Channel			CCR.3.3 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier	Config 2	-	120 KHz
spacing			
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
OCNG parameters	3		OP.2
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration to	for PDCCH#1/PDSCH		TCI.State.2
TCI configuration t			TCI.State.3
CP length			Normal
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	4

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
DDV	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: UE-spe Note 2: E-UTRAN	cific PDCCH is not transmitt I is in non-DRX mode under	ed after T1 starts test.	<u> </u>

Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1							
			T1	T2	T3	T4	T5	T1	T2	T3
AoA setup				•	•	Se	tup 3 defi	ned in A.3	.15	•
					AoA1					AoA2
Assumption for UE beams ^{Note 10}					Rough					Rough
EPRE ratio of PDCCI	H DMRS to SSS	dB			0					
EPRE ratio of PDCCI	to PDCCH DMRS	dB								
EPRE ratio of PBCH	DMRS to SSS	dB								
EPRE ratio of PBCH	to PBCH DMRS	dB								
EPRE ratio of PSS to	SSS	dB								
EPRE ratio of PDSCI	EPRE ratio of PDSCH DMRS to SSS				0					Not sent
EPRE ratio of PDSCI	to PDSCH DMRS	dB								
EPRE ratio of OCNG	DMRS to SSS	dB								
EPRE ratio of OCNG	to OCNG DMRS	dB								
SNR on RLM-RS1	Config 1, 2	dB	2 ^{Note 11}	-6 ^{Note}	-15	-4.5	2 ^{Note 11}			
	-			11						
SNR on RLM-RS2	Config 1, 2				Not sent			2 ^{Note 11}	-14	-15
N_{oc}	Config 1, 2	dBm/ 15KHz			-92.1					-92.1
Propagation condition	<u>.</u> 1			TDL	-A 30ns 7	75Hz			TD	L-A 30ns 7

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectra achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in fig 1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supbands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implement
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

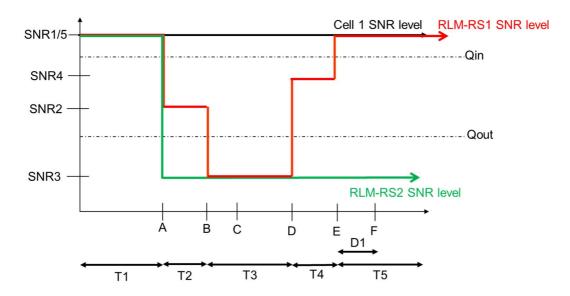


Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.7.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only required to pass in one of the supported test configurations in FR2	

Table A.5.5.1.7.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter	Unit	Value
		Test 1

Activo E LITDA E	Call		Coll 1
Active E-UTRA F E-UTRA RF Cha			Cell 1
Active PSCell	IIII EI INGIIIDEI		Cell 2
RF Channel Num	her		2
Duplex Mode	1001		TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2	1	TDDConf.3.1
DL initial BWP			
configuration	Config 1, 2		DLBWP.0.1
DL dedicated			
BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP	Config 1, 2		ULBWP.0.1
configuration	Coning 1, 2		ULBVVP.U.1
UL dedicated			
BWP	Config 1, 2		ULBWP.1.1
configuration			
RMSI	Config 1		CR. 3.1 TDD
CORESET			
Reference			
Channel			00.04.700
D 11 1 1	Config 2		CR. 3.1 TDD
Dedicated	Config 1		CCR. 3.4 TDD
CORESET	Confin C	4	CCR.3.6 TDD
Reference	Config 2		CCR. 3.4 TDD
Channel	Confin 4		CCR.3.6 TDD
SSB	Config 1	-	SSB.1 FR2
Configuration	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDCC	Config 1		120 KHz
H subcarrier	Config 2		120 KHz
spacing CSI-RS for	Config 1, 2		Resource #4 in TRS.2.1 TDD
	Coning 1, 2		
RLM TPS configuration	<u> </u> n		Resource #4 in TRS.2.2 TDD
TRS configuratio	n		TRS.2.1 TDD
TRS configuratio			TRS.2.1 TDD TRS.2.2 TDD
TRS configuration	for PDCCH#1/PDSCH		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2
TRS configuration TCI configuration TCI configuration	n for PDCCH#1/PDSCH n for PDCCH#2		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3
TRS configuration TCl configuration TCl configuration OCNG paramete	n for PDCCH#1/PDSCH n for PDCCH#2		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1
TRS configuration TCI configuration TCI configuration OCNG paramete CP length	n for PDCCH#1/PDSCH n for PDCCH#2 ers		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal
TRS configuration TCl configuration TCl configuration OCNG paramete	n for PDCCH#1/PDSCH n for PDCCH#2		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync	for PDCCH#1/PDSCH for PDCCH#2 rs DCI format Number of Control		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	for PDCCH#1/PDSCH for PDCCH#2 rs DCI format Number of Control OFDM symbols	CCE	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	for PDCCH#1/PDSCH for PDCCH#2 rs DCI format Number of Control OFDM symbols Aggregation level	CCE	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	for PDCCH#1/PDSCH for PDCCH#2 rs DCI format Number of Control OFDM symbols		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	process of the proces		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	process of the proces		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	n for PDCCH#1/PDSCH n for PDCCH#2 rs DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE		TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	n for PDCCH#1/PDSCH n for PDCCH#2 rs DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	n for PDCCH#1/PDSCH n for PDCCH#2 rs DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A.
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled 0 1000
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity REG bundle size	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled 0 1000 1
TRS configuration TCI configuration TCI configuration OCNG paramete CP length Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB dB	TRS.2.1 TDD TRS.2.2 TDD TCI.State.2 TCI.State.3 OP.1 Normal 1-0 2 8 4 REG bundle size 6 DRX.3 N.A. Enabled 0 1000 1

T1	s	0.2	
T2	S	1.28	
T3	S	1.28	
D1	S	1.24	
Note 1:	UE-specific PDCCH is not transmitted after T1 starts.		
Note 2:	E-UTRAN is in non-DRX mode under test.		

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Para	ameter	Unit		Test 1		
			T1	T2	T3	
AoA setup			Setup 1 defined in A.3.15		3.15	
Assumption for	UE beams ^{Note 10}			Rough		
EPRE ratio of P SSS	DCCH DMRS to	dB		4		
EPRE ratio of P DMRS	DCCH to PDCCH	dB				
EPRE ratio of P SSS	BCH DMRS to	dB				
EPRE ratio of P DMRS	BCH to PBCH	dB				
EPRE ratio of P	SS to SSS	dB	1			
EPRE ratio of PDSCH DMRS to SSS		dB		0		
EPRE ratio of P DMRS	DSCH to PDSCH	dB				
EPRE ratio of C	CNG DMRS to	dB				
EPRE ratio of C	CNG to OCNG	dB				
SNR on RLM- RS1	Config 1, 2	dB	2 ^{Note 11}	-6 ^{Note 11}	-15	
SNR on RLM- RS2	Config 1, 2		2 ^{Note 11}	-14	-15	
N	Config 1	dBm/15KHz	-104.7			
N_{oc}	Config 2		-104.7			
Propagation cor	opagation condition DL-A 30ns 75Hz					

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.7.1-3A: Void

Table A.5.5.1.7.1-4: Void

Table A.5.5.1.7.1-5: Void

Table A.5.5.1.7.1-6: Void

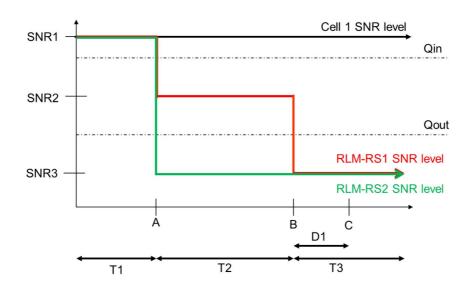


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.8.1-1, A.5.5.1.8.1-2, A.5.5.1.8.1-3 and A.5.5.1.8.1-3A below. There are two cells, cell 1 which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI

reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms).

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The UE is only	The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.8.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active F LITPA DONI			
Active E-UTRA			Cell 1
	nannel Number		1
Active PSCell			Cell 2
RF Channel No	umber		2
Duplex Mode			TDD
TDD	Config 1		TDDConf.3.1
Configuration	Config 2		TDDConf.3.1
DL initial BWP	Config 1, 2		DLBWP.0.1
configuration			
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration	On the A		00.04.700
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD
	Config 2		CR.3.1 TDD
Dedicated CORESET	Config 1		CCR.3.1 TDD CCR.3.3 TDD
Reference Channel	Config 2		CCR.3.1 TDD CCR.3.3 TDD
SSB	Config 1		SSB.1 FR2
Configuration	Config 2		SSB.1 FR2
SMTC	Config 1		SMTC.1
Configuration	Config 2		SMTC.1
PDSCH/PDC	Config 1		120 KHz
CH subcarrier	Config 2		120 KHz
spacing			B #4: =====
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
	on for PDCCH#1/PDSCH		TCI.State.2
	on for PDCCH#2	<u> </u>	TCI.State.3
OCNG parame	eters		OP.1
CP length			Normal
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2

	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to	db	7
	average CSI-RS RE energy		
	avoluge cer ite ite energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average CSI-RS RE energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX	REG buildle size		DRX.3
Gap pattern ID	,		gp0
Layer 3 filterin			gpo Enabled
Layer 3 iliteriir	9		Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for Config 1			CSI-RS.3.1 TDD
CSI reporting Config 2			CSI-RS.3.1 TDD
T1			0.2
T2		S	0.2
T3		S	1.64
T4		S	0.2
T5		S	1.88
D1		S	1.84
Note 1: LIF-	specific PDCCH is not transmitt	od ofter T1 starts	·

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption	for UE beams ^{Note 10}				Rough		
EPRE ratio o	of PDCCH DMRS to	dB			0		
EPRE ratio of DMRS	of PDCCH to PDCCH	dB					
EPRE ratio o	of PBCH DMRS to	dB					
EPRE ratio of DMRS	of PBCH to PBCH	dB					
EPRE ratio	of PSS to SSS	dB	1				
EPRE ratio o	of PDSCH DMRS to	dB	0				
EPRE ratio o	of PDSCH to PDSCH	dB					
EPRE ratio o	of OCNG DMRS to	dB					
EPRE ratio of DMRS	of OCNG to OCNG	dB					
SNR on RLM-RS1	Config 1, 2	dB	2 ^{Note 11}	-6 ^{Note 11}	-15	-4.5	2 ^{Note 11}
SNR on RLM-RS2	Config 1, 2	dB	2 ^{Note 11}	-14	-15	-15	-14
N _{oc} Config 1, 2		dBm/15KHz		•	-104.7		
Propagation condition			TDL-A 30ns 75Hz				
	CNG shall be used such	that the resources	in Cell 2 are	fully allocated	d and a const	ant total tran	smitted

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.8.1-3A: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

	Field	Test 1				
	riela					
	gapOffset	0				
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is				

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

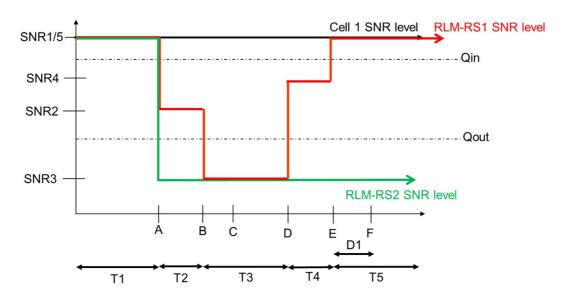


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

Configu	uration	Description		
1		FDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex		
		mode		
2		TDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode		
Note: The	e UE is only red	equired to be tested in one of the supported test configurations.		

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1, 2	1 and 2	1 for NR PSCell and 2 for LTE PCell
SSB configuration		1, 2	SSB.1 FR2	
SMTC configuration		1, 2	SMTC	
			pattern 1	
DRX cycle length	S	1, 2	OFF	
T1	S	1, 2	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Се	II 2
		configuration		
AoA setup		1, 2		ed in A.3.15.3
			AoA1	AoA2
Assumption for UE			Rough	Rough
beams ^{Note 1}				
TDD configuration		1, 2		onf.3.1
BW _{channel}	MHz	1, 2	100: N _F	RB,c = 66
Data RBs allocated		1, 2 1, 2	2	4
PDSCH Reference		1, 2	SR.3.2 TDD	Not sent
measurement				
channel				
RMSI CORESET		1, 2	CR.3.1 TDD	Not sent
RMC configuration				
Dedicated CORESET		1, 2	CCR.3.2 TDD	Not sent
RMC configuration				
TRS configuration		1, 2	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1, 2	TCI.State.2	Not sent
state				
OCNG Pattern		1, 2	OP.5 defined in	Not sent
			A.3.2.1	
Initial DL BWP		1, 2	DLBV	/P.0.1
configuration				
Initial UL BWP		1, 2	ULBWP.0.1	
configuration				
RLM-RS		1, 2	SSB with index	SSB with index
			0	1
N_{oc}	dBm/15kHz	1, 2	-92.1	-92.1
1 voc				
$N_{\!oc}$ Note2	dBm/SCS	1, 2	-83.1	-83.1
1 voc				
\hat{E}_s/N_{oc}	dB	1, 2	2	2
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ BB Note 4	dB	1, 2	1	1
SSB RP Note3	dBm/SCS	1, 2	-81.1	-81.1
lo	dBm/95.04 MHz		-51.1 -54.35	-51.1 -54.35
Time multiplexing		1, 2 1, 2	-04.35	-04.35
transmissions f		1, ∠	Defined in Figu	re A.5.5.1.9.1-1
Propagation	UIII EAUII AUA	1, 2	AWGN	AWGN
Condition		1, ∠	AVVGIN	AVVGIN
Condition				

Note 1: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate

 N_{oc} to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

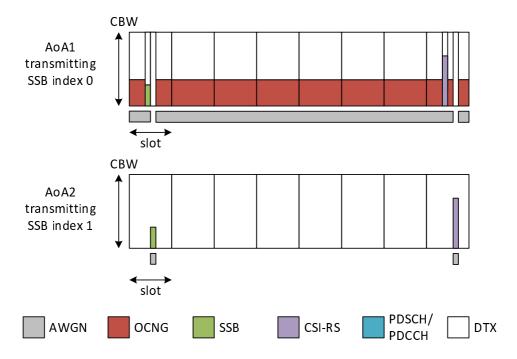


Figure A.5.5.1.9.1-1: Time multiplexed downlink transmissions

A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.5.5.2 Interruption

A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.1.1-1.

The general test parameters are given in Table A.5.5.2.1.1-2, and NR cell specific test parameters are given in Table A.5.5.2.1.1-3 and A.5.5.2.1.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.1.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell on and Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations

Table A.5.5.2.1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.4	DRX related parameters are defined in
		DNA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.5.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range	Frequency Range		FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns	•		OP.1
SSB Configuration			SSB.3 FR2
SMTC Configuration	<u> </u>		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	•	dB	SG.
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			
EPRE ratio of PDCCH to PD			0
EPRE ratio of PDSCH DMR	S to SSS		
EPRE ratio of PDSCH to PD			
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)			
Ê _s /N _{oc}	ING DIVIRS (NOTE 1)	dB	17
LS/ I NOC		ub l	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
	e used such that bo		allocated and a constant total transmitted power

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

	Parameter	Unit	Cell2		
	arrival configuration		Setup 1 according to clause A.3.15.1		
Assumption for UE beams ^{Note}			Fine		
N_{oc} Note	1	dBm/15kHz ^{Note4}	-112		
N_{oc} Note:	1	dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_o	С	dB	17		
SSB_RP	Note2	dBm/SCS Note4	-85.97		
\hat{E}_{s}/I_{ot}		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:	ote 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.				
Note 2:					
Note 3:	·				
Note 4:			Bi gain at the centre of the quiet zone		
Note 5:		Bi gain antenna at the centre			
Note 6:		bes of UE beam is given in B st system implementation	.2.1.3, and does not limit UE		

Table A.5.5.2.1.1-5: Void

A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.2 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.5.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in ENDC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.2.1-1.

The general test parameters are given in Table A.5.5.2.2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.2.1-3 and A.5.5.2.2.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.2.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is o	nly required to be tested in one of the supported test configurations

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.6	DRX related parameters are defined in
		DKA.0	Table A.3.3.6-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.5.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Paramet	er	Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BWchannel	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.3 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR	CH DMRS	dB	
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)			0
EPRE ratio of OCNG to OCNG DMRS (Note 1) Ê _s /N _{oc}		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	62.5
Note 1: OCNG shall be spectral densition	ty is achieved for all	th cells are full OFDM symbo	y allocated and a constant total transmitted power

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

slot timing boundary of PSCell including time alignment error between the two cells

	Parameter	Unit	Cell2	
Angle of	arrival configuration		Setup 1 according to clause A.3.15.1	
Assumpti	ion for UE beams ^{Note}		Fine	
N_{oc} Note:	I	dBm/15kHz ^{Note4}	-112	
N _{oc} Notes	1	dBm/SCS ^{Note3}	-102.97	
\hat{E}_s/N_{od}	2	dB	17	
SSB_RP	Note2	dBm/SCS Note4	-85.97	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	17	
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90	
Note 1:	constant over subcar	rriers and time and shall be n	ot specified in the test is assumed to be nodelled as AWGN of appropriate power	
	for N_{oc} to be fulfille	ed.		
Note 2:	Note 2: SSB_RP and lo levels have been derived from other parameters for information purpose. They are not settable parameters themselves.			
Note 3:				
Note 4:			Bi gain at the centre of the quiet zone	
Note 5:	As observed with 0d	Bi gain antenna at the centre	of the quiet zone	
Note 6:				

Table A.5.5.2.2.1-5: Void

A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.3 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.5.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.3.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.5.5.2.3.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66	66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1	DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1	DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1	ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1	ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR 3.1 TDD	CCR 3.1 TDD
OCNG Patterns			OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBE EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to PBE EPRE ratio of PDSCH DMF EPRE ratio of PDSCH DMF EPRE ratio of PDSCH to PBE EPRE ratio of OCNG DMR EPRE ratio of OCNG to OC	CH DMRS RS to SSS DCCH DMRS RS to SSS DSCH S to SSS(Note 1)	dB	0	0
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	3	3+ Time offset to cell2
Time offset to cell2 Note 3		μs	-	3
N. (4 OONO I III				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table A.5.5.2.3.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Para	ameter	Unit	Cell 2	Cell 3
Angle of arrival conf			Setup 1 defined i	n clause A.3.15.1
Assumption for UE b	oeams ^{Note 6}		Fine	Rough
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{ac} Note1	NR_TDD_FR2_F	dBm/15kHz	-111.7	-104.7
OC .	NR_TDD_FR2_G	UDIII/ IOKIIZ	-111.7	-104.7
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
Note1	NR_TDD_FR2_B	dBm/SCS ^{Note}	-102.7	-95.7
00	NR_TDD_FR2_F	3	-102.7	-93.7
	NR_TDD_FR2_G			

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
SSB_RPNote2	
NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_T NR_TDD_FR2_Y NR_TDD_FR2_Y NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_B	
SSB_RPNote2	
NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y NR_TDD_FR2_A NR_TDD_FR2_B	
NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y NR_TDD_FR2_A NR_TDD_FR2_B	
NR_TDD_FR2_Y NR_TDD_FR2_A NR_TDD_FR2_B	
NR_TDD_FR2_A NR_TDD_FR2_B	
NR_TDD_FR2_B	
\hat{F}/I NR_TDD_FR2_F dB 12 5	
$N_{\rm S}/N_{\rm ot}$ NR_TDD_FR2_G	
NR_TDD_FR2_T	
NR_TDD_FR2_Y	
NR_TDD_FR2_A	
NR_TDD_FR2_B	
\hat{E}_s/N_{oc} NR_TDD_FR2_F dB 12 5	
NR_TDD_FR2_G	
NR_TDD_FR2_T	
NR_TDD_FR2_Y	
NR_TDD_FR2_A	
NR_TDD_FR2_B	
lo ^{Note2} NR_TDD_FR2_F dBm/95.04 -61.45 -60.52	
NR_TDD_FR2_G MHz Note4 -61.45 -60.52	
NR_TDD_FR2_T	
NR_TDD_FR2_Y	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 2: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.5.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-2.

Table A.5.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.4.1-1.

The general test parameters are given in Table A.5.5.2.4.1-2, and NR cell specific test parameters are given in Table A.5.5.2.4.1-3 and A.5.5.2.4.1-4 below. The E-UTRAN cell specific test parameters can be found inTable A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.4.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

Config		Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66	66
Downlink initial BWP Configuration	Config 1,2		DLBWP.	0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.	1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.	0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.	1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD
OCNG Patterns			OP.1	OP.1
SSB Configuration			SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0	0
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	62.5	62.5+ Time offset to cell2
Time offset to cell2 Note 3	-	μs	- clicested and a constant to	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Angle of arrival configuration			Setup 1 defined i	n clause A.3.15.1
Assumption for UE b	eams ^{Note 6}		Fine	Rough
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/15kHz	-111.7	104.7
	NR_TDD_FR2_G	UDIII/ IOKHZ	-111.7	-104.7
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc} Note1	NR_TDD_FR2_F	dBm/SCS ^{Note}	102.7	-95.7
	NR_TDD_FR2_G	3	-102.7	-95.7
	NR_TDD_FR2_T			
	NR_TDD_FR2_Y			

SSB_RP	NR_TDD_FR2_A NR_TDD_FR2_B NR_TDD_FR2_F NR_TDD_FR2_G NR_TDD_FR2_T NR_TDD_FR2_Y	dBm/SCS Note4	-90.7	-90.7	
$\hat{\mathrm{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$		dB	12	5	
Ê _s /N _{oc}		dB	12	5	
Io ^{Note2} NR_TDD_FR2_A		dBm/95.04 MHz ^{Note4}	-61.45	-60.52	
Note 1:	Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				
Note 2: Note 3:	Note 2: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and				
Note 4: Note 5: Note 6:	noise at each receiver antenna port. Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone As observed with 0dBi gain antenna at the centre of the quiet zone Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.5.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-2.

Table A.5.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8.2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

The general test parameters are given in Table A.5.5.2.5.1-2, and NR cell specific test parameters are given in Table A.5.5.2.5.1-3 and A.5.5.2.5.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

Config		Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	te: The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.2.5.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		4 0 0	One is NR RF channel and two are E-
		1, 2, 3	UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle		640	
(measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD
OCNG Patterns	•		OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0
Propagation Condition	INO DIVINO (INOIG I)		AWGN
Time offset to cell1 Note 2		μs	3
Note to CONO aball be weed asset that he		μο h ll f - ll	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.5.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

	Parameter	Unit	Cell2	
	arrival configuration		Setup 1 according to clause A.3.15.1	
Assumpti	ion for UE beams ^{Note}		Fine	
$N_{\!oc}$ Note1	I	dBm/15kHz ^{Note4}	-112	
N_{oc} Note 1	ı	dBm/SCS ^{Note3}	-102.97	
\hat{E}_s/N_{od}	ç	dB	17	
SSB_RP	Note2	dBm/SCS Note4	-85.97	
\hat{E}_{s}/I_{ot}		dB	17	
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90	
Note 1:	Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.			
Note 2:		Is have been derived from ot e parameters themselves.	her parameters for information purposes.	
		requirements are specified a	ssuming independent interference and	
Note 4:	Equivalent power red	ceived by an antenna with 0d	Bi gain at the centre of the quiet zone	
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone				
Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation			.2.1.3, and does not limit UE	

A.5.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.5.2-1.

Table A.5.5.2.5.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.5.2-2: Void

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.6 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.5.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.6.1-1.

The general test parameters are given in Table A.5.5.2.6.1-2, and NR cell specific test parameters are given in Table A.5.5.2.6.1-3 and A.5.5.2.6.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2.

In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.5.5.2.6.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is NR RF channel and two are E-
	1, 2, 3		UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OFF	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	s	10	

Table A.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
	Duplex mode Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD
OCNG Patterns	•		OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0
Propagation Condition	2111110 (11010 1)		AWGN
Time offset to cell1 Note 2		μs	62.5
Nata 4: OONO ab all b	d l- 4l 4 l 4		-11

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

	Parameter	Unit	Cell2			
	arrival configuration		Setup 1 according to clause A.3.15.1			
Assumpti	ion for UE beams ^{Note}		Fine			
$N_{\!oc}$ Note1		dBm/15kHz ^{Note4} -				
$N_{oc}^{ m Note1}$		dBm/SCS ^{Note3}	-102.97			
\hat{E}_s/N_{od}	;	dB	17			
SSB_RP	Note2	dBm/SCS Note4	-85.97			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17			
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90			
Note 1:		riers and time and shall be n	ot specified in the test is assumed to be nodelled as AWGN of appropriate power			
Note 2:	SSB_RP and lo leve They are not settable	Is have been derived from ot parameters themselves.	her parameters for information purposes.			
Note 3:	SS-RSRP minimum noise at each receive	requirements are specified assuming independent interference and rer antenna port.				
		ceived by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:		Bi gain antenna at the centre of the quiet zone				
Note 6:		pes of UE beam is given in B.2.1.3, and does not limit UE est system implementation.2.1.3, and does not limit UE implementation mentation				

A.5.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.6.2-1.

Table A.5.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.6.2-2: Void

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.3 SCell Activation and Deactivation Delay

A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1 except the SCell is in FR2 intraband.

The supported test configurations are shown in table A.5.5.3.1.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.1.1-2 and A.5.5.3.1.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

In this test it is assumed that the UE is receiving RRC messages pertaining to the SCell in SCG via signaling on SRB3.

Table A.5.5.3.1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell

Configuration	Description
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to pass in one of the supported test configurations

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell

Paramet	er Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell

ParameterNote 5	l lmi4	Cell 2			Cell 3		
Parameter	Unit	T1	T2	T3	T1	T2	T3

SSB ARFCN		freq1	freq2	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	
Data RBs allocated		66	66	
PDSCH Reference measurement channel		SR.3.1 TDD	SR.3.1 TDD	
RMSI CORESET Reference Channel		CR.3.1 TDD	CR.3.1 TDD	
RMC CORESET Reference Channel		CCR.3.1 TDD	CCR.3.1 TDD	
DL initial BWP configuration		DLBW	VP.0.1	
DL dedicated BWP configuration		DLBV	VP.1.1	
UL initial BWP configuration		ULBV	VP.0.1	
UL dedicated BWP configuration		ULBV	VP.1.1	
OCNG Patterns		<u> </u>	P.1	
SMTC configuration		SM	ΓC.1	
SSB configuration			1 FR2	
TCI state		TCI.S	state.0	
TRS configuration		TRS.2.1 TDD		
CSI-RS configuration for CSI reporting		CSI-RS.	3.1 TDD	
reportQuantity		cri-RI-PMI-CQI	N/A	
CSI reporting periodicity	slot	40	N/A	
CSI reporting offset	slot	4	N/A	
PDSCH/PDCCH subcarrier spacing	kHz	12	20	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB		0	
EPRE ratio of PDSCH_DMRS to SSS	uБ	`	5	
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note				
1				
Propagation conditions		AW	'GN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

Parameter ^{Note 6}	Unit	Cell 2			Cell 3		
Farameter	Unit	T1	T2	Т3	T1	T2	T3

Angle of arrival configuration		Setup 1 accord	ling to A.3.15.1
Assumption for UE beams ^{Note 7}		Rough	Rough
$N_{_{\!OC}}$ Note1	dBm/15kHz ^N	-104.7	-104.7
$N_{oc}^{}$ Note1	dBm/SCS ^{Note}	-95.7	-95.7
\hat{E}_s/N_{oc}	dB	7	7
SSB_RPNote2	dBm/SCS Note4	-88.7	-88.7
\hat{E}_{s}/I_{ot}	dB	7	7
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-58.92	-58.92

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: Void
- Note 6: All parameters apply for configuration 1 and 2
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.5.3.1.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case.

A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2

Configuration	Description
1	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to pass in one of the supported test configurations

Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell

Parameter	Unit	Cell 2	Cell 3

SSB ARFCN			T1 T2 T3	T1 T2 T3 freq1
33D ARFUN	Config 1,4		freq2 TDD	FDD
Duplex mode	Config 2,3,5,6	1	TDD	TDD
			100	
	Config 1,4			Not Applicable
TDD configuration	Config 2,5		TDDConf.3.1	TDDConf.1.1
	Config 3,6			TDDConf.2.1
	Config 1,4			10: N _{RB,c} = 52
BW _{channel}	Config 2,5	MHz	100: N _{RB,c} = 66	10: N _{RB,c} = 52
2 T Gridinion	Config 3,6	1	1.001.11(1.0),0	40: N _{RB,c} = 106
	•			
	Config 1,4	-		52
Data RBs allocated	Config 2,5		66	52
	Config 3,6			106
DL initial BWP	Config		DLBV	VP.0.1
configuration	1,2,3,4,5,6			
DL dedicated BWP configuration	Config 1,2,3,4,5,6		DLBV	VP.1.1
UL initial BWP	Config			
configuration	1,2,3,4,5,6		ULBV	VP.0.1
UL dedicated BWP	Config			
configuration	1,2,3,4,5,6		ULBV	VP.1.1
DRX Cycle		ms	Not Ap	pplicable
<u> </u>	Config 1,4			SR.1.1 FDD
PDSCH Reference	Config 2,5	1	SR.3.1 TDD	SR.1.1 TDD
measurement channel	Config 3,6			SR.2.1 TDD
DMOI CODECET	Config 1,4			CR.1.1 FDD
RMSI CORESET	Config 2,5	1	CR.3.1 TDD	CR.1.1 TDD
Reference Channel	Config 3,6	1		CR.2.1 TDD
DMC CODECET	Config 1,4			CCR.1.1 FDD
RMC CORESET Reference Channel	Config 2,5		CCR.3.1 TDD	CCR.1.1 TDD
Reference Charmer	Config 3,6			CCR.2.1 TDD
OCNG Patterns			1	P.1
SMTC configuration				TC.1
TCI state	1000		TCI.State.0	NA TO COLO TO TO TO TO TO TO TO TO TO TO TO TO TO
TD0 " "	Config 1,4	1	TD0 0 4 TDD	TRS.1.1 FDD
TRS configuration	Config 2,5	4	TRS.2.1 TDD	TRS.1.1 TDD
	Config 3,6			TRS.1.2 TDD
SSB configuration	Config 1,2,4,5 Config 3,6	-	SSB.1 FR2	SSB.1 FR1 SSB.2 FR1
-	Config 1,4			CSI-RS.1.1 FDD
CSI-RS configuration		-		
for CSI reporting	Config 2,5		CSI-RS.3.1 TDD	CSI-RS.1.1 TDD
	Config 3,6			CSI-RS.2.1 TDD
PDSCH/PDCCH	Config 1,2,4,5	kHz	120kHz	15kHz
subcarrier spacing	Config 3,6	IXI IZ		30kHz
reportConfigType	Config 1-6		periodic	N/A
reportQuantity	Config 1-6		cri-RI-CQI	N/A
CSI reporting periodicity	Config 1,2,3,4,5,6	slot	40	N/A
•	1,2,3,4,5,6 Config		_	
CSI reporting offset	1,2,3,4,5,6	slot	4	N/A
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS		4		
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH		4		
		dB		0
		ub ub		U
		†		
EPRE ratio of OCNG DMR		1		
EPRE ratio of OCNG to OC				
			AWGN	NA
Propagation condition		-		Link only, see clause
				A.3.7A

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2.]

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit		Cell 2			Cell 3	
		Unit	T1	T2	T3	T1	T2	T3
Angle of arrival cor	nfiguration		Setup 1 according to clause A.3.15.1					
Assumption for UE	beams ^{Note 7}			Rough				
$N_{oc}^{}$ Note1		dBm/15kHz		-104.7				
N_{oc} Note1	Config 1,2,4,5 Config 3,6	dBm/SCS		-95.7				
SSB_RPNote2	Config. 4. 0. 4. F		-88.7		NA Link only, see clause A.3.7A			
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB	7		A.S.7A			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB		7				
IoNote2	Config 1,2,4,5	dBm/ChBw ^N		-58.92				
10 ^{Note2}	Config 3,6	ote4,Note6	-58.92					

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be fulfilled.

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: ChBW is 95.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test

system implementation

A.5.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, with the following exceptions:

- Placement of interruptions is only verified in NR PSCell.

A.5.5.3.3 Void

A.5.5.3.4 Void

A.5.5.3.5 SCell Activation and deactivation of SCell in FR2

A.5.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.5.1-1 below. The test parameters are the same as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.5.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.5.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot $m+T_{L1-RSRP}$. In the next DL slot after slot $m+T_{L1-RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.5.5.3.5.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

Configuration	Description
1	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
5	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
6	LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE i	is only required to be tested in one of the supported test configurations

Table A.5.5.3.5.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

Parameter	Unit	Value	Comment
Active PCell			Primary cell on E-UTRAN RF channel
		Cell 1	number 1.
			As specified in clause A.3.7.2.2
T2	6	2	During this time the UE shall activate the
	3	2	SCell.

Table A.5.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit		Cell 2		Cell 3		
		Onit	T1	T2	Т3	T1	T2	Т3
SSB ARFCN			freq1		freq2			
Dunlay made	Config 1,4			FDD			TDD	
Duplex mode	Config 2,3,5,6			TDD			TDD	

<u></u>	T	1	T	1	
	Config 1,4		Not Applicable		
TDD configuration	Config 2,5		TDDConf.1.1	-	TDDConf.3.1
	Config 3,6		TDDConf.2.1		
	Config 1,4		10: N _{RB,c} = 52		
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52	1	00: N _{RB,c} = 66
	Config 3,6		40: N _{RB,c} = 106		
Data RBs allocated	Config 1,4		52		66
	Config 2,5		52	1	
	Config 3,6		106	1	
	Config 1,4		10: N _{RB,c} = 52		
BWP BW	Config 2,5		10: N _{RB,c} = 52	1 1	00: N _{RB,c} = 66
J J	Config 3,6	_	40: $N_{RB,c} = 106$	·	00.14KB,c = 00
DRx Cycle	Coming 5,5	ms	·	l plicable	
DIX Oycie	Config 1 4	1113	SR.1.1 FDD	T	
PDSCH Reference	Config 1,4 Config 2,5	-	SR.1.1 TDD	4	SR.3.1 TDD
measurement channel	Config 3,6	-	SR.2.1 TDD	-	3K.3.1 1DD
			CR.1.1 FDD		
RMSI CORESET	Config 1,4	-		-	CR.3.1 TDD
Reference Channel	Config 2,5 Config 3,6	-	CR.1.1 TDD	-	CR.3.1 100
			CR.2.1 TDD CCR.1.1 FDD		
RMC CORESET Reference Channel	Config 1,4		CCR.1.1 FDD	000 04 TDD	
	Config 2,5			CCR.3.1 TDD	
OCNG Patterns	Config 3,6		CCR.2.1 TDD	<u> </u> P.1	
SMTC configuration				TC.1	
TCI state				NA TCI.State.0	
TOTSIALE	Config 1,4		TRS.2.1 TDD		TOI.Glate.0
TRS configuration	Config 2,5		TRS.1.1 TDD	TRS.2.1 TDD	
Tro comiguration	Config 3,6		TRS.1.2 TDD	†	11(0.2.1 100
	Config 1,2,4,5		SSB.1 FR1		
SSB configuration	Config 3,6		SSB.2 FR1		SSB.1 FR2
PDSCH/PDCCH	Config 1,2,4,5	I/LI=	15 kHz		120 kH=
subcarrier spacing	Config 3,6	kHz	30 kHz		120 kHz
CSI-RS configuration	Config 1~6		NA	NA	CSI-RS.3.1 TDD Note 5
CSI reporting periodicity Note 6	Config 1~6	ms	NA		5
EPRE ratio of PSS to SSS	1			1	
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PB					
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		<u> </u>		•	
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		dB		0	
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH		-			
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)		1			
EPRE ratio of OCNG to OC		1			
	- ()		N/A		
Propagation condition		-	Link only, see clause		AWGN
			A.3.7A		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Void

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T_{L1-RSRP} during T2.

Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.

Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit	Cell 2			Cell 3		
		Unit	T1	T2	T3	T1	T2	Т3
Angle of arrival co			NA		Setup 1 according to clause A.3.15.1			
Assumption for U	JE beams ^{Note 7}			NA			Rough	
N_{oc} Note1		dBm/15kHz	-104.7					
N_{oc} Note1	Config 1,2,4,5 Config 3,6	dBm/SCS	Link only, see clause A.3.7A		-95.7			
SSB_RPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3			-∞	-88.7	-88.7	
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB			-∞	7	7	
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB				-∞	7	7
Io ^{Note2, Note 4}	Config 1,2,4,5	dBm/95.04				-66.68	-58.92	-58.92
	Config 3,6	MHz				-00.08	-30.92	-30.92

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: Void
- Note 6: Void
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.5.3.5.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PSCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot $(m+T_{L1-RSRP})$, where $T_{L1-RSRP}$ is no larger than

$$3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}}$$

as defined in clause 8.3.2. For this test case, $T_{FirstSSB_MAX} = T_{SMTC_MAX} = T_{rs} = 20ms$; $T_{L1-RSRP, measure} = 480ms$ and $T_{L1-RSRP, measure} = 5ms$, which allows $T_{L1-RSRP}$ 1000ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \ slot \ length}$, where

- T_{HARQ} is defined in Table A.5.5.3.1.1-2
- $-T_{activation_time} = 3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + max \; \{(T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), \; (T_{uncertainty_RRC} + T_{RRC_delay})\}, \; which \; allows \; 1030ms \; T_{SMTC_MAX} + T_{SMTC_max}$
- T_{CSI_Reporting} = 10ms
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$ to $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}$, and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$ to subframe $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}$, as defined in clause 8.3, where $T_{\rm X}$ =20ms, and m_1 and m_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n + $1 + \frac{T_{\text{HARQ}}}{NR \ slot \ length}$ to n + $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{NR \ slot \ length}$, as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \ subframe \ length}$ to subframe n₂ + $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{EUTRA \ subframe \ length}$, where n₁ and n₂ are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The interruption of PSCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 8.2.1.2.10.

The interruption of PCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 7.32.2.5 of TS 36.133 [50].

A.5.5.4 Void

A.5.5.5 Beam Failure Detection and Link recovery procedures

A.5.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.1.1-1, A.5.5.5.1.1-2, A.5.5.5.1.1-3 and A.5.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.5.5.5.1.1-1: Supported test configurations for FR2 PSCell

Configur	ation	Description		
1		LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		
2		LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

D	1.1 !4	\\ - I	0 1
Parameter	Unit	value	Comment

	Test 1	

Active F-l	UTRA PCell			Cell 1	
E-UTRA RF Channel Number				1	
Active PC	Cell			Cell 2	
	nel Number			2	
Duplex mode Config 1, 2				TDD	
BW _{channel} Config 1, 2			100: N _{RB,c} = 66		
DL initial		Config 1, 2		DLBWP.0.1	
configuration		2		DI DIVID 4.4	
		Config 1, 2		DLBWP.1.1	
configuration		Config 1, 2		ULBWP.0.1	
configurat		Johny 1, 2		OLBWF.U.1	
	ated BWP (Config 1, 2		ULBWP.1.1	
configurat		301111g 1, 2		OLDWI III	
TDD Con		Config 1, 2		TDDConf.3.1	
CORESE		Config 1, 2		CR.3.1 TDD	
Reference	e Channel	5 ,			
SSB Conf		Config 1, 2		SSB.1 FR2	
SMTC		Config 1, 2		SMTC.3	
Configura					
PDSCH/F		Config 1, 2		120 KHz	
subcarrie					
PRACH		Config 1, 2		FR2 PRACH configuration 2	A.3.8.3
Configura					
	x assigned as			0	
		CBD RS (q ₁)		1	
TCI Confi		Config 1, 2		TCI.State.0	
OCNG pa				OP.1	
	CP length			Normal	
Beam				1-0	
failure	Number of Control OFDM			2	
detecti on	symbols				
transmi	Aggregation level		CCE	8	
ssion	Aggregation level		CCL	0	
param					
eters					
	Ratio of hypo	othetical	dB	0	
	PDCCH RE	energy to			
	average SSS	RE energy			
l	Ratio of hypo	othetical	dB	0	
	PDCCH DMF				
	average SSS	RE energy			
l L					
	DMRS preco	der granularity		REG bundle size	
	- الحريب	oizo	 	6	+
DDV	REG bundle	217A		6	
DRX Gap patte	arn ID			OFF and	
				gp0 0	
gapOffset	t cOutOfSyncTh	preshold		absent	When the field is
minioyile		ii GƏLIÜlÜ		สมอธาน	absent, the UE
					applies the value 0.
					(Table 8.1.1-1).
rsrp-Thres	sholdSSB		dBm/SCS	-94.5	Threshold used for
	-		kHz		Qin_LR_SSB
powerControlOffsetSS			db0	Used for deriving	
·				rsrp-ThresholdCSI-	
				RS	
beamFailureInstanceMaxCount			n1	see TS 38.321 [7],	
				clause 5.17	
beamFail	ureDetectionT	imer		pbfd4	see TS 38.321 [7],
001.50	·	10 " 1	ļ	001 00 0 4 700	clause 5.17
	onfiguration fo			CSI-RS.3.1 TDD	
CSI repor		2		TCI.State.0	TCI.State.0
TCI states	e				

CSI-RS for tracking C	Config 1,	TRS.2.1 TDD	
SSB index assigned as RLM I	RS	0, 1	
T310 Timer	ms	1000	
N310		2	
T1	s	1	During this time the the UE shall be fully synchronized to cell 1
T2	S	2.61	
T3	S	1.64	
T4	S	0	
T5	S	1.01	
D1	S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	r	Unit	Test 1				
			T1	T2	Т3	T4	T5
AoA setup				Setup 1	defined in	A.3.15	•
Assumption for UE beam	s ^{Note 10}			•	Rough		
EPRE ratio of PDCCH DI	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB	1				
EPRE ratio of PBCH DMI	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB	1				
EPRE ratio of PDSCH DI	MRS to SSS	dB	1				
EPRE ratio of PDSCH to	PDSCH DMRS	dB	1				
EPRE ratio of OCNG DM	RS to SSS	dB	1				
EPRE ratio of OCNG to 0	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
	Config 2		5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	SCS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
N	Config 1	dBm/120			-104.7		
N_{oc}		KHz					
	Config 2				-104.7		
Propagation condition	•			TDI	A 30ns 75	5Hz	

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.1.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.1.1-4: Void

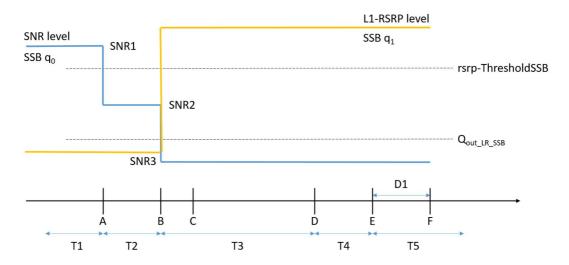


Figure A.5.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in DRX mode

A.5.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.2.1-1, A.5.5.5.2.1-2, A.5.5.5.2.1-3, A.5.5.5.2.1-4 and A.5.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based

beam failure. Figure A.5.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCSell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Description					
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					
2	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
Note: The UE is only	Note: The UE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.5.2.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Param	eter	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channe			1	
Active PCell	or runnor		Cell 2	
RF Channel Numbe	r		2	
Duplex mode	Config 1, 2		TDD	
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66	
Data RBs	Config 1, 2		66	
allocated				
DL initial BWP	Config 1, 2		DLBWP.0.1	
configuration				
DL dedicated	Config 1, 2		DLBWP.1.1	
BWP configuration				
UL initial BWP	Config 1, 2		ULBWP.0.1	
configuration				
UL dedicated	Config 1, 2		ULBWP.1.1	
BWP configuration	0 " 1 0			
TDD Configuration	Config 1, 2		TDDConf.3.1	
RMSI CORESET	Config 1		CR.3.1 TDD	
Reference Channel	Config 2		CR.3.2 TDD	
SSB Configuration	Config 1		SSB.1 FR2	
	Config 2		SSB.2 FR2	
SMTC	Config 1, 2		SMTC.3	
Configuration				
PDSCH/PDCCH	Config 1, 2		120 KHz	
subcarrier spacing	Corning 1, 2		120 1112	
outcurrer opacing				
PRACH	Config 1, 2		FR2 PRACH configuration 2	A.3.8.3
Configuration			-	
SSB index assigned	I as BFD RS (q ₀)		0	
SSB index assigned	I as CBD RS (a ₁)		1	
	,			
TCI Configuration	Config 1, 2		TBD	
OCNG parameters	1		OP.1	
CP length			Normal	
DCI forma	ıt		1-0	
Number o	f Control OFDM		2	
symbols				

Beam	Aggregation le	vel	CCE	8	
failure	Ratio of hypoth		dB	0	
detecti	PDCCH RE en			· ·	
on	average SSS RE energy				
transm	3	3,			
ission	Ratio of hypoth	netical	dB	0	
param	PDCCH DMRS			· ·	
eters	average SSS F	RE eneray			
	3	3,			
	DMRS precode	er		REG bundle size	
	granularity				
	REG bundle si	ze		6	
DRX				DRX.3	A.3.3.3
Gap pat	tern ID			N.A.	
	ncOutOfSyncThr	eshold		absent	When the field is
	,				absent, the UE
					applies the value 0.
					(Table 8.1.1-1).
rsrp-Thr	esholdSSB	Config 1	dBm/SS	-94.5	Threshold used for
		Config 2	B SCS	-91.5	Q _{in_LR_SSB}
powerCo	ontrolOffsetSS			db0	Used for deriving
ļ ·					rsrp-ThresholdCSI-
					RS
beamFa	ilureInstanceMa	xCount		n1	see TS 38.321 [7],
					clause 5.17
beamFa	ilureDetectionTir	mer		pbfd4	see TS 38.321 [7],
					clause 5.17
	configuration	Config 1,		CSI-RS.3.1 TDD	A.3.14.2
	reporting	2			
TCI state	es			TCI.State.0	TCI.State.0
CSI-RS	for tracking	Config 1,		TRS.2.1 TDD	
		2			
	ex assigned as F	RLM RS		0, 1	
T310 Tir	mer		ms	1000	
N310				2	
T1			S	1	During this time the
					the UE shall be
					fully synchronized
					to cell 1
T2		S	3.37		
T3			S	2.8	
T4			S	0	
T5			S	0.61	
D1			S	0.57	
Note 1:	UE-specific P	DCCH is not	transmitted after	T1 starts.	

Table A.5.5.5.2.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Paramete	r	Unit	Test 1				
			T1	T2	Т3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beam	s ^{Note 10}				Rough		
EPRE ratio of PDCCH DI	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB					
EPRE ratio of PDSCH DI	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to 0	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
	Config 2		5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/SSB	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
N_{oc}	Config 1	dBm/120 KHz			-104.7		
	Config 2				-104.7		
Propagation condition				TDI	A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.2.1-4: Void

Table A.5.5.5.2.1-5: Void

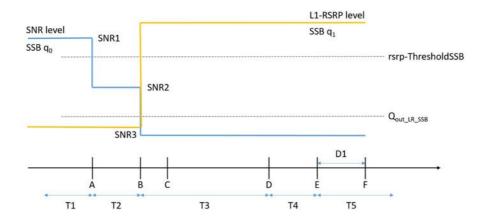


Figure A.5.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.5.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.5.5.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.3.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment	
, aramo			Test 1		
A (' E LITDA DO II			0 11.4		
Active E-UTRA PCell			Cell 1		
E-UTRA RF Channel N	umber		1		
Active PSCell			Cell 2		
RF Channel Number			2		
Duplex mode	Config 1		TDD		
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66		
Data RBs allocated	Config 1		66		
TDD Configuration	Config 1		TDDConf.3.1		
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2	
SSB Configuration	Config 1		SSB.1 FR2	A.3.10	
SMTC Configuration	Config 1		SMTC.3	A.3.11	
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	-	
PRACH Configuration	Config 1		FR2 PRACH configuration 4	A.3.8.3	
csi-RS-Index assigned detection RS in set qo	as beam failure		0		
TRS configuration			TRS.2.1 TDD		
PDSCH/PDCCH TCI st	ate		TCI.State.2		
OCNG parameters			OP.1	A.3.2.1	
CP length			Normal	71101211	
Beam failure	DCI format		1-0		
detection transmission parameters	Number of Control OFDM symbols		2		
paramotoro	Aggregation level	CCE	8		
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0		
	DMRS precoder granularity		REG bundle size		
	REG bundle size		6		
DRX			OFF		
Gap pattern ID			N.A.		
csi-RS-Index assigned beam detection RS in s			1		
rlmlnSyncOutOfSyncTh			absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).	

rsrp-ThresholdSSB	dBm/SC	-94.5	Threshold used
	S kHz		for Q _{in_LR_SSB}
powerControlOffsetSS		db0	Used for deriving
			rsrp-
			ThresholdCSI-RS
beamFailureInstanceMaxCount		n1	see TS 38.321 [7],
			clause 5.17
beamFailureDetectionTimer		pbfd4	see TS 38.321 [7],
			clause 5.17
CSI-RS configuration Config 1		CSI-RS.3.2 TDD	A.3.14.2
for q ₀ and q ₁			
CSI-RS configuration Config 1		CSI-RS.3.1 TDD	A.3.14.2
for CSI reporting			
csi-RS-Index Config 1		CSI-RS.3.2 TDD	A.3.14.2
assigned as RLM RS			
T310 Timer	ms	1000	
N310		2	
T1	S	1	During this time
			the the UE shall
			be fully
			synchronized to
			cell 1
T2	S	1.17	
T3	S	0.9	
T4	S	0	
T5	S	0.31	
D1	_	0.27	
<u> </u>	S	0.27	

Table A.5.5.3.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5

AoA setu			Setup 1	I defined in	A.3.15				
Assumption for UE beams ^{Note 10}				Rough					
EPRE ratio of PDCCH DMRS to SSS			dB	0					
EPRE rat	EPRE ratio of PDCCH to PDCCH DMRS								
EPRE rat	io of PBCH DMRS	S to SSS	dB						
EPRE rat	io of PBCH to PB	CH DMRS	dB						
EPRE rat	io of PSS to SSS		dB						
EPRE rat	io of PDSCH DMI	RS to SSS	dB						
EPRE rat	io of PDSCH to P	DSCH DMRS	dB						
EPRE rat	io of OCNG DMR	S to SSS	dB						
EPRE rat	io of OCNG to OC	CNG DMRS	dB						
SNR_CSI	l-RS of set q₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12	
SNR_CSI	I-RS of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2	
CSI-RS_F	RP of set q ₁	Config 1	dBm/S	S -104.5 -104.5 -84.5 -84.5			-84.5		
			CS kHz						
N_{oc}		Config 1	dBm/15	-104.7					
¹ V _{oc}			KHz						
Propagati	on condition			TDL-A 30ns 75Hz					
Note 1:		used such that the					constant to	otal	
		er spectral density							
Note 2:		urces for CSI repo							
Note 3:		source set configu	ration for C	SI reporting	g are assigr	ned to the ${\sf l}$	JE prior to	the start	
	of time period T	1.							
Note 4:	Void		_						
Note 5:		layer 3 filtering rela	ated param	eters are c	onfigured p	rior to the s	start of time	period	
NI-4- C	T1.	: DD0011411				_4	4 00NO		
Note 6:		ains PDCCH for U						The CND	
Note 7:		espond to the sign							
	in time periods 7	i i s is dend	ned as Sivi	KI, SINKZ 8	ina sinks i	espectively	in ligure		
A.5.5.5.3.1-1. Note 9: The SNR values are specified for testing a UE which supports 2R					nnorte 2PY	on at least	one hand	For	
Note 3.		which supports 4R							
	clause A.3.6.	willou supports 411	A on an ba	iius, iiie oi	in during i	o io modilie	ou as speci	iica iii	
Note 10:		ut types of UE bea	am is given	in B.2.1.3	and does n	ot limit UF	implement	ation or	
1,1010 10.		a. 1, poo o, o e boo	10 9. 1011	D.2. 1.0,	aa acco 11	5. III III 5L		4	

Table A.5.5.5.3.1-4: Void

Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.3.1-5: Void

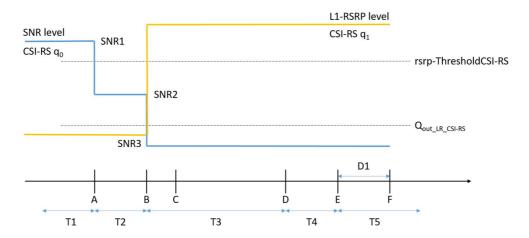


Figure A.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.3.2 Test Requirements

test system implementation

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.5.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description			
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			

Table A.5.5.5.4.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channel Nu	ımber		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1		TDD	
BW _{channel}	Config 1	MHz	100: $N_{RB,c} = 66$	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference	Config 1		CR.3.1 TDD	A.3.1.2
Channel				
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11

<u> </u>	T	1		1
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing				
PRACH Configuration Config 1			FR2 PRACH	A.3.8.3
		configuration 4		
csi-RS-Index assigned as	s beam failure		0	
detection RS in set q ₀			TD0 0 4 TDD	
TRS configuration			TRS.2.1 TDD	
PDSCH/PDCCH TCI stat	ie		TCI.State.2	
OCNG parameters			OP.1	A.3.2.1
CP length	T =		Normal	
Beam failure detection	DCI format		1-0	
transmission	Number of		2	
parameters	Control OFDM			
	symbols	005		
	Aggregation	CCE	8	
	level	15	•	
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-RS			
	RE energy Ratio of	40	0	
		dB	0	
	hypothetical PDCCH DMRS			
	energy to			
	average CSI-RS			
	RE energy DMRS precoder		REG bundle size	
			KEG buildle Size	
	granularity REG bundle		6	
	size		Ö	
DRX	SIZE		DRX.3	A.3.3.3
Gap pattern ID			N.A.	A.J.J.J
csi-RS-Index assigned as	s candidate heam		1	
detection RS in set q ₁	s candidate beam		'	
rlmInSyncOutOfSyncThre	eshold		absent	When the field is
Tilling yncodiolognic filit	531101U		absent	absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm/S	-94.5	Threshold used
		CS kHz		for Qin LR SSB
powerControlOffsetSS			db0	Used for deriving
pomor commercine			3.0 0	rsrp-
				ThresholdCSI-RS
beamFailureInstanceMax	Count		n1	see TS 38.321 [7],
				clause 5.17
beamFailureDetectionTin	ner		pbfd4	see TS 38.321 [7],
			,	clause 5.17
CSI-RS configuration	Config 1		CSI-RS.3.2 TDD	A.3.14.2
for q ₀ and q ₁				
CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
for CSI reporting				
csi-RS-Index assigned	Config 1		CSI-RS.3.2 TDD	A.3.14.2
as RLM RS				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time
				the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	5.43	
T3		S	5.16	
T4		S	0	
T5		S	0.31	
		s	0.27	
D1		3	V. <u>-</u> .	

Note 1: UE-specific PDCCH is not transmitted after T1 starts.

Table A.5.5.5.4.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter				Test 1		
		T1	T2	Т3	T4	T5
			Setup ²	defined in	A.3.15	
Note 10				Rough		
IRS to SSS	dB			0		
PDCCH DMRS	dB					
S to SSS	dB					
BCH DMRS	dB					
EPRE ratio of PSS to SSS						
IRS to SSS	dB					
PDSCH DMRS	dB					
RS to SSS	dB					
CNG DMRS	dB					
Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
Config 1	dB	0.2	0.2	20.2	20.2	20.2
Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
	CS kHz					
N_{oc} Config 1				-104.7		
TV _{oc}						
			TDI	-A 30ns 7	5Hz	
	PDCCH DMRS S to SSS BCH DMRS S IRS to SSS PDSCH DMRS RS to SSS CNG DMRS Config 1 Config 1 Config 1 Config 1	RRS to SSS	Note 10	Setup 1	Setup 1 defined in Rough R	Setup 1 defined in A.3.15 Rough Rough

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.4.1-4: Void

Table A.5.5.5.4.1-5: Void

Table A.5.5.5.4.1-6: Void

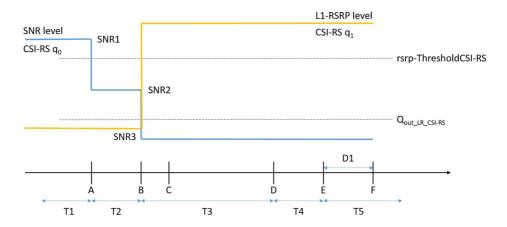


Figure A.5.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.5.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.5 EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements for SSB based beam failure detection and link recovery for an FR2 serving cell in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.5.5.5.5.1-1, A.5.5.5.5.1-2 and A.5.5.5.5.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.1-3 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.5.1-3 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall

be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.5.5.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.5.5.5.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit Value		Comment		
			Test 1			
Active E-UTRA PCell			Cell 1			
E-UTRA RF Channel Number			1			
Active PSCell			Cell 2			
RF Channel Number			2			
Duplex mode	Config 1,2		TDD			
BW _{channel}	Config 1,2	MHz	100: $N_{RB,c} = 66$			
Data RBs allocated	Config 1,2		66			
TDD Configuration	Config 1,2		TDDConf.3.1			
DL initial BWP configuration	Config 1, 2		DLBWP.0.1			
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1			
UL dedicated BWP	Config 1, 2		ULBWP.1.1			
configuration CORESET Reference	Config 1,2		CR.3.1 TDD			
Channel	2 " 12		205 / 552			
SSB Configuration	Config 1,2		SSB.1 FR2			
SMTC Configuration	Config 1,2		SMTC.1			
PDSCH/PDCCH subcarrier spacing	Config 1,2		120 KHz			
PRACH Configuration	Config 1,2		FR2 PRACH	A.3.8.3		
			configuration 2			
SSB index assigned as BFI			0			
SSB index assigned as CBI	O RS (q ₁)		1			
TRS configuration			TRS.2.1 TDD			
TCI configuration			TCI.State.0 OP.1			
OCNG parameters			Normal			
CP length Beam failure detection	DCI format		1-0			
transmission parameters	Number of		2			
transmission parameters	Control OFDM symbols		۷			
	Aggregation level	CCE	8			
	Ratio of	dB	0			
	hypothetical					
	PDCCH RE					
	energy to					
	average SSS RE					
	energy					
	Ratio of hypothetical	dB	0			
	PDCCH DMRS energy to					
	average SSS RE					
	energy					
	DMRS precoder		REG bundle size			
	granularity REG bundle size		6			
DRX	L VER DRITITIE SIZE		6 OFF	DRX is not in use		
Gap pattern ID			N.A.	No measurement gap		
				pattern is configured		
ssb-Index			2	Number of SSB indexes used for beam failure detection		
rlmInSyncOutOfSyncThresh	nold		absent	When the field is absent, the UE applies the value 0.		
				(Table 8.1.1-1).		
rsrp-ThresholdSSB		dBm/SC	-94.5	Threshold used for		
		S kHz		$Q_{in_LR_SSB}$		

powerControlOffsetSS		db0	Used for deriving rsrp-	
				ThresholdCSI-RS
beamFailureInstanceMaxCo		n1	see TS 38.321 [7], clause	
				5.17
beamFailureDetectionTime	r		pbfd4	see TS 38.321 [7], clause
				5.17
CSI-RS Configuration for	Config 1, 2		CSI-RS.3.1 TDD	A.3.14.2
reporting				
T310 Timer	•	ms	1000	
N310			2	
T1		S	1	During this time the UE shall
				be fully synchronized to cell
				1
T2		S	2.6	
T3		S	1.64	
T4	S	0		
T5	S	1.01		
D1	<u>-</u>	S	0.97	

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

Table A.5.5.5.5.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	Unit		Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup 1	defined in	A.3.15	•
Assumption for UE bean	ns ^{Note 10}			-	Rough		
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	MRS to SSS	dB					
EPRE ratio of PBCH to I	PBCH DMRS	dB	1				
EPRE ratio of PSS to SS	SS	dB	1				
EPRE ratio of PDSCH D	dB	1					
EPRE ratio of PDSCH to PDSCH DMRS		dB	1				
EPRE ratio of OCNG DI	MRS to SSS	dB	1				
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
	Config 2		5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
1	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	SCS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
N Config 1		dBm/15K			-104.7		
N_{oc}		Hz					
	Config 2				-104.7		
Propagation condition				TDL-A 30ns 75Hz			
Note 1: OCNG shall b	oe used such that	the resources	in Cell 1 a	re fully allog	cated and a	constant to	otal

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

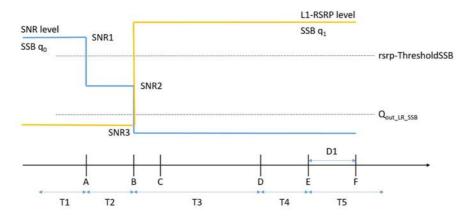


Figure A.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.5.5.6 Active BWP switch

A.5.5.6.1 DCI-based and Timer-based Active BWP Switch

A.5.5.6.1.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.5.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one PSCell (Cell 2) as given in Table A.5.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell is specified in Table A.5.5.6.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.6.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.5.5.6.1.1.1-1: DL BWP switch supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations
Note 2:	A UE which fulfils	the requirements in test case A.5.5.2.2 can skip the test cases in A.5.5.2.1.

Table A.5.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	ub	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	O	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.5.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note 1)		
Propagation Condition		AWGN
r ropagation Condition	1	AWGIN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.1.1.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

	Parameter	Unit	Cell 2			
Angle of arrival configuration			Setup 1 according to clause			
			A.3.15.1			
	on for UE beams ^{Note 6}		Fine			
N _{oc} Note 1		dBm/15	-112			
		kHz				
N _{oc} Note 1		dBm/SCS	-103			
SS-RSRI	Note 2	dBm/120	-85			
		kHz Note3				
Ês/Iot		dB	18			
Io ^{Note2}		dBm/95.04	-55.94			
		MHz Note4				
Note 1:	Interference from other cells and r					
	assumed to be constant over subc					
	AWGN of appropriate power for N					
Note 2:	SS-RSRP and lo levels have beer					
	information purposes. They are no	•				
Note 3:						
	interference and noise at each receiver antenna port.					
Note 4:	, , , , , , , , , , , , , , , , , , ,					
Note 5	quiet zone As observed with 0dBi gain antenna at the centre of the quiet zone.					
Note 5:						
Note 6:	Information about types of UE bea		s.z.1.3, and does not limit UE			
	implementation or test system imp	nementation				

A.5.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+kI$), ($j+T_{BWPswitchDelay}+kI$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.5.5.6.1.2 E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in synchronous EN-DC

A.5.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.2, and interruption requirements for NR victim cell defined in clause 8.2.1.2. 7. Supported test configurations are shown in Table A.5.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one SCell (Cell 3) as given in Table A.5.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell and SCell are specified in Table A.5.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) and SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(i+T_{\rm BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than the first UL slot that occurs after the beginning of slot $(i+T_{\rm BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{\rm BWPswitchDelay})$.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of SCell.

Table A.5.5.6.1.2.1-1: DL BWP switch supported test configurations

Config		Description	
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1:	: The UE is only required to be tested in one of the supported test configurations		
Note 2:	A UE which fulfils the requirements in test case A.5.5.6.1.2 can skip the test cases in A.5.5.6.1.1.		
Note 3:	NR configuration is the same for PSCell and SCells.		

Table A.5.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2, 3	Two NR radio channels are used for this
		2, 3	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	uБ	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.5.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3		
Frequency Range		FF	R2		
Duplex mode		TC	DD .		
TDD configuration		TDDC	onf.3.1		
BW _{channel}		100 MHz:	$N_{RB,c} = 66$		
Active BWP ID		0	1,2		
Initial DL BWP Configuration		DLBWP.0.2	DLBWP.0.2		
Active DL BWP-0 Configuration		DLBWP.0.2	N.A.		
Active DL BWP-1 Configuration		N.A.	DLBWP.1.3		
Active DL BWP-2 Configuration		N.A.	DLBWP.1.1		
Initial UL BWP Configuration		ULBWP.0.2	ULBWP.0.2		
Active UL BWP-0 Configuration		ULBWP.0.2	N.A.		
Active UL BWP-1 Configuration		N.A.	ULBWP.1.3		
Active UL BWP-2 Configuration		N.A.	ULBWP.1.1		
PDSCH Reference measurement channel		SR.3.	1 TDD		
RMSI CORESET parameters		CR.3.	1 TDD		
Dedicated CORESET parameters		CCR.3	.1 TDD		
OCNG Patterns		OP.1			
SSB Configuration		SSB.	1 FR2		
SMTC Configuration		SMT	TC.1		
TCI State		TRS.2.	1 TDD		
TRS Configuration		TCI.S	tate.0		
Antenna Configuration			(2		
Propagation Condition		AW	GN		
EPRE ratio of PSS to SSS	dB	0	0		
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
	Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power				
spectral density is achieved for all					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over					
subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.					

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3.

Table A.5.5.6.1.2.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

	Parameter		Cell 2	Cell 3
Angle of	Angle of arrival configuration		Setup 1 accordir	ng to clause A.3.15
	ion for UE beams ^{Note 6}		F	ine
N _{oc} Note 1		dBm/15 kHz	-112	-112
SS-RSRI	Note 2	dBm/120 kHz ^{Note3}	-85	-85
Ê _s /I _{ot}		dB	18	18
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-55.94	-55.94
Note 1: Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N _{oc} to be fulfilled. SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 3:	· ·			ence and noise at each receiver
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone			
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone.			
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation			

A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelav}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k₁ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in Clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$, $(j+T_{BWPswitchDelay}+k_1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.5.5.6.2 RRC-based Active BWP Switch

A.5.5.6.2.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.5.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one PSCell (Cell 2) as given in Table A.5.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell are specified in Table A.5.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE on SRB3, is received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PSCell from the first DL slot occurs right after the beginning of PSCell's DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} \quad \text{as defined in clause 8.6.3 and starts to}$ report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1..$ The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs right after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}.$

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.5.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1: The UE is only requ	Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.5.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		1	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	

Table A.5.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Para	meter	Unit	Cell 2	
Frequency Range			FR2	
Duplex mode			TDD	
TDD configuration			TDDConf.3.1	
BW _{channel}			100 MHz: N _{RB,c} = 66	
Active BWP ID			1, 2	
Initial DL BWP Config	guration		DLBWP.0.2	
Initial UL BWP Config			ULBWP.0.2	
Initial Condition	Active DL BWP-1		DLBWP.1.3	
	Configuration			
	Active UL BWP-1 Configuration		ULBWP.1.3	
Final	Active DL BWP-1		DLBWP.1.1	
Condition	Configuration			
	Active UL BWP-1		ULBWP.1.1	
	Configuration			
	neasurement channel		SR.3.1 TDD	
RMSI CORESET par			CR.3.1 TDD	
Dedicated CORESE	Γ parameters		CCR.3.1 TDD	
OCNG Patterns			OP.1	
SSB Configuration			SSB.1 FR2	
SMTC Configuration			SMTC.1	
TCI State			TCI.State.0	
TRS Configuration			TRS.2.1 TDD	
Antenna Configuration	n		1x2	
Propagation Condition			AWGN	
EPRE ratio of PSS to S		dB	0	
EPRE ratio of PBCH DI				
EPRE ratio of PBCH to				
EPRE ratio of PDCCH I				
EPRE ratio of PDCCH t				
EPRE ratio of PDSCH t				
EPRE ratio of OCNG D				
EPRE ratio of OCNG to		1		
Note 1: OCNG shall be used such that both cells are fully allocated and a constant				
total transmitted power spectral density is achieved for all OFDM symbols.				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

SS-RSRP and lo levels have been derived from other parameters for Note 3: information purposes. They are not settable parameters themselves.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Para	meter	Unit	Cell 2
Angle of arrival config	nuration		Setup 1 according to
	,		A.3.15
Assumption for UE be	eams ^{Note 5}		Fine
	NR_TDD_FR2_A		
	NR_TDD_FR2_B	dDas/45kd le	-112
N_{oc} Note1	NR_TDD_FR2_F		
	NR_TDD_FR2_G	dBm/15kHz	
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
	NR_TDD_FR2_A	dD/CCC	102
	NR_TDD_FR2_B	dBm/SCS	-103

	NR_TDD_FR2_F				
N_{oc} Note1	NR_TDD_FR2_G				
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS	-85		
33-K3KP-1862	NR_TDD_FR2_G	Note3	-05		
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
\hat{E}_{s}/I_{ot}	<u> </u>	dB	18		
$\mathbf{L}_{\mathrm{s}}/1_{\mathrm{ot}}$		uБ	16		
	NR_TDD_FR2_A				
	NR_TDD_FR2_B	dBm/95.04 MHz ^{Note4}	-55.94		
Io ^{Note2}	NR_TDD_FR2_F				
10	NR_TDD_FR2_G				
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
Note 1: Inter	ference from other cells and	noise sources no	ot specified in the test is		
assu	imed to be constant over sub	carriers and time	e and shall be modelled as		
AWO	SN of appropriate power for	N_{oc} to be fulfille	ed.		
Note 2: SS-F	RSRP and lo levels have bee	en derived from o	other parameters for		
	mation purposes. They are n		•		
		minimum requirements are specified assuming independent			
	ference and noise at each re				
	valent power received by an				
quiet zone					
Note 5: Information about types of UE beam is given in B.2.1.3, and does not lin					
implementation or test system implementation					

A.5.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell from the first DL slot that occurs right after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.7 PSCell addition and release delay

A.5.5.7.1 Addition and Release Delay of NR PSCell

A.5.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 of TS 36.133 [15] for the case when the PSCell is unknown by the UE at the time of addition.

Supported test configurations are shown in A.5.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on

radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description			
1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz		
2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz		
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Par	Parameter		Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold	dBm	-118	Actual RSRP threshold for event B1. Needs to
	RSRP			take absolute accuracy tolerance in clause
				9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
PRACH config	uration on cell2		FR2	Captured in A.3.8.3.2
			configuration 2	
Cell-individual RF channel nu	offset for cells on mber 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individual RF channel nu	offset for cells on mber 2	dB	0	Individual offset for cells on carrier frequency of cell2.
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2	T2		1	During this time the UE adds the PSCell.
Т3		s	1	During this time the UE sends CSI reports for PSCell.
T4		S	1	During this time the UE releases the PSCell.

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test
	O.I.I.	comig	T1 T2 T3 T4
E-UTRA Channel Number		1,2	1
NR Channel Number		1,2	2
Duplex Mode		1,2	TDD
TDD configuration		1,2	TDDConf.3.1
BW _{channel}	MHz	1,2	100: NRB,c = 66
Data RBs allocated	IVII IZ	1,2	48
Initial BWP		,	DLBWP.0.1
Configuration		1,2	ULBWP.0.1
Dedicated BWP			DLBWP.1.1
Configuration		1,2	ULBWP.1.1
TRS Configuration		1	TRS.2.1 TDD
		l	113.2.1 100
PDSCH/PDCCH TCI state		1	TCI.State.2
PDSCH Reference			00.00
measurement channel		1,2	SR.3.3 TDD
RMSI CORESET			00.00.707
Reference Channel		1,2	CR.3.2 TDD
Dedicated CORESET		4.0	CCD 2 7 TDD
Reference Channel		1,2	CCR.3.7 TDD
OCNG Patterns		1,2	OP.3
SSB configuration		1,2	SSB.2 FR2
SMTC configuration		1,2	SMTC.2
PDSCH/PDCCH	1.11=	4.0	400
subcarrier spacing	kHz	1,2	120
TRS Configuration		1,2	TRS.2.1 TDD
CSI-RS configuration		1,2	CSI-RS.3.1 TDD
for CSI reporting			C31-1(3.3.1 1DD
reportConfigType		1,2	periodic
reportQuantity		1,2	cri-RI-CQI
CSI reporting	slot	1,2	40
periodicity		·	
CSI reporting offset	slot	1,2	4
EPRE ratio of PSS to			
SSS			
EPRE ratio of PBCH			
DMRS to SSS			
EPRE ratio of PBCH to			
PBCH DMRS	-		
EPRE ratio of PDCCH			
DMRS to SSS EPRE ratio of PDCCH	1		
to PDCCH DMRS	dB	1,2	0
EPRE ratio of PDSCH	ub.	1,4	0
DMRS to SSS			
EPRE ratio of PDSCH	1		
to PDSCH			
EPRE ratio of OCNG	1		
DMRS to SSS(Note 1)			
EPRE ratio of OCNG	1		
to OCNG DMRS (Note			
1)			
Propagation condition		1,2	AWGN

Cell 2

Parameter

Table A.5.5.7.1.1-4: OTA related test parameters

Unit

			T1	T2	Т3	T4
Angle of arrival configuration			Setup 2a according to clause			
	· · · Noto		A.3.15.2.1			
Assumption for UE beams ^{Note}			Rough			
Ês Note2		dBm/SCS	-∞	-81		
SSB_RP	Note 2, Note 4	dBm/SCS		-81		
$\hat{E}_{_{S}}/I_{_{ m ot}}$ BB Note 2, Note 7		dB	-∞	-∞ 4.88		
Io ^{Note 2, No}	ote 4	dBm/95.04 MHz	N/A		-56.41	
Note 1:	Void					
Note 2:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information					
	purposes. They are not settable parameters themselves.					
Note 3:	Void					
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 5:	Void					
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE					
	implementation or test system implementation.					
Note 7:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for					
	the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance					
	of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.					

A.5.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 582 ms^{Note1} into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3.

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2ms$$

Where:

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 40 ms$

 $T_{search} = 8*3*20 = 480 \text{ ms}$

 $T_{\Lambda} = 20 ms$

 $T_{PSCell_DU}\!=1\!*\!10\!+\!10=20~ms$

A.5.5.8 Active TCI state switch delay

A.5.5.8.1 MAC-CE based active TCI state switch

A.5.5.8.1.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different TCI states for PSCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCI state 1 (QCL'd to SSB1), in Cell 2 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PSCell on TCI state 0 till n+ T_{HARQ} +3 ms. The test equipment also verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + ($T_{first-SSB}$ + $T_{SSB-proc}$).

Table A.5.5.8.1.1.1-1: Supported test configurations

Config		Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only required to be tested in one of the supported test configurations			

Table A.5.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number			test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	

Table A.5.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2		
Frequency Range		FR2		
Duplex mode		TDD		
TDD configuration		TDDConf.3.1		
BW _{channel}		100 MHz: N _{RB,c} = 66		
Initial DL BWP Configuration		DLBWP.0.2		
Dedicated DL BWP Configuration		DLBWP.1.1		
Initial UL BWP Configuration		ULBWP.0.2		
Dedicated UL BWP Configuration		ULBWP.1.1		
PDSCH Reference measurement channel		SR.3.2 TDD		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		OP.5		
SSB Configuration		SSB.1 FR2		
SMTC Configuration		SMTC.1		
TCI State 0		TCI.State.0		
TCI State 1		TCI.State.1		
TRS Configuration		TRS.2.1 TDD		
Correlation Matrix and Antenna		1x2 Low		
Configuration				
EPRE ratio of PSS to SSS	dB	0		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note				
1)				
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that a constant total transmitted power spectral				

Cell 2

Parameter

Table A.5.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Unit

Faranteter		Ollit	Cell Z					
			SS	B0	SS	SB1		
			T1	T2	T1	T2		
Angle of	arrival		Setup 3 according to clause A.3.15.3					
configura	tion		Ao	A1	Ad	oA2		
Assumpti	on for		Rou	ıgh	Ro	ough		
UE beam	IS Note 6			_				
Ês		dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
SSB-RP1	Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
Ê , /I ot BB No	ote 7	dB	8.3	8.3	-Infinity	8.3		
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0		
Note 1:	Void							
Note 2:	SSB-RF	and lo levels have been	derived from	m other par	ameters for	information		
	purpose	s. They are not settable p	parameters t	themselves	S.			
Note 3:	Void							
Note 4:	•	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone						
Note 5:	As obse	As observed with 0dBi gain antenna at the center of the quiet zone.						
Note 6:	Information about types of UE beam is given in B.2.1.3 and does not limit UE							
	implementation or test system implementation.							
Note 7:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value							
	assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-							
		nd an allowance of 1dB f		band relax	ation factor	ΔMB_P from		
	TS 38.101-2 [19] Table 6.2.1.3-4.							

A.5.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARO}+3 ms$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $T_{first-SSB}$

A.5.5.8.2 RRC based active TCI state switch

A.5.5.8.2.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 1 TCI state for PSCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing}$ + $T_{first\text{-}SSB}$ + 2ms.

Table A.5.5.8.2.1.1-1: Supported test configurations

Config	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only re	equired to be tested in one of the supported test configurations			

Table A.5.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		-	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	מם	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	d	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	2	

Table A.5.5.8.2.1.1-3: NR Cell specific test parameters for TCl state switch

Parameter	Unit	Cell 2				
Frequency Range		FR2				
Duplex mode		TDD				
TDD configuration		TDDConf.3.1				
BW _{channel}		100 MHz: N _{RB,c} = 66				
Initial DL BWP Configuration		DLBWP.0.2				
Dedicated DL BWP Configuration		DLBWP.1.1				
Initial UL BWP Configuration		ULBWP.0.2				
Dedicated UL BWP Configuration		ULBWP.1.1				
PDSCH Reference measurement channel		SR.3.2 TDD				
RMSI CORESET parameters		CR.3.1 TDD				
Dedicated CORESET parameters		CCR.3.1 TDD				
OCNG Patterns		OP.5				
SSB Configuration		SSB.1 FR2				
SMTC Configuration		SMTC.1				
TCI State 0		TC. State.0				
TCI State 1		TCI.State.1				
TRS Configuration		TRS.2.1 TDD				
reportConfigType		ssb-Index-RSRP				
reportConfigType		periodic				
Number of reported RS		2				
L1-RSRP reporting period	slot	640				
timeRestrictionForChannelMeasurements		configured				
Correlation Matrix and Antenna		1x2 Low				
Configuration						
EPRE ratio of PSS to SSS	dB	0				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note						
1)						
Propagation Condition		AWGN				
Note 1: OCNG shall be used such that a constant total transmitted power spectral						

density is achieved for all OFDM symbols.

ETSI

Table A.5.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parai	meter	Unit		С	ell 2		
			SS	B0	SS	SB1	
			T1	T2	T1	T2	
Angle of	arrival		Setup	3 according	g to clause A	A.3.15.3	
configura	ation		Ao	A1	Ad	A2	
Assumpt			Rou	ıgh	Ro	ugh	
UE bean	ns ^{note o}			1			
Ês		dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
SSB-RP	Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
£ ,/I ot BB Note 7		dB	8.3	8.3	-Infinity	8.3	
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0	
Note 1:	Void	Void					
Note 2:	SSB-RF	and lo levels have been	derived from	m other pai	ameters for	information	
	purpose	s. They are not settable p	parameters t	themselves	S.		
Note 3:	Void						
Note 4:	Equivale	ent power received by an	antenna wit	h 0 dBi gai	n at the cen	tre of the	
	quiet zo	ne					
Note 5:	As obse	rved with 0dBi gain anter	nna at the ce	enter of the	quiet zone.		
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE						
	implementation or test system implementation						
Note 7:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value						
	assume	d for the associated Refs	ens requirer	ment in cla	use 7.3.2 of	TS 38.101-	
		ind an allowance of 1dB f					
		01-2 [19] Table 6.2.1.3-4.					

A.5.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + T_{first_SSB} + 2ms.

A.5.6 Measurement procedure

A.5.6.1 Intra-frequency Measurements

A.5.6.1.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.1.1-1.

Table A.5.6.1.1.1-1: supported test configurations

(Configuration	Description			
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations.			

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.1.1-2, A.5.6.1.1.1-3 and A.5.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell			E-UTRAN	
		1~4	PCell (Cell 1)	
			PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number			1: Cell 1	One TDD carrier frequency is used for the NR cells and
		1~4	2: Cell 2 and	one TDD or FDD carrier frequency is used for E-UTRAN
			Cell 3	cell.
SMTC configuration		1~4	SMTC.1	
offsetMO	dB	1~4	16	Applied to NR Cell 3 measurement object
A3-Offset	dB	1~4	-11	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between		1~4	3 μs	Synchronous EN-DC
Cell 1 and Cell 2		1~4	•	
Time offset between		1~4	3 μs	Synchronous cells
Cell 2 and Cell 3		1~4		
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Cel	II 2	Cel	13
			T1	T2	T1	T2

TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1~4	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1,2	24	24
allocated		3,4	48	48
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1~4	SSB	SSB
PDSCH RMC		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET RMC		1,2	CR.3.1 TDD	CR.3.1 TDD
configuration		3,4	CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET RMC		1,2	CCR.3.1 TDD	CCR.3.1 TDD
configuration		3,4	CCR.3.7 TDD	CCR.3.7 TDD
PDSCH/PDCCH subcarrier spacing	kHz	1~4	120	120
OCNG Patterns		1~4	OP.5	N/A
TRS configuration		1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
SSB configuration		1, 2	SSB.3 FR2	SSB.7 FR2
		3, 4	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1~4	AWGN	AWGN

Table A.5.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Cel	Cell 2		ell 3
			T1	T2	T1	T2
AoA setup		1~4	Se	tup 3 defin	ed in A.3.15.3	
			Ao	A1	Ac	A2
Assumption for UE beams ^{Note 4}		1~4	Rou	ıgh	Ro	ugh
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1, 2	-64.41	-64.41	See	Cell 2
		3, 4	-61.41	-61.41	colu	ımns
Time multiplexing of the downlink transmissions from each AoA		1~4	Defir	Defined in Figure A.5.6.1.1.1-1		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

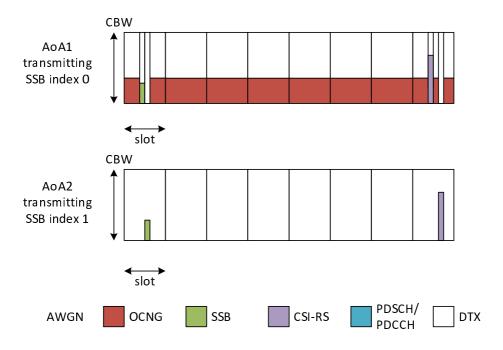


Figure A.5.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

A.5.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.2 EN-DC event triggered reporting test without gap under DRX

A.5.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.2.1-1.

Table A.5.6.1.2.1-1: supported test configurations

С	onfiguration	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.2.1-2 ~ Table A.5.6.1.2.1-6 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	
Active cell		1~4	E-UTRAN I	PCell (Cell 1)	
		1~4	PSCell (Ce	II 2)	
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number			1: Cell 1		One TDD carrier frequency is used for the NR
		1~4	2: Cell 2 an	nd Cell 3	cells and one TDD or FDD carrier frequency is
					used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1		
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	S	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.7	DRX related parameters are defined in Table A.5.6.1.2.1-4
Time offset between			3 μs		Synchronous EN-DC
Cell 1 and Cell 2		1~4	ο μο		-,
Time offset between		1~4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4			
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1~4	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1~4	66	66
allocated				
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1~4	SSB	SSB
PDSCH RMC		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET		1,2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration		3,4	CR.3.2 TDD	CR.3.2 TDD
Dedicated		1,2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			200 4	222.4.
configuration		3,4	CCR.3.7 TDD	CCR.3.7 TDD
PDSCH/PDCCH	kHz	1~4	120	120
subcarrier				
spacing				
OCNG Patterns		1~4	OP.1	OP.1
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
CSI-RS for			TRS.2.1 TDD	TRS.2.1 TDD
tracking			TRS.2.1 TDD	TRS.2.1 TDD
SSB configuration		1, 2	SSB.3 FR2	SSB.3 FR2
		3, 4	SSB.4 FR2	SSB.4 FR2
Propagation		1~4	AWGN	AWGN
Condition				

Table A.5.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	ell 2	Се	Cell 3		
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 1 defi	ned in A.3.1	5.1		
Assumption for UE beams ^{Note 4}		1~4		Rough				
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	3.77	-1.52	-Infinity	-1.52		
N_{oc} Note 2	dBm/15 KHz	1~4			-98			
N_{oc} Note 2	dBm/SCS	1, 2		-89				
		3, 4		-86				
SSB_RP	dBm/SCS	1, 2	-85 -85 -Infinity -85					
		3, 4	-82	-82	-Infinity	-82		

\hat{E}_s/N_{oc}	:	dB 1~4		4	4	-Infinity	4		
Io		dBm/95.04MHz	1~4	-54.53	-52.18	See Cell 2	2 columns		
Note 1:	The reso	ources for uplink trans	mission are assigned	to the UE	orior to the	start of time	e period		
Note 2:	· - ·								
	N_{oc} to	be fulfilled.							
Note 3:	3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.								
Note 4:									
Note 5:	associat	ion of Es/lot _{BB} include: ed Refsens requireme nulti-band relaxation fa	ent in clause 7.3.2 of	ΓS 38.101-	2 ['] [19], and	an allowand			

A.5.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.3 EN-DC event triggered reporting test with per-UE gaps under non-DRX

A.5.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.3.1-1.

Table A.5.6.1.3.1-1: supported test configurations

Co	onfiguration	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell			E-UTRAN	
		1~4	PCell (Cell 1)	
			PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number			1: Cell 1	One TDD carrier frequency is used for the NR cells and
		1~4	2: Cell 2 and	one TDD or FDD carrier frequency is used for E-UTRAN
			Cell 3	cell.
Gap type		1~4	Per-UE gaps	
Measurement gap repitition periodicity	ms	1~4	40	
Measurement gap length	ms	1~4	6	
Measurement gap offset	ms	1~4	39	
SMTC configuration		1~4	SMTC.1	
CSI-RS parameters		1~4	CSI-RS.3.2 TDD	
offsetMO	dB	1~4	16	Applied to NR Cell 3 measurement object
A3-Offset	dB	1~4	-11	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between		1~4	3 μs	Synchronous EN-DC
Cell 1 and Cell 2		1~4		
Time offset between		1~4	3 μs	Synchronous cells
Cell 2 and Cell 3		1~4		
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BWchannel	MHz	1~4	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1,2	24	24
allocated		3,4	48	48
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.2	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.2	ULBWP.1.1
configuration				
RLM-RS		1~4	CSI-RS	SSB
PDSCH RMC		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET		1,2	CR.3.1 TDD	CR.3.1 TDD
RMC				
configuration		3,4	CR.3.2 TDD	CR.3.2 TDD
Dedicated		1,2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC		2.1	000 0 7 700	000 0 7 700
configuration		3,4	CCR.3.7 TDD	CCR.3.7 TDD
TRS configuration		1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
PDSCH/PDCCH	kHz	1~4	120	120
subcarrier				
spacing				
OCNG Patterns		1~4	OP.5	N/A
SSB		1, 2	SSB.3 FR2	SSB.7 FR2
		3, 4	SSB.4 FR2	SSB.8 FR2
Propagation		1~4	AWGN	AWGN
Condition				

Table A.5.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Ce	II 2	Cell 3	
			T1	T2	T1	T2
AoA setup		1~4	S	etup 3 defii	ned in A.3.1	5.3
			Ac	A1	Ao	A2
Assumption for UE beams ^{Note 4}		1~4	Ro	Rough		ıgh
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1, 2	-64.41	-64.41	See Cell 2 columns	
		3, 4	-61.41	-61.41		
Time multiplexing of the downlink transmissions from each AoA		1~4	Def	Defined in Figure A.5.6.1.3.1-1		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

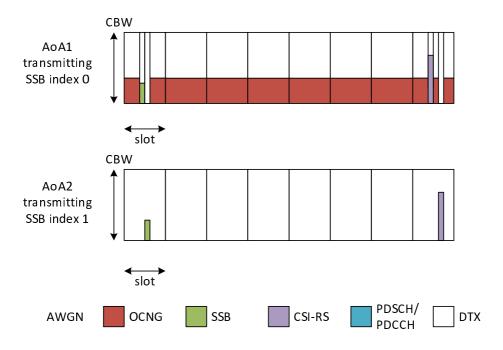


Figure A.5.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

A.5.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.4 EN-DC event triggered reporting test with per-UE gaps under DRX

A.5.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.4.1-1.

Table A.5.6.1.4.1-1: supported test configurations

С	onfiguration	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.4.1-2 ~ 6.

During the test, Cell 2 and Cell 3 are transmitted from the direction determined according to A3.8.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1 Test 2		
Active cell		1~4	E-UTRAN PCell (Cell 1)		
		1~4	PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number			1: Cell 1		One TDD carrier frequency is used for the NR
		1~4	2: Cell 2 and Cell 3		cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE gap	s	
Measurement gap repitition periodicity	ms	1~4	40		
Measurement gap length	ms	1~4	6		
Measurement gap	ms	1~4	39		
offset		4 4	ONATO 4		
SMTC configuration		1~4	SMTC.1	TDD	
CSI-RS parameters A3-Offset	4D	1~4	CSI-RS.3.2	טטו	
	dB		Normal		
CP length	dB	1~4	0		
Hysteresis		1~4	0		
Time To Trigger Filter coefficient	S	1~4	0		L2 filtering is not used
DRX		1~4	DRX.1	DRX.7	L3 filtering is not used
DRA		1~4	DKA. I	DRA.7	DRX related parameters are defined in Table A.5.6.1.4.1-5
Time offset between			3 μs	<u>l</u>	Synchronous EN-DC
Cell 1 and Cell 2		1~4	ο μο		Synonical En Bo
Time offset between		1~4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4	,		
T1	S	1~4	5		
T2	s	1~4	10	52	

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2

TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1~4	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1~4	66	66
allocated				
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.2	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.2	ULBWP.1.1
configuration				
RLM-RS		1~4	CSI-RS	SSB
PDSCH RMC		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET		1,2	CR.3.1 TDD	CR.3.1 TDD
RMC		2.4	0D 0 0 TDD	0D 0 0 TDD
configuration		3,4	CR.3.2 TDD	CR.3.2 TDD
Dedicated		1,2	CCR.3.1 TDD	CCR.3.1 TDD
CORESET RMC			202.4.7.72	222 2
configuration		3,4	CCR.3.7 TDD	CCR.3.7 TDD
TRS configuration		1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
PDSCH/PDCCH	kHz	1~4	120	120
subcarrier				
spacing				
OCNG Patterns		1~4	OP.1	OP.1
SSB		1, 2	SSB.3 FR2	SSB.3 FR2
		3, 4	SSB.4 FR2	SSB.4 FR2
Propagation		1~4	AWGN	AWGN
Condition				

Table A.5.6.1.4.1-4: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	ell 2	Се	Cell 3		
			T1	T2	T1	T2		
AoA setup		1~4	S	etup 1 defi	ned in A.3.1	5.1		
Assumption for UE beams ^{Note 4}		1~4	Ro	ugh	Rou	ugh		
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	3.77	-1.52	-Infinity	-1.52		
N_{oc} Note 2	dBm/15 KHz	1~4		-98				
N_{oc} Note 2	dBm/SCS	1, 2		-89				
		3, 4			-86			
SSB_RP	dBm/SCS	1, 2	-85	-85	-Infinity	-85		
		3, 4	-82	-82	-Infinity	-82		
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4		
Io	dBm/95.04MHz	1~4	-54.53	-52.18	See Cell 2	2 columns		

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.
- Note 5: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

Table A.5.6.1.4.1-5: Void

Table A.5.6.1.4.1-6: Void

A.5.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.20s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2 Inter-frequency Measurements

A.5.6.2.1 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the ENDC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.1.1-1, A.5.6.2.1.1-2, and A.5.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.1.1-1.

Table A.5.6.2.1.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations
Note 2:	target NR cell ha	s the same SCS, BW and duplex mode as NR serving cell

Table A.5.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config 1,2	1		One E-UTRAN TDD carrier
Number		3 ,			frequency is used.
NR RF Channel		Config 1,2	1	, 2	Two FR2 NR carrier frequencies
Number					are used.
Active cell		Config 1,2	LTE Cell 1 (Pocell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39	39	
SMTC-SSB parameters		Config 1,2	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.
T1	s	Config 1,2	5		
T2	S	Config 1,2	5.2 for PC1; 5.2 for PC1; 3.5 for other PC PC		

Table A.5.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit Test		Ce	ell 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
AoA setup		Config 1,2	Setu	p 3 as speci	fied in clause	e A.3.15	
			Ac	A1	,	NoA2	
Assumption for UE beams ^{Note}		Config 1,2	Ro	ugh	R	lough	
NR RF Channel Number		Config 1,2		1	2		
Duplex mode		Config 1,2	TI	DD	TDD		
BW _{channel}	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 66		
Data RBs allocated		Config 1,2	6	66	66		
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 66		
TDD configuration		Config 1,2	TDDC	TDDConf.3.1		Conf.3.1	
Initial DL BWP		Config 1,2	DLBWP.0.1		NA		
Initial UL BWP		Config 1,2	ULBWP.0.1 N		NA		
Dedicated DL BWP		Config 1,2	DLBWP.1.1			NA	

OCNG Patterns defined in A.3.2.1.1 TRS configuration		Config 1,2	OI			
TRS configuration			OP.1		OP.1	
		Config 1,2	TRS.2	.1 TDD	NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.S	State.2		NA
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	.1 TDD		-
SMTC configuration defined in A.3.11		Config 1,2	SM	TC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	120		120	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH						
DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	0		0	
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
Ês	dBm/S CS	Config 1,2	-87	-87	-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87
\hat{E}_s/I_{ot} BB Note 8	dB	Config 1,2	1.89	1.89	-Infinity	1.89
Io Note3	dBm/95 .04 MHz Note5	Config 1,2	-58.01	-58.01	-Infinity	-58.01
Propagation Condition		Config 1,2	AW	/GN	AWGN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.1.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.2 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.2.1-1, A.5.6.2.2.1-2, and A.5.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.2.1-1.

Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations
Note 2:	target NR cell has	s the same SCS, BW and duplex mode as NR serving cell

Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Va	Value		Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config 1,2		•	1		One E-UTRAN TDD carrier
Number							frequenciy is used.
NR RF Channel Number		Config 1,2		1,	2		Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	cell 2 (ell 1 (P0 (PScell)	Cell) and	NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3µs			Synchronous cells.	
T1	s	Config 1,2	5				
T2	S	Config 1,2	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Ce	ell 2		Cell 3	
		configuratio n	T1	T2	T1	T2	
AoA setup		Config 1,2	Setu	p 1 as speci	fied in clause	A.3.15	
Assumption for UE beams ^{Note} 7		Config 1,2	Ro	Rough		tough	
NR RF Channel Number		Config 1,2		1		2	
Duplex mode		Config 1,2	TI	DD	TDD		
BW _{channel}	MHz	Config 1,2	100: N	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs allocated		Config 1,2	6	66	66		
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 60		
TDD configuration		Config 1,2	TDDConf.3.1		1 TDDConf.		
Initial DL BWP		Config 1,2	DLBWP.0.1			NA	
Initial UL BWP		Config 1,2	ULBWP.0.1				

Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA
Dedicated UL BWP				VP.1.1		NA
		Config 1,2	•==.			
OCNG Patterns defined in		Config 1,2	Ol	P.1)P.1
A.3.2.1.1 (OP.1)		3 ,				
TRS configuration			TRS.2	.1 TDD		NA
		Config 1,2				
		_				
PDSCH/PDCCH TCI state			TCI.S	State.2		NA
		Config 1,2				
PDSCH Reference		Config 1,2	SR.3.	1 TDD		-
measurement channel						
RMSI CORESET Reference		Config 1,2	CR.3.	1 TDD		-
Channel Dedicated CORESET			000			
Reference Channel		Config 1,2	CCR.3	3.1 TDD		-
SMTC configuration defined in A.3.11		Config 1,2	SM	TC.1	SN	/ITC.1
	1.1.1-	_				
PDSCH/PDCCH subcarrier	kHz	Config 1,2	1.	20		120
spacing EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS						
to SSS						
EPRE ratio of PBCH to PBCH						
DMRS EPRE ratio of PDCCH DMRS						
to SSS						
EPRE ratio of PDCCH to						
PDCCH DMRS		Config 1,2		0	0	
EPRE ratio of PDSCH DMRS		_				
to SSS						
EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)	alDina /4.5		4.0	24.7		04.7
$N_{oc}^{ m Note2}$	dBm/15 kHz		-10	04.7	-1	04.7
	Note5					
N _{oc} Note2	dBm/S	Config 1,2	-95.7			95.7
IV oc	CS	551g 1,2	-33.1]	
	Note4					
SSB_RP Note 3	dBm/S	Config 1,2	-89.7	-89.7	-Infinity	-86.7
	CS	-				
	Note5					
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2	6	6	-Infinity	9
IoNote3	dBm/95	Config 1,2	-59.7	-59.7	-66.7	-57.2
	.04	001111g 1,2	55.1	00.7	00.7	01.2
	MHz					
	Note5					
Propagation Condition		Config 1,2	AW	/GN	A۱	WGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	quired to be tested in one of the supported test configurations
Note 2:	target NR cell has	s the same SCS, BW and duplex mode as NR serving cell

Table A.5.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config 1,2		1	One E-UTRAN TDD carrier
Number		_			frequency is used.
NR RF Channel Number		Config 1,2	1,	2	Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39	39	
SMTC-SSB parameters		Config 1,2	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3μs		Synchronous cells.
T1	S	Config 1,2	5		
T2	S	Config 1,2	7 for PC1; 7 for PC1; 4.5 for other PC PC		

Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	ell 2		Cell 3		
		configuratio n	T1	T1 T2		T2		
AoA setup		Config 1,2	Setu	Setup 3 as specified in clause A.3.15				
			Ac	AoA1		AoA2		\oA2
Assumption for UE beams ^{Note} 7		Config 1,2	Ro	Rough		lough		
NR RF Channel Number		Config 1,2		1		1		2
Duplex mode		Config 1,2	TDD) TDD			
BW _{channel}	MHz	Config 1,2	100: N _{RB,c} = 66		100:	N _{RB,c} = 66		
Data RBs allocated		Config 1,2	66		66 66			

BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100: I	V _{RB,c} = 66	
TDD configuration		Config 1,2		onf.3.1		Conf.3.1	
		Corning 1,2					
Initial DL BWP		Config 1,2	DLBWP.0.1			NA	
Initial UL BWP		Config 1,2	DLBV	VP.0.1		N/A	
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA	
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1		NA	
OCNG Patterns defined in A.3.2.1.1		Config 1,2	Ol	P.1	(DP.1	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-	
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	3.1 TDD		-	
TRS configuration		Config 1,2	TRS.2	.1 TDD		NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.State.2		NA		
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	120		120		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2		0		0	
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Ės	dBm/S CS	Config 1	-87	-87	-Infinity	-87	
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87	
$\hat{E}_{s}/I_{ot\ BB\ Note\ 8}$	dB	Config 1,2	1.89	1.89	-Infinity	1.89	
Io Note3	dBm/95 .04 MHz Note5	Config 1,2	-58.01	-58.01	-Infinity	-58.01	
Propagation Condition		Config 1,2	AW	/GN	A	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.3.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.4 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.4.1-1, A.5.6.2.4.1-2, and A.5.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.4.1-1.

Table A.5.6.2.4.1-1: EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell has	s the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati on	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2			1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2		1,	2		Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2		ell 1 (P0 (PScell)	Cell) and	I NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3μs			Synchronous cells.	
T1	S	Config 1,2	5				
T2	S	Config 1,2	11 for PC1; 6.5 for othe r PC	108 for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	108 for PC1; 67 for other PC	

Table A.5.6.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2 T1 T2			Cell 3	
		configuratio			T1	T2	
AoA setup		Config 1,2	Setu	n 1 as snaci	fied in clause A 3 15		
		<u> </u>	Setup 1 as specified in clause A.3.15				
Assumption for UE beams ^{Note} ⁷		Config 1,2	Rough		Rough		
NR RF Channel Number		Config 1,2	1		2		
Duplex mode		Config 1,2	TI	TDD		TDD	

BW _{channel}	MHz	Config 1,2	100: N	RB,c = 66	100: N	I _{RB,c} = 66
Data RBs allocated		Config 1,2	66			66
BWP BW	MHz	Config 1,2		RB,c = 66		$I_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	Conf.3.1	TDD0	Conf.3.1
Initial DL BWP		Config 1,2	DLBV	VP.0.1		NA
Initial UL BWP		Config 1,2	ULBV	VP.0.1		
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA
Dedicated UL BWP		Config 1,2	ULBV	VP.1.1		NA
OCNG Patterns defined in A.3.2.1.1		Config 1,2	0	P.1	C	P.1
PDSCH Reference measurement channel		Config 1,2		.1 TDD		-
RMSI CORESET Reference Channel		Config 1,2	CR.3	.1 TDD		-
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	3.1 TDD		-
TRS configuration		Config 1,2	TRS.2	2.1 TDD		NA
PDSCH/PDCCH TCI state		Config 1,2	TCI.S	State.2	NA	
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1	20	120	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2		0	0	
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
$N_{\it oc}^{}$ Note2	dBm/15 kHz Note5		-104.7		-1	04.7
$N_{oc}^{}$ Note2	dBm/S CS Note4	Config 1,2	-95.7		-9	95.7
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-89.7	-89.7	-Infinity	-86.7
\hat{E}_s/I_{ot}	dB	Config 1,2	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2	6	6	-Infinity	9
IoNote3	dBm/95 .04 MHz Note5	Config 1,2	-59.7	-59.7	-66.7	-57.2

Propagation Condition			Config 1,2	AWGN	AWGN				
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power								
	spectral density is ac	hieved for	all OFDM symbo	ols.					
Note 2:	Interference from oth	er cells an	d noise sources	not specified in the test is	assumed to be constant				
	over subcarriers and	time and s	hall be modelled	l as AWGN of appropriate	power for N_{oc} to be				
	fulfilled.								
Note 3:	SSB_RP and lo leve	s have bee	en derived from o	other parameters for infor	mation purposes. They				
	are not settable para	meters the	mselves.						
Note 4:	Void								
Note 5:		Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone							
Note 6:		As observed with 0dBi gain antenna at the centre of the quiet zone							
Note 7:			eam is given in l	B.2.1.3, and does not limit	t UE implementation or				
	test system impleme	ntation.							

A.5.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	120 kHz SSB SCS,
	mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	duplex mode
	mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	
	mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	
	mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
Note: The UE	is only required to be tested in one of the supported test configuration	IS

Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment	
		configurati on	Test 1	Test 2		
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN TDD carrier frequency is used.	
NR RF Channel Number		Config 1,2,3,4,5,6	1,	, 2	One FR1 and one FR2 NR carrier frequency is used.	
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PC cell 2 (PScell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.	
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.	
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.	
Measurement gap offset		Config 1,2,3,4,5,6	39	39		
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1	
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1	
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1	
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.3 FR2		As specified in clause A.3.10.2	
CSI-RS for tracking		Config 1,4 Config 2,5	TRS.1.1 FDD TRS.1.1 TDD			
		Config 3,6	TRS.1.2 TDD			
offsetMO	dB	Config 1,2,3,4,5,6	6			
Hysteresis	dB	Config 1,2,3,4,5,6	0			
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105			
CP length		Config 1,2,3,4,5,6	Normal			
TimeToTrigger	S	Config 1,2,3,4,5,6	0			
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used	
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used	
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC	
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.	
		Config 2,3,5,6	3μs		Synchronous cells.	
T1	S	Config 1,2,3,4,5,6	5			
T2	S	Config 1,2,3,4,5,6	5.2 for PC1; 3.5 for other PC	5.2 for PC1; 3.5 for other PC		

Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio	T1	T2	T1	T2
		n				

	Config	N/A	Setup 1 as specified in clause A.3.15
	Config	N/A	Rough
	Config	1	2
		FDD	TDD
	Config	TDD	TDD
MHZ			100: N _{RB,c} = 66
			100: N _{RB,c} = 66 100: N _{RB,c} = 66
MHz			100: N _{RB,c} = 66
1711 12			100: N _{RB,c} = 66
			100: N _{RB,c} = 66
		52	66
	Config 2,5	52	66
	Config 3,6	106	66
	Config 2,5	TDDConf.1.1	TDDConf.3.1
	Config 3,6	TDDConf.2.1	TDDConf.3.1
	Config	DLBWP.0.1	NA
	Config	ULBWP.0.1	NA
	Config	DLBWP.1.1	NA
	Config	ULBWP.1.1	NA
	Config	OP.1	OP.1
	-	SR.1.1 FDD	-
			7
			_
		CR2.1 TDD	
	Config 1,4	CCR.1.1 FDD	-
	Config 2,5	CCR.1.1 TDD	
	Config 3,6	CCR.2.1 TDD	
	Config 1,4	SMTC.2	SMTC.2
	Config 2,3,5,6	SMTC.1	SMTC.1
kHz	Config 1.2.4.5	15	120
		30	120
	Config 1,2,3,4,5,6	0	0
	MHz MHz	1,2,3,4,5,6	1,2,3,4,5,6 Config

EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
Ês	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87
$\hat{E}_{_{\mathrm{s}}}/I_{_{\mathrm{ot}}}$ BB Note 8	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6		-Infinity	-58.01
Propagation Condition		Config 1,2,3,4,5,6		A	WGN
Note 1: OCNG shall be used	d such that b	ooth cells are ful	ly allocated and a constai	nt total trans	mitted power

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 4: Void.

Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

test system implementation

Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the ENDC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is

provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.6.1-1.

Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	120 kHz SSB SCS,					
	mode	100 MHz bandwidth, TDD					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	duplex mode					
	mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex						
	mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex						
	mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex						
	mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex						
	mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value				Comment			
		configurati	Test	Test						
		on	1 2 3 4		4					
E-UTRA RF Channel		Config		•	1		One E-UTRAN TDD carrier			
Number		1,2,3,4,5,6					frequency is used.			
NR RF Channel		Config		1,	2		One FR1 and one FR2 NR carrier			
Number		1,2,3,4,5,6					frequency is used.			
Active cell		Config	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF			
		1,2,3,4,5,6	cell 2 ((PScell)			channel number 1.			
							NR Cell 2 is on NR RF channel			
							number 1.			
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel			
0 5 " 11		1,2,3,4,5,6			4.0		number 2.			
Gap Pattern Id		Config	0		13		As specified in clause 9.1.2-1.			
Magaurament can		1,2,3,4,5,6	39		39					
Measurement gap offset		Config 1,2,3,4,5,6	39		39					
SMTC-SSB parameters		Config 1,4	SSB.1	ED1			As specified in clause A.3.10.1			
on NR RF Channel 1		Coning 1,4	33B.1	LKI			As specified in clause A.S. 10.1			
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1			
		Config 3,6	SSB.2 FR1		SSB.2 FR1		SSB.2 FR1			As specified in clause A.3.10.1
SMTC-SSB parameters		Config	SSB.3 FR2			As specified in clause A.3.10.2				
on NR RF Channel 2		1,2,3,4,5,6				-				
CSI-RS for tracking		Config 1,4	TRS.1	.1 FDD						
		Config 2,5	TRS.1.1 TDD							
		Config 3,6	TRS.1	.2 TDD						

offsetMO	dB	Config 1,2,3,4,5,6	6				
Hysteresis	dB	Config 1,2,3,4,5,6	0				
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105				
CP length		Config 1,2,3,4,5,6	Norma	al			
TimeToTrigger	s	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs			Synchronous cells.	
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	С	ell 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
AoA setup		Config 1,2,3,4,5,6	N/A			s specified in e A.3.15	
Assumption for UE beams ^{Note}		Config 1,2,3,4,5,6		N/A	R	Rough	
NR RF Channel Number		Config 1,2,3,4,5,6		1	1 2		
Duplex mode		Config 1,4	F	FDD	-	ΓDD	
		Config 2,3,5,6	7	ΓDD	-	ΓDD	
BW _{channel}	MHz	Config 1,4	10: N	10: $N_{RB,c} = 52$		$N_{RB,c} = 66$	
		Config 2,5	10: N _{RB,c} = 52 40: N _{RB,c} = 106		100: 1	$N_{RB,c} = 66$	
		Config 3,6			100: 1	$N_{RB,c} = 66$	
BWP BW	MHz	Config 1,4	10: N	10: $N_{RB,c} = 52$		$N_{RB,c} = 66$	
		Config 2,5	10: $N_{RB,c} = 52$		100: 1	$N_{RB,c} = 66$	
		Config 3,6	40: N	RB,c = 106	100: 1	$N_{RB,c} = 66$	
Data RBs allocated		Config 1,4	52			66	
		Config 2,5	52			66	
		Config 3,6	Config 3,6 106			66	
TDD configuration		Config 2,5	TDDConf.1.1		TDD	Conf.3.1	
		Config 3,6	TDDConf.2.1		TDDConf.3.		
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1 NA		NA		
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA		

r =		Т		1	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1		NA
Dedicated UL BWP			ULBWP.1.1		NA
Dedicated UL BWP		Config	ULBWP.1.1		INA
		1,2,3,4,5,6			
OCNG Patterns defined in		Config	OP.1)P.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6			
PDSCH Reference		Config 1,4	SR.1.1 FDD		-
measurement channel		Config 2,5	SR.1.1 TDD		
				-	
DATE: CORECET D.		Config 3,6	SR2.1 TDD		
RMSI CORESET Reference		Config 1,4	CR.1.1 FDD		-
Channel		Config 2,5	CR.1.1 TDD		
		Config 3,6	CR2.1 TDD		
Dedicated CORESET		Config 1,4	CCR.1.1 FDD		-
Reference Channel					
		Config 2,5	CCR.1.1 TDD		
		001111g 2,0	Coltaini		
		0 " 00	000 0 4 700		
		Config 3,6	CCR.2.1 TDD		
SMTC configuration defined		Carefier 4.4	CMTC		ATC 0
in A.3.11		Config 1,4	SMTC.2	21/	/ITC.2
		Config			
		2,3,5,6	SMTC.1	SN	/ITC.1
DD0011/DD0011					
PDSCH/PDCCH subcarrier	kHz	Config	15		120
spacing		1,2,4,5			
		Config 3,6	30	,	120
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS					
to SSS					
EPRE ratio of PBCH to PBCH					
DMRS					
EPRE ratio of PDCCH DMRS					
to SSS					
EPRE ratio of PDCCH to		Config			
PDCCH DMRS		1,2,3,4,5,6	0		0
EPRE ratio of PDSCH DMRS		1,2,3,4,5,0			
to SSS					
EPRE ratio of PDSCH to					
PDSCH					
EPRE ratio of OCNG DMRS					
to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
$N_{oc}^{$	dBm/15			-1	04.7
<i>0</i> C	kHz				
	Note5				
$N_{\it oc}^{}$ Note2	dBm/S	Config		-!	95.7
- · oc	CS	1,2,4,5			
	Note4	Config 3,6		-:	95.7
SSB_RP Note 3	dBm/S	Config	†	-Infinity	-86.7
<u></u>	CS	1,2,4,5			00.1
	Note5	Config 3,6	†	-Infinity	-86.7
<u>^</u> /-		Config	†		-00.7 9
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB		N1/A	-Infinity	9
	ļ <u>, , , , , , , , , , , , , , , , , , ,</u>	1,2,3,4,5,6	N/A	1.6.1	
\hat{E}_s/N_{oc}	dB	Config	Link only, see clause	-Infinity	9
		1,2,3,4,5,6	A.3.7A		
Io ^{Note3}	dBm/9.	Config		-	-
	36MHz	1,2,4,5	1		
	dBm/38	Config 3,6		-	-
	.16MHz				
	dBm/95	Config]	-66.7	-57.2
	.04	1,2,3,4,5,6			- · · -
	MHz	.,_,0,,,0,0			
	Note5				
D (O 1)	140100	0	†	Δ.	MONI
Propagation Condition		(Antid			
Propagation Condition		Config 1,2,3,4,5,6		A	WGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\it oc}$ to be
	fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or
	test system implementation

A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	120 kHz SSB SCS,
	mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	duplex mode
	mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	
	mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	
	mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
Note: The U	E is only required to be tested in one of the supported test configuration	is

Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Parameter Unit Test Value		Comment		
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	,	-	One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1, 2		One FR1 and one FR2 NR carrier frequency is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.3 FR2		As specified in clause A.3.10.2
CSI-RS for tracking		Config 1,4 Config 2,5	TRS.1.1 FDD TRS.1.1 TDD		
		Config 3,6	TRS.1.2 TDD		
offsetMO	dB	Config 1,2,3,4,5,6	6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	S	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	ell 2	Cell 3		
		configuratio	T1	T2	T1	T2	
		n					

AoA setup		Config 1,2,3,4,5,6	N/A	Setup 1 as specified in clause A.3.15
Assumption for UE beams ^{Note}		1,2,3,4,5,6 Config 1,2,3,4,5,6	N/A	Rough
NR RF Channel Number		Config 1,2,3,4,5,6	1	2
Duplex mode		Config 1,4	FDD	TDD
		Config 2,3,5,6	TDD	TDD
BW _{channel}	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 3,6	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 52	100: N _{RB,c} = 66
		Config 2,5	10: N _{RB,c} = 52	100: N _{RB,c} = 66
Data RBs allocated		Config 3,6	40: N _{RB,c} = 106 52	100: N _{RB,c} = 66
Data RBS allocated		Config 1,4 Config 2,5	52 52	66 66
		Config 3,6	106	66
OCNG Patterns defined in		Config	OP.1	OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	01.1	
PDSCH Reference		Config 1,4	SR.1.1 FDD	-
measurement channel		Config 2,5	SR.1.1 TDD	-
		Config 3,6		_
RMSI CORESET Reference		Config 3,6	SR2.1 TDD	-
Channel		Config 1,4	CR.1.1 FDD CR.1.1 TDD	- -
Chamie		Config 3,6	CR2.1 TDD	_
Dedicated CORESET		Config 1,4	CCR.1.1 FDD	
Reference Channel				_
		Config 2,5	CCR.1.1 TDD	
		Config 3,6	CCR.2.1 TDD	
TDD configuration		Config 2,5	TDDConf.1.1	TDDConf.3.1
		Config 3,6	TDDConf.2.1	TDDConf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1	NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1	NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1	NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1	NA
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SMTC.2
		Config 2,3,5,6	SMTC.1	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config	45	400
spacing		1,2,4,5	15	120
		Config 3,6	30	120
EPRE ratio of PSS to SSS		Config 1,2,3,4,5,6	0	0
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				

EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
Ês	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87
$\hat{E}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note 8	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6		-Infinity	-58.01
Propagation Condition		Config 1,2,3,4,5,6		A	WGN
Note 1: OCNG shall be used spectral density is ad Note 2: Void			ly allocated and a constarols.	nt total trans	mitted power

Note 3: SS-RP, Es/lot and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

test system implementation

Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the ENDC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is

provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	120 kHz SSB SCS,
	mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	duplex mode
	mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex	
	mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex	
	mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex	
	mode	
Note: The UE	is only required to be tested in one of the supported test configuration	s

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Parameter Unit Test Value		Comment				
		configurati	Test	Test	Test	Test	
E LITEA DE OL		on	1	2	3	4	0 5 1170 431 700
E-UTRA RF Channel Number		Config 1,2,3,4,5,6		•	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel		Config		1	2		One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6		٠,	_		frequency is used.
Active cell		Config	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2	(PScell)	•		channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR ce	II 3			NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0		13		As specified in clause 9.1.2-1.
Measurement gap		Config	39		39		
offset		1,2,3,4,5,6					
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters		Config	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					
CSI-RS for tracking		Config 1,4		.1 FDD			
		Config 2,5 Config 3,6		.1 TDD .2 TDD			
offsetMO	dB	Config	6	.2 100			
	_	1,2,3,4,5,6					
Hysteresis	dB	Config 1,2,3,4,5,6	0				
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105				
CP length		Config 1,2,3,4,5,6	Norma	al			
TimeToTrigger	s	Config 1,2,3,4,5,6	0				
Filter coefficient		Config	0				L3 filtering is not used
DRX		1,2,3,4,5,6 Config	DRX	DRX	DRX	DRX	As specified in clause A.3.3
		1,2,3,4,5,6	.1	.7	.1	.7	
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	for PC1; 6.5 for othe r PC	108 for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	108 for PC1; 67 for other PC	

Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit Test		Cell 2		Cell 3	
		configuratio n	T1	T2	T1	T2
AoA setup		Config	N/A		Setup 1 a	s specified in
No.		1,2,3,4,5,6			clause A.3.15	
Assumption for UE beams ^{Note}		Config 1,2,3,4,5,6	N/A		R	ough
NR RF Channel Number		Config	1			2
Dunlay made		1,2,3,4,5,6	FDD	<u> </u>	-	TDD
Duplex mode		Config 1,4 Config	TDD			TDD TDD
		2,3,5,6	100	•		100
BW _{channel}	MHz	Config 1,4	10: N _{RB,c}	= 52	100: 1	V _{RB,c} = 66
		Config 2,5	10: N _{RB,c}			$V_{RB,c} = 66$
		Config 3,6	40: N _{RB,c}			$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4	10: N _{RB,c}	= 52	100: 1	$N_{RB,c} = 66$
		Config 2,5	10: N _{RB,c}	= 52		$N_{RB,c} = 66$
Data DDa allacatad		Config 3,6	40: N _{RB,c}	= 106	100: 1	$N_{RB,c} = 66$
Data RBs allocated		Config 1,4 Config 2,5	52 52			66 66
		Config 2,5	106			66
OCNG Patterns defined in		Config	OP.1		-	DP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6	01.		`	J1 . 1
PDSCH Reference		Config 1,4	SR.1.1 I	-DD		-
measurement channel		+ · · · · · +				
		Config 2,5	SR.1.1			
RMSI CORESET Reference		Config 3,6	SR2.1 TDD CR.1.1 FDD			
Channel		Config 1,4 Config 2,5	CR.1.11			-
Chamer		Config 3,6	CR.1.1			
Dedicated CORESET		Config 1,4	CCR.1.1			_
Reference Channel		Johns 1,4	0011.1.1	100		
		Config 2,5	CCR.1.1	TDD		
		Config 3,6	CCR.2.1	TDD		
TDD configuration		Config 2,5	TDDConf.1.1		TDD	Conf.3.1
		Config 3,6	TDDConf.2.1		TDD	Conf.3.1
Initial DL BWP		Config	DLBWP	2.0.1		NA
		1,2,3,4,5,6				
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP	2.0.1		NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP	.1.1		NA
Dedicated UL BWP		Config	ULBWP	1.1.1		NA
		1,2,3,4,5,6				
SMTC configuration defined in A.3.11		Config 1,4	SMTC	5.2	SI	MTC.2
		Config 2,3,5,6	SMTC	5.1	SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15			120
		Config 3,6	30			120
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS		7				
to SSS		Config	2			0
EPRE ratio of PBCH to PBCH DMRS		1,2,3,4,5,6	0			0
EPRE ratio of PDCCH DMRS to SSS						

		1			1	
	tio of PDCCH to					
PDCCH [
	tio of PDSCH DMRS					
to SSS						
	tio of PDSCH to					
PDSCH						
	tio of OCNG DMRS					
to SSS(N						
EPRE rat	tio of OCNG to					
	MRS (Note 1)					
N_{oc} Note2	2	dBm/15			-1	04.7
2 · oc		kHz				
		Note5				
N_{oc} Note2	2	dBm/S	Config		-9	95.7
1 v oc		CS	1,2,4,5			
		Note4	Config 3,6		-9	95.7
SSB_RP	Note 3	dBm/S	Config		-Infinity	-86.7
		CS	1,2,4,5			
		Note5	Config 3,6		-Infinity	-86.7
\hat{E}_{s}/I_{ot}		dB	Config		-Infinity	9
L _s /L _{ot}			1,2,3,4,5,6	N/A		-
\hat{E}_s/N_{oc}		dB	Config	Link only, see clause	-Infinity	9
E_s/W_{oc}			1,2,3,4,5,6	A.3.7A		
Io ^{Note3}		dBm/9.	Config		-	-
		36MHz	1,2,4,5			
		dBm/38	Config 3,6		-	-
		.16MHz	5 T 5 C, C			
		dBm/95	Config		-66.7	-57.2
		.04	1,2,3,4,5,6		00	07.2
		MHz	1,2,0,1,0,0			
		Note5				
Propagat	ion Condition	110100	Config	•	Δ١	WGN
Tropagai	ion condition		1,2,3,4,5,6		, , ,	
Note 1:	OCNG shall be used	such that h		ly allocated and a constar	nt total transi	mitted power
1.0.0	spectral density is a					
Note 2:				not specified in the test is	assumed to	he constant
Note 2.						
	over subcarriers and	time and s	nail be modelled	I as AWGN of appropriate	power for 1	v_{oc} to be
	fulfilled.					
Note 3:	SSB RP and lo leve	ls have bee	n derived from	other parameters for infor	mation purpo	ses. Thev
	are not settable para			,		,
Note 4:	-			ssuming independent inte	erference and	d noise at
11016 7.	COD_IXI IIIIIIIIIIIIIIIII	oquii oi nont	and openined a	Southing independent inte	moronoe and	מ ווטוטט מנ

A.5.6.2.8.2 Test Requirements

Note 5:

Note 6:

Note 7:

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

As observed with 0dBi gain antenna at the centre of the quiet zone

10080 for UE supporting power class 1, or

each receiver antenna port.

test system implementation

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3 L1-RSRP measurement for beam reporting

A.5.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description				
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations					

A.5.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.1.2-1 and Table A.5.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~4		66
PDSCH Reference	1,2		SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD
Channel	3,4		CR.3.2 TDD
Dedicated CORESET	1~4		CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD
000 " "	1,2		SSB.1 FR2
SSB configuration	3,4	1	SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3
	4 4		ULBWP.1.3
SMTC configuration	1~4 1~4		SMTC.1
TRS Configuration PDCCH/PDSCH TCI	1~4		TRS.2.1 TDD
Configuration	1~4		TCI.State.2
DRX configuration	1~4		Off
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	320
T1	1~4	s	5
T2	1~4	S	2
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~4	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~4		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSB#0		SSB#1	
rarameter			T1	T2	T1	T2
Angle of arrival configuration			Setup 1 according to A.3.15.1			15.1
Assumption for UE beams ^{Note 4}	1~4		Rough			
$N_{oc}^{ m Note2}$	1~4	dBm/15kHz	-105			
$N_{oc}^{ m Note2}$	1,2	dBm/SSB SCS	-96			
	3,4	UBII/33B 3C3	-93			
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	1~4	dB	0	0	-Infinity	9
SSB_RP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87
	3,4	dbiii/00b 000	-93	-93	-Infinity	-84
lo ^{Note3}	1,2	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
	3,4		-63.97	-63.97	-66.98	-57.47
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.3.1.3 Test Requirements

A.5.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.5.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations				

A.5.6.3.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.2.2-1 and Table A.5.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.2.2-1: General test parameters

SSB GSCN 1~4 freq1 Duplex mode 1~4 TDD TDD Configuration 1~4 TDDConf.3.1 BW _{channel} 1~4 MHz 100: N _{RB,c} = 66 Data RBs allocated 1~4 66 PDSCH Reference measurement channel 1,2 SR.3.2 TDD RMSI CORESET Reference Channel 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD	Parameter	
Duplex mode 1~4 TDD TDD Configuration 1~4 TDDConf.3.1 BW _{channel} 1~4 MHz 100: N _{RB,c} = 66 Data RBs allocated 1~4 66 PDSCH Reference measurement channel 1,2 SR.3.2 TDD RMSI CORESET Reference Channel 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD		
BW _{channel} 1~4 MHz 100: N _{RB,c} = 66 Data RBs allocated 1~4 66 PDSCH Reference measurement channel 1,2 SR.3.2 TDD RMSI CORESET Reference Channel 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD		
Data RBs allocated 1~4 66 PDSCH Reference measurement channel 1,2 SR.3.2 TDD RMSI CORESET Reference Channel 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD	TDD Configuration	
PDSCH Reference measurement channel 1,2 measurement channel SR.3.2 TDD RMSI CORESET Reference Channel 1,2 minute control	BWchannel	
measurement channel 3,4 SR.3.3 TDD RMSI CORESET Reference 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD	Data RBs allocated	
RMSI CORESET Reference 1,2 CR.3.1 TDD Channel 3,4 CR.3.2 TDD	PDSCH Reference	
Channel 3,4 CR.3.2 TDD	measurement channel	
Channel 3,4 CR.3.2 TDD	RMSI CORESET Reference	
' '	•	
I Dedicated CORESET 1.2 CCR.3.1 IDD	Dedicated CORESET	
Reference Channel 3,4 CCR.3.7 TDD	ŀ	
1.2 SSB.1 FR2	005 " "	
SSB configuration 3,4 SSB.2 FR2	SSB configuration	
OCNG Patterns 1~4 OP.1	OCNG Patterns	
Initial BWP Configuration 1~4 DLBWP.0.1 ULBWP.0.1	Initial BWP Configuration	
Dedicated BWP configuration 1~4 DLBWP.1.3 ULBWP.1.3	Dedicated BWP configuration	
SMTC configuration 1~4 SMTC.1	SMTC configuration	
TRS Configuration 1~4 TRS.2.1 TDD		
PDCCH/PDCCH TCI		
Configuration 1~4 TCI.State.2	Configuration	
DRX configuration 1~4 DRX.3	DRX configuration	
reportConfigType 1~4 periodic		
reportQuantity 1~4 ssb-Index-RSRP		
Number of reported RS 1~4 2		
L1-RSRP reporting period 1~4 slot 320		
T1 1~4 s 5		
T2 1~4 s 3		
EPRE ratio of PSS to SSS		
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH		
DMRS		
	EPRE ratio of PDSCH DMRS to SSS	
EPRE ratio of PDSCH to PDSCH DMRS		
EPRE ratio of OCNG DMRS to SSS ^{Note 1}	EPRE ratio of OCNG DMRS to	
EPRE ratio of OCNG to OCNG DMRS Note 1	EPRE ratio of OCNG to OCNG	
Propagation condition 1~4 AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	SSB#0		SSB#1	
rarameter		Offit	T1	T2	T1	T2	
Angle of arrival configuration			Setup 1 according to A.3.15.1			15.1	
Assumption for UE beams ^{Note 4}	1~4		Rough				
$N_{oc}^{ m Note2}$	1~4	dBm/15kHz	-105				
$N_{oc}^{ m Note2}$	1,2	dBm/SSB SCS	-96				
	3,4	ubiii/33b 3C3	-93				
$\hat{\mathbf{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	1~4	dB	0	0	-Infinity	9	
SSB_RP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87	
	3,4		-93	-93	-Infinity	-84	
lo ^{Note3}	1,2	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47	
	3,4		-63.97	-63.97	-66.98	-57.47	
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9	

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.5.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.3.1-1.

Table A.5.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		8
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH	1 2	,	
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1}	1~2	dB	0
EPRE ratio of OCNG to OCNG DMRS Note 1			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1		
Assumption for UE beams ^{Note 4}	1~2		Rough		
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105		
$N_{oc}^{ m Note1}$	1~2	dBm/SSB SCS	-95.97		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0 9		
CSI-RS RSRP Note2	1~2	dBm/SSB SCS -95.97 -		-86.97	
lo ^{Note2}	1~2	dBm/95.04MHz	-63.97	-57.47	
\hat{E}_s/N_{oc}	1~2	dB	0	9	
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for					
N_{oc} to be fulfilled.					
Nets 0. COLDO DODD and le levele have desired from other properties.					

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information

purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.5.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3			
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}			
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}			
Note 1:	Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zon configured in the test for the CSI-RS n under consideration				
Note 2:	2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the Io used in the test				
Note 3:					

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.5.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.4.1-1.

Table A.5.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.5.6.3.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.4.2-1 and Table A.5.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		8
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS	_		-
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1~2	dB	0

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1		
Assumption for UE beams ^{Note 4}	1~2		Rough		
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105		
Noc Note1	1~2	dBm/SSB SCS	-95.97		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~2	dB	0 9		
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97 -86.97		
lo Note2	1~2	dBm/95.04MHz	-63.97 -57.47		
\hat{E}_s/N_{oc}	1~2	dB	0	9	
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for					
N_{oc} to be fulfilled.					
Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					

A.5.6.3.4.3 Test Requirements

Note 4:

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3			
CSI-RS0		CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}			
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}			
Note 1:	ote 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration				
Note 2:	ote 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test				
Note 3:	3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class				

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported

measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.

- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.5.7.1 SS-RSRP

A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.5.7.1.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.1.1.2-2 and A.5.7.1.1.2-3. The E-UTRA PCell is configured as specified in clause A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 is the target cell. The test consists of two time phases T1 and T2.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Co	onfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter ^{Note 5}	Unit		T1		T2	
Farameter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	
Physical cell ID		489	0	489	0	

SSB ARFCN		fre	:a1	fre	a1	
Duplex mode		TDD		TDD		
TDD configuration			TDDC		TDDC	
BW _{channel}		MHz	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs allocated				4	24	
Data NDO anocatou	Initial DL BWP		_	DLBV	_	•
BWP configuration	Dedicated DL BWP			DLBW		
2777 comigaration	Initial UL BWP			ULBV		
	Dedicated UL BWP				/P.1.1	
	Bodioalou GE Biii		TRS.2.	025.	TRS.2.	
TRS configuration			1 TDD	-	1 TDD	-
			TCI.Sta		TCI.Sta	
TCI state			te.0	-	te.0	-
			SR.3.2		SR.3.2	
PDSCH Reference m	easurement channel		TDD	-	TDD	-
			CR.3.1		CR.3.1	
RMSI CORESET Ref	erence Channel		TDD	_	TDD	_
			CCR.3.		CCR.3.	
Dedicated CORESET	Reference Channel		1 TDD	-	1 TDD	-
OCNG Patterns			OP.3	OP.3	OP.3	OP.3
SSB configuration			SSB.3	SSB.3	SSB.3	SSB.3
33b configuration			FR2	FR2	FR2	FR2
SMTC configuration			SMTC.	SMTC.	SMTC.	SMTC.
			1	1	1	1
Time offset with Cell		μs	-	3	-	3
PDSCH/PDCCH sub		kHz	120	120	120	120
EPRE ratio of PSS to	SSS					
EPRE ratio of PBCH	DMRS to SSS					
EPRE ratio of PBCH	EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS		dB	0	0	0	0
EPRE ratio of PDSCI	EPRE ratio of PDSCH_DMRS to SSS		U	U	U	U
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSSNote 1						
EPRE ratio of OCNG to OCNG DMRS Note						
1						
Propagation condition	าร		AW	GN	AW	GN
Antenna configuration		1x2	1x2	1x2	1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Note 6: Void

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter	Unit	Т	1	T2	
	Oill	Cell 2	Cell 3	Cell 2	Cell 3

Angle of arrival configuration			Setup	o 1 according	to clause A.3	.15.1
Assumpti UE beam	on for			Ro	ugh	
N_{oc} Note1	N_{oc} Note1		-91.6		N/A	
N_{oc} Note1		dBm/SCS Note4	-82	2.6	N/A	
\hat{E}_s/N_{oc}		dB	6.0	1.0	N/A	N/A
Es		dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
SSB_RP ^I	SSB_RP ^{Note2}		-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BE	Note6	dB	2.44	-5.98	-5.98	-5.98
Io ^{Note2}		dBm/95.04 MHz ^{Note4}		.05	(Table B.2.2-2 Rx Beam Peak +29.70dB)	
Note 1:	Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be					
Note 2: Note 3:	for information purposes. They are not settable parameters themselves.					
Note 4:	Equival	lent power rec et zone	eived by an a	intenna with (dBi gain at t	he centre of
Note 5: Note 6: Note 7: Note 8:	Note 6: Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from TS 38.101-2 [19] Table 6.2.1.3-4. Note 7: All parameters apply for configurations 1 and 2 Note 8: Information about types of UE beam is given in B.2.1.3, and does not				ause 7.3.2 and I.	
. 1010 0.		implementati				2000 1101

A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 3 during T2 compared with Cell 3 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}		
	Cell 3	SSB_RP3 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 + δ +G _{max}		
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration			
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo used in the test			
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss		

A.5.7.1.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.1.2.1-1.

Table A.5.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.5.7.1.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP intrer-frequency measurements are tested by using the parameters in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config Unit	Unit	Tes	st 1	Test 2	
Faranietei		Oilit	Cell 2	Cell 3	Cell 2	Cell 3

SSB ARFCN	1~4		freq1	freq2	freq1	freq2
BW _{channel}	1~4		10	0:	100:	
	1,2			<u>= 66</u> 4	N _{RB,c} = 66	
Data RBs allocated	3,4			8	48	
Duplex mode	1~4		TC			DD
TDD configuration	1~4		TDDC		TDDC	onf.3.1
PDSCH Reference	1,2		SR.3.2 TDD		SR.3.2 TDD	
measurement channel	3,4		SR.3.3 TDD	-	SR.3.3 TDD	-
RMSI CORESET	1,2		CR.3.1 TDD		CR.3.1 TDD	
Reference Channel	3,4		CR.3.2 TDD	-	CR.3.2 TDD	-
Dedicated CORESET	1,2		CCR.3.1 TDD		CCR.3.1 TDD	
Reference Channel	3,4		CCR.3.7 TDD	-	CCR.3.7 TDD	-
SSB configuration	1,2 3,4		SSB.4 SSB.4	3 FR2 4 FR2		3 FR2 4 FR2
PDSCH/PDCCH subcarrier spacing	1~4	kHz		20		20
OCNG Patterns	1~4		OF	P.3	OF	P.3
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Dedicated BWP configuration	1~4		DLBW	/P.1.3 /P.1.3	DLBWP.1.3 ULBWP.1.3	
TRS Configuration	1~4		TRS.2.		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~4			tate.2		tate.2
SMTC configuration	1~4		SMT	ГС.1	SMT	ГС.1
Time offset between Cell 2 and Cell 3	1~4	μs	3	3	3	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1	1~4	dB	0	0	0	0
Propagation condition	1~4	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~4	-	1x2	1x2	1x2	1x2

OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Void Note 1:

Note 2:

Table A.5.7.1.2.2-2: SS-RSRP inter-frequency OTA related test parameters

Dovementor	Confin	I limit	Test 1		Test 2	
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3
Angle of arrival				ccording to .3.15.4.2		ccording to3.15.4.2
configuration	1~4		AoA1 Spherical coverage	AoA2 Rx Beam Peak	AoA1 Spherical coverage	AoA2 Rx Beam Peak
Assumption for UE beams ^{Note 7}	1~4		J	ugh		ugh
	1, 2	dBm/15kH	-90.6	-90.6	(Table B.2.3-2	(Table B.2.3-2
$N_{oc}^{ m Note1}$	3, 4	z ^{Note4}	-93.7	-93.7	Rx Beam Peak ^{Note 8} +1.97dB)	Rx Beam Peak ^{Note 8} -3.03dB)
N	1, 2	dBm/SCS	-81.6	-81.6	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +11.0dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +6.0dB)
N_{oc} Note1	3, 4	Note4	-81.7	-81.7	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +14.0dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +9.0dB)
\hat{E}_{s}/N_{oc}	1~4	dB	6.0	6.0	17.0	-1.0
	1, 2		-75.6	-75.6	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +28.0dB)	(Table B.2. 3-2 Rx Beam Peak ^{Note 8} +5.0dB)
SSB_RPNote2	3, 4	dBm/SCS	-75.7	-75.7	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +31.0dB)	(Table B.2. 3-2 Rx Beam Peak ^{Note 8} +8.0dB)
(SSB_RP _{Cell 2} - SSB_RP _{Cell 3})	1~4	dB	()	23	.00
$\hat{E}_{s}/I_{_{otBB}Note6}$	1, 2 3, 4	dB	5.26 4.61	5.96 5.91	9.53	-3.46
Io ^{Note2}	1, 2	dBm/95.04	-50.00	-50.00	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +52.68dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +33.13dB)
	3, 4	MHz Note4	-50.09	-50.09	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +55.69dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +36.14dB)
(IOfreq 1 - IO freq 2)	1~4	dB	()		.55

Note 1:	Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN
	of appropriate power for N_{oc} to be fulfilled.
Note 2:	SSB_RP, Es/lot, Io, (SSB_RP _{Cell 3} – SSB_RP _{Cell 2}) and (Io _{freq 2} – Io _{freq 1}) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	Void
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	Void
Note 6:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB _P or Δ MB _S from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS _{SSB} = 120 kHz, selected according to the operating band of cell 3 and UE power class, without Δ MB _{P,n} adjustment.

A.5.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Table A.5.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3,4	
	Cell 2	SSB_RP2 -δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 +δ +G _{max}	
	Cell 3	SSB_RP3 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 + δ +G _{max}	
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zor configured in the test for the cell n under consideration			
Note 2:			
Note 3:	G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class		
Note 4:		overage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from auses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X evalue.	

Table A.5.7.1.2.3-2: SS-RSRP relative accuracy test requirement

Test requirement Notes1,2,3,4					
С	Cell 3 – Cell 2	SSB_RP3 - SSB_RP2 -δ ≤ Reported RSRP(dB) ≤ SSB_RP3 - SSB_RP2 +δ –(X)			
Note 1:		uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone st for the cell n under consideration			
Note 2: δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1 Note 3: Void					
Note 4:		overage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from causes 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is value.			

A.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	bandwidth, TDD duplex mode
	bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz	
	bandwidth, TDD duplex mode	
Note: The L	JE is only required to be tested in one of the su	pported test configurations

A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Doromotor	Config	Unit	Tes	st 1	Test 2		
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~6		freq1	freq2	freq1	freq2	
	1,4		10: N _{RB,c} = 52		10: N _{RB,c} = 52		
BW _{channel}	2,5	2,5 MHz		100: N _{RB,c} = 66	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	3,6		N _{RB,c} = 52 40: N _{RB,c} = 106		40: N _{RB,c} = 106		
Data RBs allocated	1,2,4,5		52	24	52	66	
Data RBS allocated	3,6		106	24	106	66	
Gap pattern ID			0 0)		
Duplex mode	1,4		FDD	TDD	FDD	TDD	

	2.5		TDD		TDD		
	2,5		TDD		TDD		
	3,6		TDD		TDD		
	1,4		N/A		N/A		
TDD configuration	2,5		TDDConf.	TDDConf.	TDDConf.	TDDConf.	
TDD configuration			1.1	3.1	1.1 TDDConf.	3.1	
	3,6		TDDConf.				
			2.1		2.1		
PDSCH Reference	1,4		SR.1.1 FDD		SR.1.1 FDD		
measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	
	3,6		SR.2.1 FDD		SR.2.1 FDD		
RMSI CORESET	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-	
Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	
	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-	
	1,4		SSB.1		SSB.1		
	, -		FR1	007.5	FR1	007.5	
SSB configuration	2,5		SSB.1	SSB.3	SSB.1	SSB.3	
	,-		FR1	FR2	FR1	FR2	
	3,6		SSB.2		SSB.2		
OONO Dettorio			FR1	00.0	FR1	OD 4	
OCNG Patterns	1~6		OP.1	OP.3	OP.1 OP.1		
Initial BWP	1~6		DLBWP.0.1		DLBWP.0.1		
Configuration Dedicated BWP			ULBWP.0.1 DLBWP.1.3		ULBWP.0.1 DLBWP.1.3		
	1~6		ULBWP.1.3		_		
configuration	1.0				ULBWP.1.3 TRS.2.1 TDD		
TRS Configuration PDCCH/PDSCH TCI	1~6		185.2.	.1 TDD	185.2.	טטו ו	
	1~6		TCI.S	tate.2	TCI.State.2		
Configuration	_		_				
SMTC configuration	1~6		SMT	ГС.1	SMT	C.1	
Time offset between	1~6	μs	3	3	3		
Cell 2 and Cell 3		•			 		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to							
PBCH DMRS							
EPRE ratio of PDCCH							
DMRS to SSS							
EPRE ratio of PDCCH to	4.0	40				0	
PDCCH DMRS	1~6	dB	0	0	0	0	
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to							
PDSCH DMRS							
EPRE ratio of OCNG							
DMRS to SSS ^{Note 1}							
EPRE ratio of OCNG to							
OCNG DMRS Note 1				414/651		414/01/	
Propagation condition	1~6	-	NA Linksonks	AWGN	NA Linksonks	AWGN	
Antonno ocafianastia	4.0		Link only, see clause	1,:0	Link only,	450	
Antenna configuration	1~6	-	A.3.7A	1x2	see clause A.3.7A	1x2	

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Void Note 1:

Note 2:

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test 2 NOTE 3		
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b	
Assumption for UE beams ^{Note 4}			N/A	Rough	N/A	Rough	
N_{oc}	1~6	dBm/15 kHz		-90		NA	
N_{oc}	1~6	dBm/SS B SCS		-80.97		NA	
\hat{E}_s/N_{oc}	1~6	dB		5		NA	
Es	1~6	dBm/SC S	NA Link only,		B.2 Spl NA cov	(Table B.2.3-2 Spheric al coverag e +1dB)	
SSB_RPNote1	1~6	dBm/SC S	see clause A.3.7A	-76.0	see clause A.3.7A	(Table B.2.3-2 Spheric al coverag e +1dB)	
$\hat{E}/I_{ ext{otBB}^{ ext{Note6}}}$	1~6	dB		4.35		-3.81	
Io ^{Note1}	1~6	dBm/ 95.04M Hz		-50.18		SSB_R P+28.9 8	

- Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Void
- Note 3: No additional noise is added by the test system in Test 2.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.
- Note 5: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of

appropriate power for N_{oc} to be fulfilled.

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.5.7.2 SS-RSRQ

A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is on	ly required to pass in one of the supported test configurations

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Dem	Parameter		Tes	t 1	Test 2	
Parameter		Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN		Free	q1	Freq1		
Duplex mode		TD		TDD		
TDD configuration			TDDCo	nf.3.1	TDDC	onf.3.1
BW _{channel}		MHz	100: N _{RE}	$_{B,c} = 66$	100: N _R	$_{\rm B,c} = 66$
Data RBs allocated			66		6	6
	Initial DL BWP				NP.0.1	
BWP	Dedicated DL BWP				NP.1.1	
configuration	Initial UL BWP				NP.0.1	
	Dedicated UL BWP			ULB	WP.1.1	
TRS configuration			TRS.2.1		TRS.2.1	
			TDD		TDD	
TCI state			TCI.State		TCI.State	
			.0 SR.3.1		.0 SR.3.1	
PDSCH Reference r	measurement channel		TDD		TDD	
			CR.3.1		CR.3.1	
RMSI CORESET Reference Channel			TDD	-	TDD	-
			CCR.3.1		CCR.3.1	
Control channel RMC			TDD	-	TDD	-
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
SMTC configuration			SMTC.1			
SSB configuration			SSB.3	SSB.3	SSB.3	SSB.3
			FR2	FR2	FR2	FR2
PDSCH/PDCCH sub		kHz	120	120	120	120
SS-RSSI-Measurem				Not Ap	oplicable	
EPRE ratio of PSS t						
EPRE ratio of PBCH						
EPRE ratio of PBCH						
EPRE ratio of PDCC						
EPRE ratio of PDSC	CH to PDCCH_DMRS	dB	0	0	0	0
	CH to PDSCH_DMRS					
	DMRS to SSS ^{Note 1}					
EPRE ratio of OCNO	6 to OCNG DMRS Note 1					
LI IL IAIIO OI OOI10	o to corto divirto					
Propagati	ion condition		AWGN		AW	GN
	Configuration		1x2	1x2	1x2	1x2
	all be used such that bot	h cells are fully				
	ectral density is achieved					
Note 2: Void						
Note 3: Void						
Note 4: Void						
Note 5: Void						

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

	Parameter	Unit	Tes	st 1	Test 2		
Parameter		Unit	Cell 2	Cell 3	Cell 2	Cell 3	
Angle of arrival configuration			Setup 1 according to clause A.3.15.1		Setup 1 according to clause A.3.15.1		
Assumpti	ion for UE beams ^{Note 9}				Rough		
N_{oc} Note1	ı	dBm/15kHz ^N	-9	5	-95		
N_{oc} Note1	ı	dBm/SCS ^{Note}	-86		-8	36	
\hat{E}_{s}/N_{oc}	;	dB	3	3	-3	-3	
SSB_RP	Note2	dBm/SCS Note4	-83	-83	-89	-89	
SS-RSRQ Note2		dB	-14.77	-14.77	-16.81	-16.81	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-1.76	-1.76	-4.76	-4.76	
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-50		54		
Note 1:	Interference from other cells and	noise sources no	ot specified	in the test	is assumed to	be constant	
	over subcarriers and time and shafulfilled.	all be modelled a	as AWGN o	f appropria	te power for $\it I$	${ m V}_{oc}$ to be	
Note 2:	SS-RSRQ, SSB_RP, and lo level purposes. They are not settable p			ther param	eters for inforr	nation	
Note 3:	SS-RSRQ and SS-RSRP minimu and noise at each receiver antenr		are specifie	ed assumin	g independent	interference	
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone						e	
Note 5:	As observed with 0dBi gain anten	ina at the centre	of the quie	t zone			
Note 6: Note 7:	Void Void						
Note 7:	Void						
Note 9:	Information about types of UE bea	am is given in B.	2.1.3, and	does not lin	nit UE implem	entation or	

A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.8.1.1. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3.

A.5.7.2.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.2.1 Test Purpose and Environment

test system implementation

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.5.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.5.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Poro	meter	Unit	Tes	st 1	Cell 2 freq1 TI TDDC 100: N (P.0.1 /P.0.1	st 2
Para	meter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN			Freq1	freq2	freq1	Freq2
Duplex mode			TE	DD	TDD	
TDD configuration			TDDC	onf.3.1	TDDC	onf.3.1
BW _{channel}		MHz	100: N _F	RB,c = 66	100: N _F	RB,c = 66
Data RBs allocated			6	6	6	6
	Initial DL BWP			DLBV	VP.0.1	
BWP configuration	Dedicated DL BWP			DLBV	VP.1.1	
· ·	Initial UL BWP				VP.0.1	
	Dedicated UL BWP			ULBV	VP.1.1	
TDC configuration			TRS.2.		TRS.2.	
TRS configuration			1 TDD	-	1 TDD	-
TCI state			TCI.Sta		TCI.Sta	
TOTState			te.0	-	te.0	-
			SR.3.1		SR.3.1	
PDSCH Reference m	neasurement channel		TDD	-	TDD	-
			CR.3.1			
RMSI CORESET Re	ference Channel		TDD	-	TDD	-
OCNG Patterns			OP.1	OP.1	OP.1	OP.1
000 " "			SSB.3	SSB.3	SSB.3	SSB.3
SSB configuration			FR2	FR2		FR2
OMTO C C			SMTC.	SMTC.		SMTC.
SMTC configuration			1 FR2	1 FR2	1 FR2	1 FR2
PDSCH/PDCCH sub	carrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to	SSS					
EPRE ratio of PBCH	_DMRS to SSS					
EPRE ratio of PBCH	to PBCH_DMRS					
EPRE ratio of PDCC	H_DMRS to SSS	-ID		0		
EPRE ratio of PDCC	H to PDCCH_DMRS	dB	0	0	U	0
EPRE ratio of PDSC	H_DMRS to SSS					
EPRE ratio of PDSC						
EPRE ratio of OCNG						
EPRE ratio of OCNG						
1						
Propagation condition			AWGN	AWGN	AWGN	AWGN
Antenna configuratio		1x2	1x2	1x2	1x2	
Note 1: OCNG sha	all be used such that bo	th cells are full	y allocated	and a cons	stant total	
	d power spectral density	y is achieved fo	or all OFDM	symbols.		
Note 2: Void						
Note 3: Void						

Note 3: Void Note 4: Void

Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
Parameter		Cell 2	Cell 3	Cell 2	Cell 3

AoA setup			Setup 1 in clause in clause A.3.15		Setup 1 in claus in clause A.3.1	
Assumption for UE beams ^{Note 8}				ugh	1	ugh
N_{oc} Note		dBm/15kHz ^N	-94.03	-94.03	-94.03	-94.03
N_{oc} Note	1	dBm/SCS ^{Note}	-85.0	-85.0	-85.0	-85.0
\hat{E}_s/N_o	c	dB	-1.75	-1.75	-3	-3
SSB_RP		dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSR	QNote2	dB	-14.75	-14.75	-15.56	-15.56
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-1.75	-1.75	-3	-3
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25
Note 1:	Interference from other cells and constant over subcarriers and time					
	for N_{oc} to be fulfilled.					
Note 2:	SS-RSRQ, SSB_RP, and lo level information purposes. They are n	ot settable parar	meters the	mselves.		
Note 3:	Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					
Note 4:	·					
Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone						
	Note 6: Void					
Note 7:	Void	am is givan in P	212 224	door not l	imit LIE	
NOLE O.	te 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation					

A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.5.7.3 SS-SINR

A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE is of	only required to pass in one of the supported test configurations

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit		st 1	Test 2	
Parameter	Offic	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN			eq2		eq2
Duplex mode			DD		DD
TDD configuration			onf.3.1		onf.3.1
BWchannel	MHz		RB,c = 66	100: N _F	RB,c = 66
Data RBs allocated		6	6	_	6
Downlink initial BWP configuration				VP.0.1	
Downlink dedicated BWP configuration				VP.1.1	
Uplink initial BWP configuration				VP.0.1	
Uplink dedicated BWP configuration				VP.1.1	
DRX cycle configuration	ms			plicable	
TRS configuration				.1 TDD	
TCI state			TCI.S	State.0	
PDSCH Reference measurement channel		SR.3.1		SR.3.1	
1 DSCIT Reference measurement channel		TDD		TDD	
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1	_
		TDD	_	TDD	_
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_
Channel		.1 TDD		1 TDD	
OCNG Patterns		OP.1	OP.1	OP.1	OP.1
SMTC configuration				TC.1	1
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1
PDSCH/PDCCH subcarrier spacing	kHz	FR2 120	FR2 120	FR2 120	FR2 120
SS-RSSI-Measurement	KI IZ	120		plicable	120
EPRE ratio of PSS to SSS			Ινοι Αμ	plicable	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS	dB	0	0	0	0
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
EFRE Tallo of OCING to OCING DIVING					
Propagation conditions		A1A	/GN	A1A	'GN
		AV	I GIN	AVV	UIN
Antenna configuration		1x2	1x2	1x2	1x2
Note 1: OCNG shall be used such that bot				stant total	I
transmitted power spectral density Note 2: Void	is achieved to	or all OFDM	symbols.		
NOTO Z. VOIU					

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

	Parameter	Unit	Tes	st 1	Tes	st 2
raiametei		Onit	Cell 2	Cell 3	Cell 2	Cell 3
				up 1		up 1
Angle of	arrival configuration		according to			ding to
A = = : : :== := 4:	Son for LIC became Note 9			A.3.15.1	clause A.3.15.1	
	on for UE beams ^{Note 9}		RO	ugh	RO	ugh
N_{oc} Note1		dBm/15kHz Note4	-105		-105	
N_{oc} Note1		dBm/SCS Note3	-(96	-9	96
\hat{E}_s/N_{oc}		dB	4.54	2.66	-3	-3
	SS-RSRP ^{Note2} dBm/SCS Note4 -91.46 -93.34		-99	-99		
SS-SINR	Note2	dB	0	-3.2	-4.76	-4.76
$\hat{E}_{_{s}}/I_{_{ot}}$		dB	0	-3.2	-4.76	-4.76
Io ^{Note2}		dBm/95.04 MHz Note4	59.43		-64	
Note 1:	Interference from other cells and constant over subcarriers and time					
	for N_{oc} to be fulfilled.					
Note 2:	SS-SINR, SSB_RP, and lo levels information purposes. They are n				eters for	
Note 3:	SS-SINR and SS-RSRP minimum interference and noise at each re-	ceiver antenna p	ort.			
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of						t zone
Note 5:	As observed with 0dBi gain anten	na at the centre	of the quie	et zone		
Note 6:	Void					
Note 7:						
Note 8:	Void		040 - 1	da	:::: 1 1 .	
Note 9:	Information about types of UE be implementation or test system im		.2.1.3, and	aoes not I	imit UE	

A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy

requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.5.7.3.2.2-2: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Davamatas	Unit	Te	Test 1		Test 2		Test 3	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2	
Duplex mode			TDD		TDD		TDD	
TDD configuration		TDDC	onf.3.1	TDDConf.3.1		TDDConf.3.1		
BW _{channel}	MHz	100: N	RB,c = 66	100: N	RB,c = 66	100: N _{RB,c} = 66		
Data RBs allocated		6	6		6	6	6	
Downlink initial BWP configuration					/P.0.1			
Downlink dedicated BWP configuration					/P.1.1			
Uplink initial BWP configuration				ULBV				
Uplink dedicated BWP configuration					/P.1.1			
DRX cycle configuration	ms				olicable			
TRS configuration					.1 TDD			
TCI state					tate.0			
		SR.3.1		SR.3.1		SR.3.1		
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-	
		CR.3.1		CR.3.1		CR.3.1		
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-	
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1	
SMTC configuration		SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	SMTC. 1 FR2	
SSB configuration		SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	
· ·		FR2	FR2	FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120	
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of PDCCH_DMRS to SSS	dB	0	0	0	0	0	0	
EPRE ratio of PDCCH to PDCCH_DMRS								
EPRE ratio of PDSCH_DMRS to SSS								
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSSNote 1								
EPRE ratio of OCNG to OCNG DMRS Note								
Propagation conditions		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN	
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2	
Note 1. OCNIC aball be used such that be			· .					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
Parameter		Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3

Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beams ^{Note 10}		Ro	ugh	Ro	ugh	Rough	
$N_{oc}^{}$ Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
$N_{oc}^{}$ Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11	11.	-3.0	-3.0
SS-RSRP ^{Note2}	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0
\hat{E}_{s}/I_{ot}	dB	-0.5	-0.5	11	11	-3.0	-3.0
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: Void
- Note 7: Void
- Note 8: Void
- Note 9: Void
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.5.7.4 L1-RSRP measurement for beam reporting

A.5.7.4.1 SSB based L1-RSRP measurement

A.5.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.5.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.5.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.5.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~4		freq1	freq1
Duplex mode	1~4		TDD	TDD
TDD Configuration	1~4		TDDConf.3.1	TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	1~4		66	66
PDSCH Reference	1,2		SR.3.2 TDD	SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD	CR.3.1 TDD
Channel	3,4		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1,2		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD	CCR.3.7 TDD
	1,2		SSB.1 FR2	SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
Initial DMD Configuration	4 4		DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~4		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3	DLBWP.1.3
			ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~4		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI	1~4		TCI.State.2	TCI.State.2
Configuration				
SMTC configuration	1~4		SMTC.1	SMTC.1
reportConfigType	1~4		periodic	periodic
reportQuantity	1~4		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~4		2	2
L1-RSRP reporting period	1~4		slot320	slot320
Propagation condition	1~4		AWGN	AWGN
Antenna configuration			1x2	1x2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~4	dB	0	0
EPRE ratio of PDSCH to PDSCH				
DMRS EPRE ratio of OCNG DMRS to				
SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG				
DMRS Note 1				

OCNG shall be used such that both cells are fully allocated and a constant total Note 1:

transmitted power spectral density is achieved for all OFDM symbols.

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power Note 2:

for N_{oc} to be fulfilled.

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test 2	NOTE 3
Parameter	Config	Onit	SSB0	SSB1	SSB0	SSB1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 according to	
			A.3.	15.1	A.3.1	5.1
Assumption for UE beams ^{Note 4}			Rou	ıgh	Rou	gh
λI	1~4	dBm/15	-10	20	n	
N_{oc}	1~4	kHz	- 11	50	n.a.	
M	1,2	dBm/SS	-91		n.a.	
N_{oc}	3,4	B SCS	-8	8	n.a	ì.
\hat{E}_{s}/I_{ot}	1~4	dB	10	-2	n.a	1
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~4	ub.	10	-2	11.6	4.
SSB_RP ^{Note1}	1,2	dBm/SC	-81	-93	As in Table	e B.2.4-2
33B_KF	3,4	S	-78	-90	As in Table	e B.2.4-2
		dBm/	-51	57		
Io ^{Note1}	1~4	95.04M	-51	.57	SSB_RP	+28.98
		Hz				
\hat{E}_{s}/N_{oc}	1~4	dB	10	-2	n.a	<u> </u>
L_s/I_{oc}	1~4	ub	10	-2	11.0	a.

Note 1: SSB_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

A.5.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.5.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3			
	SSB0	SSB_RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq SSB_RP0 + δ + G _{max}			
	SSB1	SSB_RP1 - δ + G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 + δ + G _{max}			
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration				
Note 2:					
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss			

A.5.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.5.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.5.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations in each supported band

A.5.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.5.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
CSI-RS	1~2		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		cri-RSRP	cri-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot320	slot320
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1~2	UD		U
DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OEDM symbols

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

			Tes	Test 1		NOTE 3
Parameter	Config	Unit	CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 according to	
			A.3.	15.1	A.3.1	5.1
Assumption for UE beams ^{Note 4}			Rou	ıgh	Rou	gh
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1~2	dB	10	-2	n.a.	
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2	
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-59.86		SS-RSRF	°+28.98
\hat{E}_s/N_{oc}	1~2	dB	-51.57	-2	n.a	l .

- Note 1: RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 3: No additional noise is added by the test system in Test 2.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.5.7.4.2.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3					
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}					
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}					
Note 1:	e 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration						
Note 2:	δ is the RSRP abso in the test	lute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used					
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss					

A.5.8 Void

A.6 NR standalone tests with all NR cells in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

С	onfiguration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3	Cell1	
condition					
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
RF Channe			1, 2, 3	1	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	SMTC configuration		1	SMTC.2	Configured in SIB2 of Cell 1
				SMTC.6	Configured in SIB2 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2, 3	Not configured	
T1		S	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		S	1, 2, 3	40	T2 needs to be defined so that cell re- selection reaction time is taken into account.
T3		S	1, 2, 3	15	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in **AWGN**

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T1 T2 T3			T2	T3
TDD configuration		1		N/A		N/A		
		2	Т	DDConf.1.	1	TI	DDConf.1.	.1
		3	TDDConf.2.1 TDDConf.2				DDConf.2.	.1
PDSCH RMC		1	5	R.1.1 FDD)	S	SR.1.1 FDD	
configuration		2	5	R.1.1 TDD)	S	R.1.1 TDI)
		3	5	R.2.1 TDD)	S	R.2.1 TDI)
RMSI CORESET		1		CR.1.1 FDC		C	R.1.1 FDI)
RMC configuration		2	(CR.1.1 TDD)	C	R.1.1 TDI)
		3	(CR.2.1 TDD)	C	R.2.1 TDI)
Dedicated		1	С	CR.1.1 FDI	D		CR.1.1 FD	
CORESET RMC		2	С	CR.1.1 TDI	D	C	CR.1.1 TD	D
configuration		3		CR.2.1 TDI		C	CR.2.1 TD	D
OCNG Pattern		1, 2, 3		defined in A			lefined in A	
Initial DL BWP		1, 2, 3		DLBWP.0.1			LBWP.0.	1
configuration								
Initial UL BWP		1, 2, 3	ι	JLBWP.0.1		L	JLBWP.0.	1
configuration								
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2		-130			-130	
		3		-127			-127	
Pcompensation	dB	1, 2, 3		0		0		
Qhysts	dB	1, 2, 3	0			0		
Qoffsets, n	dB	1, 2, 3		0		0		
Cell_selection_and_		1, 2, 3		SS-RSRP			SS-RSRP	
reselection_quality_								
measurement				T	1			
Ê s /I ot	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11
		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
- · oc								
		2			-98			
		3			-95			
Note2	dBm/15 kHz	1			-98			
1 V _{oc}								
		2						
		3		1	1	1		
\hat{E}_{s}/N_{oc}	dB	1	16	13	16	-infinity	16	13
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
lo	dBm/9.36 MHz	1	-53.94	-52.21	-52.21		as param	
							l in Cell 1	
	dBm/9.36 MHz	2	-53.94 -52.21 -52.21					
	dBm/38.16 MHz	3	-47.85 -46.12 -46.12					
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3		60			60	
Propagation		1, 2, 3			AWG	N		
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Interference from other cells and noise sources not specified in the test is assumed to be constant over Note 2:

subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

Note 3: parameters themselves.

A.6.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than $8\ s.$

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{\text{evaluate, NR_intra}} + T_{\text{SI-NR}}$,

Where:

 $T_{\text{detect, NR_Intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3}$ $T_{\text{evaluate, NR_intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3}$

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s for the cell re-selection delay to an already detected cell in the test case, which we allow 8 s.

A.6.1.1.2 Cell reselection to FR1 inter-frequency NR case

A.6.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.6.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.2.2-1, A.6.1.1.2.2-2 and A.6.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.6.1.1.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD			
	duplex mode	duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode	duplex mode			
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3	Cell 2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2, 3	Cell 1	phase and during T1 period the UE reselects to cell 1
T1 end	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3	Cell2	during T1
T3 end	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3	Cell 1	with higher priority during T3
RF Channe			1, 2, 3	1, 2	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	Configured in SIB4 of Cell 1
				SMTC.6	Configured in SIB4 of Cell 2
			2	SMTC.1	J
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2, 3	Not	
				configured	
T1		S	1, 2, 3	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
T3		S	1, 2, 3	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1		Cell 2			
		configuration	T1	T2	T3	T1	T2	T3

TDD configuration		1		N/A			N/A	
1DD coringalation		2	Т	DDConf.1.	1	Т	DDConf.1.	1
		3	TDDConf.2.1				DDConf.2.	
PDSCH RMC		1		SR.1.1 FDD			SR.1.1 FDD	
configuration		2	SR.1.1 TDD				SR.1.1 TDD	
comigaration		3	SR.2.1 TDD				SR.2.1 TDD	
RMSI CORESET		1	CR.1.1 FDD CR.1.					
RMC configuration		2		CR.1.1 TDD			CR.1.1 TD	
Time comigaration		3		CR.2.1 TDD			CR.2.1 TDE	
Dedicated		1		CR.1.1 FDI			CR.1.1 FD	
CORESET RMC		2		CR.1.1 TDI			CR.1.1 TD	
configuration		3		CR.2.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.	
configuration		1, 2, 0		JEBVVI .0.1			JLDVVI .0.	•
Initial UL BWP		1, 2, 3	ı	JLBWP.0.1		l	JLBWP.0.	1
configuration		., _, o				,	0	•
RLM-RS		1, 2, 3		SSB			SSB	
Qrxlevmin	dBm/SCS	1, 2		-140			-140	
		3		-137			-137	
Pcompensation	dB	1, 2, 3		0			0	
Cell_selection_and_	4.2	1, 2, 3		SS-RSRP			SS-RSRP	
reselection_quality_		., _, o	JO-KOKF					
measurement								
Ê _s /I _{ot}	dB	1	14	14	14	-4	-infinity	12
s / Ot		2	†					
		3	†					
λ7 Note2	dBm/SCS	1	-98					
N_{oc} Note2								
		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
OC		2	+					
		3	1					
\hat{E}_{s}/N_{oc}	dB	<u>3</u> 1	14	14	14	-4	-infinity	12
E _s /N _{oc}	uБ		14	14	14	-4	-inininty	12
		2	4					
OO DODD Noto3	ID (0.00	3	0.4	0.4	0.4	400		00
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-86
		2	-84	-84	-84	-102	-infinity	-86
1-	-ID /O OO MI I-	3	-81	-81	-81	-99	-infinity	-83
lo	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60	70.05	-57.78
	dBm/9.36 MHz	2	-55.88	-55.88	<i>EE</i> 00	-68.60	-70.05	-57.78
	UDIII/9.30 IVITZ	2	-33.00	-55.66	-55.88	-00.00	70.05	-57.76
}	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50	-70.05	-51.69
	UDITI/30.10 WITZ	S	-43.13	-43.73	-43.13	-02.50	-63.96	-51.09
Treselection	S	1, 2, 3	0 0 0		0	0	0	
SnonintrasearchP	dB	1, 2, 3		50			50	
Thresh _{x, highP}	dB	1, 2, 3		48			48	
Thresh _{serving, lowP}	dB	1, 2, 3	 					
Thresh _{x, lowP}	dB	1, 2, 3	44 44 50 50					
Propagation	υ <u>υ</u>	1, 2, 3		50	AWG	N		
Condition		1, 2, 0			AVVO			
Condition			1					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral

density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

 $T_{higher_priority_search}$ See clause 4.2.2.7

T_{evaluate, NR_ inter} See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell reselection delay to a lower priority cell in the test case, which we allow 8 s.

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode				
	FDD duplex mode					
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode				
	TDD duplex mode					
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode				
	TDD duplex mode					
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode				
	FDD duplex mode					
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode				
	TDD duplex mode					
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode				
	TDD duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter	Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition					phase and during T2 period the UE reselects to cell 2.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T2.
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	during T3 for iteration of the tests.
Access Bar	rring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access
					procedure.
DRX cycle	length	S	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACE	NR PRACH configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in
					TS 38.211 clause 6.3.3.2
	PRACH configuration		1, 2, 3	53	As specified in table 5.7.1-2 in
index			4, 5, 6	4	TS 36.211 [23]
T1		S	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off,
					and during the off time the physical cell identity shall be changed. The intention is
					to ensure that cell 2 has not been
					detected by the UE prior to the start of
					period T2.
T2	T2		1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-
					selection reaction time is taken into
					account.
T3		S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell re-
					selection reaction time is taken into
					account.

Table A.6.1.2.1.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1				
			T1	T2	T3		
TDD configuration		1, 4		N/A			
		2, 5	Т	DDConf.1	.1		
		3, 6	Т	DDConf.2	.1		
PDSCH parameters		1, 4	SR.1.1 FDD				
		2, 5		SR.1.1 TD			
		3, 6		SR.2.1 TD	D		
RMSI CORESET		1, 4	(CR.1.1 FD	D		
parameters		2, 5	(CR.1.1 TD	D		
		3, 6	(CR.2.1 TD	D		
Dedicated CORESET		1, 4	С	CR.1.1 FE	DD		
parameters		2, 5	С	CR.1.1 TE	DD		
		3, 6	С	CR.2.1 TE	DD		
SSB parameters		1, 4	;	SSB.1 FR	1		
		2, 5		SSB.1 FR			
		3, 6	;	SSB.2 FR	1		
NR SMTC parameters		1, 4		SMTC.2			
		2, 5		SMTC.1			
		3, 6		SMTC.1			
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 (defined in	A.3.2.1		
Initial DL BWP configuration		1, 2, 3, 4, 5, 6		DLBWP.0.			
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	l	JLBWP.0.	1		
RLM-RS		1, 2, 3, 4, 5, 6		SSB			
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140				
		3, 6		-137			
N_{oc}	dBm/SCS	1, 4		-98			
· oc		2, 5		-98			
		3, 6		-95			

N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6		-98	
SS-RSRP	dBm/SCS	1, 4	-84	-84	-84
55-115111	dBitt/565	2, 5	-84	-84	-84
		3, 6	-81	-81	-81
Ê s /I ot	dB	1, 4	14	14	14
		2, 5 3, 6			
\hat{E}_s/N_{oc}	dB	1, 4	14	14	14
		2, 5 3, 6	+		
lo	dBm/9.36 MHz	1, 4	-55.88	-55.88	-55.88
	dBm/9.36 MHz	2, 5	-55.88	-55.88	-55.88
	dBm/38.16 MHz	3, 6	-49.79	-49.79	-49.79
Treselection	S	1, 2, 3, 4, 5, 6		0	•
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6		50	
Threshx, highP (Note 2)	dB	1, 2, 3, 4, 5, 6		48	
Thresh _{serving, lowP}	dB	1, 2, 3, 4, 5, 6		44	
Thresh _{x, lowP}	dB	1, 2, 3, 4, 5, 6		50	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	

OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell Note 1:

Note 2:

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2				
		T1	T2	Т3		
E-UTRA RF Channel			1			
number						
BWchannel	MHz		10			
OCNG Patterns defined in		_	2 TDD for			
TS 36.133 [15] clause A.3.2			uration 1			
			2 FDD for			
		config	guration 4	, 5, 6		
PBCH_RA	dB	<u> </u>				
PBCH_RB	dB					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB					
PHICH_RA	dB		0			
PHICH_RB	dB		0			
PDCCH_RA	dB					
PDCCH_RB	dB					
PDSCH_RA	dB					
PDSCH_RB	dB					
OCNG_RA ^{Note 1}	dB					
OCNG_RB ^{Note 1}	dB					
Qrxlevmin	dBm		-140			
N_{oc}	dBm/15 kHz		-98			
RSRP	dBm/15 KHz	-infinity	-86	-102		
Ê s /I ot	dB	-infinity	12	-4		
\hat{E}_s/N_{oc}	dB	-infinity 12 -4		-4		
Treselection _{EUTRAN}	S	0				
SnonintrasearchP	dB	Not sent				
Thresh _{x, highP}	dB	48				
Thresh _{serving} , lowP	dB	44				
Thresh _{x, lowP} (Note 2)	dB	50				
Propagation Condition		AWGN				

Note 1:	OCNG shall be used such that both cells are fully allocated
	and a constant total transmitted power spectral density is
	achieved for all OFDM symbols.
Note 2:	This refers to the value of Threshx, Low which is included in E-
	UTRA system information, and is a threshold for the NR target
	cell

A.6.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$

Where:

Thigher_priority_search See clause 4.2.2.7

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
Note: The L	JE is only required to be tested in one of the suppo	orted test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

	Parameter	Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	phase.
T1 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T1.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	during T2 for iteration of the tests.
Access Ba	rring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access
					procedure.
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the
					test.
NR PRACE	I configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in
					TS 38.211 clause 6.3.3.2
E-UTRAN	PRACH configuration		1, 2, 3	53	As specified in table 5.7.1-2 in
index			4, 5, 6	4	TS 36.211 [23]
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-
					selection reaction time is taken into
					account.
T2		S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-
					selection reaction time is taken into
					account.

Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1			
			T1	T2		
TDD configuration		1, 4	N/A	1		
		2, 5	TDDCo	nf.1.1		
		3, 6	TDDCo	nf.2.1		
PDSCH RMC configuration		1, 4	SR.1.1	FDD		
_		2, 5	SR.1.1	TDD		
		3, 6	SR.2.1	TDD		
RMSI CORESET RMC		1, 4	CR.1.1	FDD		
configuration		2, 5	CR.1.1	TDD		
		3, 6	CR.2.1	TDD		
Dedicated CORESET RMC		1, 4	CCR.1.1	FDD		
configuration		2, 5	CCR.1.1	TDD		
		3, 6	CCR.2.1	TDD		
SSB configuration		1, 4	SSB.1			
		2, 5	SSB.1	FR1		
		3, 6	SSB.2			
SMTC configuration		1, 4	SMT	0.2		
		2, 5	SMT			
		3, 6	SMT			
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined			
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWI			
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWI			
RLM-RS		1, 2, 3, 4, 5, 6	SSI	3		
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-14			
		3, 6	-13	7		
N_{oc}	dBm/SCS	1, 4	-98			
T voc		2, 5	-98	3		
		3, 6	-95			
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98			
1 v _{oc}						
SS-RSRP	dBm/SCS	1, 4	-102	-86		
		2, 5	-102	-86		
		3, 6	-99	-83		
Ê s /I ot	dB	1, 4	-4	12		
		2, 5				
		3, 6				
\hat{E}_s/N_{oc}	dB	1, 4	-4	12		
		2, 5				
		3, 6				
lo	dBm/9.36 MHz	1, 4	-68.60	-57.78		
	dBm/9.36 MHz	2, 5	-68.60	-57.78		
	dBm/38.16 MHz	3, 6	-62.50	-51.69		
Treselection	S	1, 2, 3, 4, 5, 6	0			
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50			
Threshx, highP	dB	1, 2, 3, 4, 5, 6	48			
Thresh _{serving} , lowP	dB	1, 2, 3, 4, 5, 6	44			
Thresh _{x, lowP} (Note 2)	dB	1, 2, 3, 4, 5, 6	50			
Propagation Condition		1, 2, 3, 4, 5, 6	AWC	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh_{x, Low} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Cell 2						
		T1	T2					
E-UTRA RF Channel			1					
number								
BWchannel	MHz	10						
OCNG Patterns defined in			D for test					
TS 36.133 [15] clause A.3.2			tion 1, 2, 3;					
			D for test					
		configura	tion 4, 5, 6					
PBCH_RA	dB							
PBCH_RB	dB							
PSS_RA	dB							
SSS_RA	dB							
PCFICH_RB	dB							
PHICH_RA	dB		0					
PHICH_RB	dB		0					
PDCCH_RA	dB							
PDCCH_RB	dB							
PDSCH_RA	dB							
PDSCH_RB	dB							
OCNG_RA ^{Note 1}	dB							
OCNG_RB ^{Note 1}	dB							
Qrxlevmin	dBm	-1	140					
N_{oc}	dBm/15 kHz	-	98					
RSRP	dBm/15 KHz	-84	-84					
Ê s /I ot	dB	14	14					
\hat{E}_s/N_{oc}	dB	14 14						
TreselectionEUTRAN	S	0						
SnonintrasearchP	dB	Not sent						
Thresh _x , highP (Note 2)	dB	48						
Thresh _{serving} , lowP	dB	44						
Thresh _{x, lowP}	dB	50						
Propagation Condition		AV	/GN					
	Note 1: OCNG shall be used such that both cells are fully allocated							

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is

achieved for all OFDM symbols.

Note 2: This refers to the value of Threshx, high which is included in E-UTRA system information, and is a threshold for the NR target cell

A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than $8\ s.$

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: T_{evaluate, E-UTRAN} + T_{SI-E-UTRA},

Where:

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.2 SA: RRC INACTIVE state mobility

A.6.3 RRC_CONNECTED state mobility

A.6.3.1 Handover

A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell

A.6.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.1.2-2, and A.6.3.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.6.3.1.1.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description				
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.3.1.1.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offset		dB	0	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	
T3		s	1	

Table A.6.3.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit	Cell 1 Ce					
		Onit	T1	T2	Т3	T1	T2	Т3
NR RF Channel Number				1			1	
Duplex mode	Config 1		FDD					
	Config 2,3				TE	DD		
	Config 1		Not Applicable					
TDD configuration	Config 2		TDDConf.1.1					
	Config 3				TDDC	onf.2.1		

	Config 1	T .	I		10. N-	- F2		
BW _{channel}	Config 1	MHz				B,c = 52		
DVV channel	Config 2	IVITZ	10: N _{RB,c} = 52 40: N _{RB,c} = 106					
	Config 3							
DIA/D DIA/	Config 1	N 41 1-	10: N _{RB,c} = 52 10: N _{RB,c} = 52					
BWP BW	Config 2	MHz						
DD 0 1	Config 3			40: N _{RB,c} = 106				
DRx Cycle	10 "	ms		Not Applicable SR.1.1 FDD				
PDSCH Reference	Config 1							
measurement channel	Config 2			SR.1.1 TDD				
	Config 3					1 TDD		
CORESET Reference	Config 1					1 FDD		
Channel	Config 2					1 TDD		
Charliner	Config 3					1 TDD		
	Config 1				TRS.1	.1 FDD		
TRS configuration	Config 2				TRS.1	.1 TDD		
· ·	Config 3				TRS.1	.2 TDD		
OCNG Patterns						P.1		
SMTC Configuration					SM			
	Config 1,2							
SSB Configuration	SSB Configuration Config 3		SSB.1 FR1 SSB.2 FR1					
PDSCH/PDCCH	Config 1,2					kHz		
subcarrier spacing	Config 3	kHz						
PUCCH/PUSCH	Config 1,2			30 kHz 15 kHz				
subcarrier spacing	Config 1,2	kHz	30 kHz					
PRACH configuration	Corning 5							
	Initial DL DWD		FR1 PRACH configuration 1					
BWP configuration			DLBWP.0.1					
Dedicated DL			DLBWP.1.1					
	BWP					/D 0 4		
	Initial UL BWP					/P.0.1		
	Dedicated UL			ULBWP.1.1				
EDDE	BWP							
EPRE ratio of PSS to S								
EPRE ratio of PBCH D								
EPRE ratio of PBCH to		ļ						
EPRE ratio of PDCCH								
EPRE ratio of PDCCH		dB			()		
EPRE ratio of PDSCH					`			
EPRE ratio of PDSCH								
EPRE ratio of OCNG I	\ ,							
EPRE ratio of OCNG to	o OCNG DMRS (Note							
1)								
N oc Note2		dBm/15kH			_0	98		
		Z						
Note2 Config 1,2						98		
Config 3		dBm/SCS			-6	95		
\hat{E}_{s}/I_{ot}		dB	8	-3.3	-3.3	- Infinity	2.36	2.36
						Infinity -		
\hat{E}_{s}/N_{oc}		dB	8	8	8	Infinity	11	11
Config 1,2		dBm/SCS	-90	-90	-90	- Infinity	-87	-87
SSB_RP Config 3		dDm/000	07	0.7	0.7		0.4	0.4
Config 3		dBm/SCS	-87	-87	-87	Infinity	-84	-84
Config 1,2		dBm/ 9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06
Io ^{Note3}		dBm/	FF 04	50.00	50.00	FF 04	50.00	50.00
Config 3		38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96
Propagation condition		1	AWGN AWGN					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 62$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.2.2-2, and A.6.3.1.2.2-3.

The test scenario comprises of two cells on one carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.2.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description	
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is	s only required to be tested in one of the supported test configurations	

Table A.6.3.1.2.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Par	Parameter		Value	Comment
Initial conditions	Initial conditions		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Inf	Access Barring Information		Not Sent	No additional delays in random access procedure.
Time offset between	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Dovementor		Unit	Cell 1		Cell 2		
Parai	Parameter		T1	T2	T1	T2	
NR RF Channel Number			1		1		
Dlass and a	Config 1			FI	OD)	
Duplex mode	Config 2,3		TDD				
	Config 1		Not Applicable				
TDD configuration	Config 2		TDDConf.1.1				
	Config 3		TDDConf. 2.1				

DW.		Config 1	NALI-		10: N _{RE}			
BWchannel		Config 2	MHz		10: N _{RE}			
		Config 3			40: N _{RB}	_{,c} = 106		
DIA/D DIA/		Config 1	N 41 1—		10: N _{RE}			
BWP BW		Config 2	MHz		10: N _{RE}			
DD. OI-		Config 3		40: N _{RB,c} = 106				
DRx Cycle	!	10 " 1	ms		Not App			
PDSCH R	eference	Config 1			SR.1.1			
	ent channel	Config 2			SR.1.1			
		Config 3			SR2.1			
CORESET Reference		Config 1			CR.1.1			
Channel		Config 2			CR.1.			
		Config 3			CR2.1			
		Config 1			TRS.1.			
TRS config	guration	Config 2			TRS.1.			
		Config 3			TRS.1.			
OCNG Pat					OF			
SMTC Cor	nfiguration	T			SMT			
SSB Confi	guration	Config 1,2			SSB.1			
	Config 3				SSB.2			
PDSCH/PI	DCCH	Config 1,2	kHz		15 k			
subcarrier		Config 3	NI IZ		30 k	кHz		
PUCCH/P	USCH	Config 1,2	kHz		15 k	кHz		
subcarrier	spacing	Config 3	KHZ					
PRACH co	onfiguration			FR1 PRACH configuration 1				
		Initial DL BWP		DLBWP.0.1				
BWP configuration	Dedicated DL		DLBWP.1.1					
	BWP							
BWP confi	guration	Initial UL BWP		ULBWP.0.1				
	Dedicated UL				ULBWP.1.1			
		BWP						
EPRE ratio	of PSS to S	SS						
EPRE ratio	of PBCH DM	MRS to SSS						
EPRE ratio	of PBCH to	PBCH DMRS						
EPRE ratio	of PDCCH D	MRS to SSS						
EPRE ratio	of PDCCH to	PDCCH DMRS	40					
EPRE ratio	of PDSCH D	MRS to SSS	dB		C)		
EPRE ratio	of PDSCH to	PDSCH						
EPRE ratio	of OCNG DI	MRS to SSS(Note 1)						
		OCNG DMRS (Note						
1)		•						
Note2			dBm/15kH		-9	8		
	Confic 1 0		Z					
N_{oc} Note2	Config 1,2		dBm/SCS		-9			
	Config 3		dBm/SCS		-9		0.04	
Ê s /I ot			dB	8	-0.64	-Infinity	-0.64	
\hat{E}_{s}/N_{oc}	1		dB	8	8	-Infinity	8	
SSB_RP	Config 1,2		dBm/SCS	-90	-90	-Infinity	-90	
20 <u>2</u> _(\(Config 3		dBm/SCS	-87	-87	-Infinity	-87	
Io ^{Note3}	Config 1,2		dBm/ 9.36MHz	-61.41	-58.71	-61.41	-58.71	
.0	Config 3		dBm/ 38.16MHz	-55.31	-52.60	-55.31	-52.60	
Propagation	n condition		-	AW	GN	AW	GN	
		ne used such that hoth	colle ore fully					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 82$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

A.6.3.1.3 Inter-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 inter frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.3.2-2, and A.6.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.3.2-1: Inter-frequency handover from FR1 to FR1 test configurations

Config	Description						
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note: The UE is only re	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.6.3.1.3.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Final condition Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T1		S	5	
T2		S	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Donomotor		Unit	Cell 1		Cell 2		
Para	Parameter		T1	T2	T1	T2	
NR RF Channel Numl	oer		•	1	2	2	
Dunlay mada	Config 1			FD)D		
Duplex mode	Config 2,3		TDD				
	Config 1		Not Applicable TDDConf.1.1				
TDD configuration	Config 2						
-	Config 3		TDDConf.2.1				
	Config 1		10: N _{RB,c} = 52				
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
BWP BW	Config 1	MHz		10: N _{RE}	$_{3,c} = 52$		

	Config 2				10: N _R	B,c = 52		
		Config 3				s,c = 106		
		Config 1				.1 FDD		
TRS config	guration	Config 2		TRS.1.1 TDD				
	,	Config 3			TRS.1			
DRx Cycle	!	, <u></u>	ms			plicable		
		Config 1				1 FDD		
PDSCH Re		Config 2			SR.1.	1 TDD		
measurement channel		Config 3				I TDD		
		Config 1				1 FDD		
	Reference	Config 2				1 TDD		
Channel		Config 3				1 TDD		
OCNG Pat	terns				OF			
SMTC Cor					SM			
		Config 1,2			SSB.			
SSB Confi	guration	Config 3			SSB.:			
PDSCH/PI	OCCH	Config 1,2				kHz		
subcarrier		Config 3	kHz			kHz		
PUCCH/PI		Config 1,2				kHz		
subcarrier		Config 3	kHz			kHz		
	onfiguration	Comig o			FR1 PRACH configuration 1			
110,01100	migaration	Initial DL BWP				/P.0.1		
		Dedicated DL		DLBWP.1.1				
	BWP	BWP			525W			
BWP		Initial UL BWP			ULBWP.0.1			
		Dedicated UL				/P.1.1		
		BWP			<u> </u>			
EPRE ratio	of PSS to S							
	of PBCH DN		İ					
		PBCH DMRS						
		DMRS to SSS						
		o PDCCH DMRS						
		MRS to SSS	dB		()		
	of PDSCH to							
		MRS to SSS(Note 1)						
		OCNG DMRS (Note						
1)	0. 00.10 10							
Noto?			dBm/15kH		20			
N_{oc}			Z	-(98	-98		
. Note2	Config 1,2			-(98	-9)8	
N_{oc}	Config 3		dBm/SCS	-(95	-9	95	
Ê s /I ot			dB	4	4	-Infinity	5	
\hat{E}_{s}/N_{oc}			dB	4	4	-Infinity	5	
	Config 1,2		dBm/SCS	-94	-94	-Infinity	-93	
SSB_RP Config 1,2 Config 3			dBm/SCS	-91	-91	-Infinity	-90	
			dBm/					
Io ^{Note3}	Config 1,2		9.36MHz	-64.59	-64.59	-70.05	-63.85	
	Config 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75	
Propagation	n condition		-	AWGN		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 132 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 122$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 132 ms.

A.6.3.1.4 SA NR - E-UTRAN handover

A.6.3.1.4.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel N	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measur	ement quantity		RSRP	
b2-Threshold1		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.6.3.1.4-3	for event B2
b2-Threshold2EU	ΓRAN	dBm	-98	Absolute E-UTRAN RSRP
				threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Inf	ormation	-	Not sent	No additional delays in random
				access procedure
Time offset between	en cells		3 ms	Asynchronous cells
Gap pattern config	juration Id		0	As specified in Table 9.1.2-1
				started before T2 starts
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit	Configuration	n Cell 1		
		_	T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 4		FDD	
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
BW _{channel}	MHz	1, 4	10:	$N_{RB,c} = 52 (FI)$	DD)
		2, 5	10:	$N_{RB,c} = 52$ (TE	DD)
		3, 6	40:	$N_{RB,c} = 106 (T$	DD)
PDSCH reference measurement		1, 4		SR.1.1 FDD	
channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
TRS configuration		1, 4		TRS.1.1 FDD	
		2, 5		TRS.1.1 TDD	
		3, 6		TRS.1.2 TDD	
OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP	1, 2, 3, 4, 5, 6		DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL BWP			ULBWP.1.1	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
-		3, 6		SSB.2 FR1	
b2-Threshold1	dBm	1, 2, 4, 5		-96	
		3, 6		-93	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH_DMRS to SSS					

		1			
EPRE ratio of PBCH to					
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to					
SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to					
SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS					
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-100	-104	-100
N _{oc} Note2	dBm/SCS	1, 2, 4, 5	-100	-104	-100
		3, 6	-97	-101	-97
Ês/Noc	dB	1, 2, 3, 4, 5, 6	12	0	-4
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	12	0	-4
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104	-104
		3, 6	-85	-101	-101
Io ^{Note3}	dBm/9.36	1, 2, 4, 5	-59.78	-73.04	-70.59
10.1000	MHz				
	dBm/38.16	3, 6	-53.68	-66.9448	-64.49
	MHz				
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2				
			T1	T2	Т3		
RF channel number		1, 2, 3, 4, 5, 6		2			
Duplex mode		1, 2, 3		FDD			
		4, 5, 6		TDD			
TDD special subframe configuration ^{Note1}		4, 5, 6		6			
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1			
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25			
				10 MHz: $N_{RB,c} = 50$			
				20 MHz: N _{RB,c} = 100			
PRACH		1, 2, 3		4			
Configuration ^{Note2}		4, 5, 6		53			
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD				
DL Reference			10 MHz: R.3 FDD				
Measurement			20 MHz: R.6 FDD 5 MHz: R.4 TDD				
Channel ^{Note3}		4, 5, 6					
				10 MHz: R.0 TDD			
				20 MHz: R.3 TDD			
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FDD			
parameters:			10 MHz: R.6 FDD				
DL Reference			20 MHz: R.10 FDD				
Measurement		4, 5, 6	5 MHz: R.11 TDD				
Channel ^{Note3}				10 MHz: R.6 TDD			
Note2				20 MHz: R.10 TDD			
OCNG Patterns ^{Note3}		1, 2, 3		5 MHz: OP.20 FDD			
				10 MHz: OP.10 FDD			
				20 MHz: OP.17 FDD			

		1	1		
		4, 5, 6		5 MHz: OP.9 TDD	
				10 MHz: OP.1 TDD	
				20 MHz: OP.7 TDD	
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB			0	
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG_RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	8	78
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	78	78
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
SCH_RPNote6	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21	-58.57	-58.57
10.10.0			+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration		1, 2, 3, 4, 5, 6		1x2 Low	
and Correlation Matrix					
Note7					
Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].					
Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].					
Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.					
Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral					
density is achieved for all OFDM symbols. Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over					
subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.					

 \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes.

A.6.3.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]

The rate of correct handovers observed during repeated tests shall be at least 90%.

They are not settable parameters themselves.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 35$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

Note 6:

Note 7:

A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell

A.6.3.1.5.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.5-1. General test parameters are provided in Table A.6.3.1.5-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.5-3 and A.6.3.1.5-4 respectively.

Table A.6.3.1.5-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description			
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD			
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD			
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD			
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD			
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD			
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD			
Note: The UE is only required to be tested in one of the supported test configurations				

Table A.6.3.1.5-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel Number			2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		S	≤5	
T2		S	1	

Table A.6.3.1.5-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter		Unit Configuration		Cell 1		
				T1	T2	
RF channel nu	umber		1, 2, 3, 4, 5, 6		1	
Duplex mode			1, 4	FDD		
			2, 3, 5, 6	T	DD	
TDD Configura	ation		2, 5	TDDConf.1.1		
			3, 6	TDDConf.2.1		
BW _{channel}		MHz	1, 4	10: N _{RB,c} :	= 52 (FDD)	
			2, 5	10: $N_{RB,c} = 52 \text{ (TDD)}$		
			3, 6	40: $N_{RB,c} = 106 \text{ (TDD)}$		
PDSCH refere	ence measurement		1, 4	SR.1.1 FDD		
channel			2, 5	SR.1.1 TDD		
			3, 6	SR.2.1 TDD		
CORSET refe	rence channel		1, 4	CR.1.	.1 FDD	
			2, 5	CR.1.1 TDD		
			3, 6	CR.2.1 TDD		
TRS configura	ation		1, 4	TRS.1	.1 FDD	
			2, 5		.1 TDD	
			3, 6	TRS.1.2 TDD		
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6	OP.1		
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1	
	Dedicated DL BWP			DLBV	VP.1.1	
	Initial UL BWP			ULBV	VP.0.1	

Dedicated UL BWP			ULB\	WP.1.1
SMTC configuration		1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration		1, 2, 4, 5	SSB.1 FR1	
•		3, 6	SSB.2 FR1	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH_DMRS to				
SSS				
EPRE ratio of PBCH to				
PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to				
SSS				
EPRE ratio of PDCCH to				
PDCCH_DMRS	dB			0
EPRE ratio of PDSCH_DMRS to				
SSS				
EPRE ratio of PDSCH to				
PDSCH_DMRS				
EPRE ratio of OCNG DMRS to				
SSS				
EPRE ratio of OCNG to OCNG				
DMRS				
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-98	
NocNote2	dBm/SCS	1, 2, 4, 5	-98	
Nocities		3, 6	-95	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	0	0
Ê _s /I _{ot} ^{Note3}	dB	1, 2, 3, 4, 5, 6	0	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-98	-98
		3, 6	-95	-95
	dBm/9.36	1, 2, 4, 5	-67.04	-67.04
Io ^{Note3}	MHz			
10	dBm/38.16	3, 6	-60.94	-60.94
	MHz			
Propagation condition		1, 2, 3, 4, 5, 6	AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		
Correlation Matrix				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.5-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	F[DD	
		4, 5, 6	TI	DD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6	6 5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100		
PRACH Configuration ^{Note2}		1, 2, 3	4		
		4, 5, 6	5	3	
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD		
DL Reference Measurement			10 MHz: R.3 FDD		
Channel ^{Note3}			20 MHz: R.6 FDD		
		4, 5, 6	5 MHz:	R.4 TDD	
			10 MHz:	R.0 TDD	

			20 MHz:	R.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R	R.11 FDD	
parameters:		., _, -		R.6 FDD	
DL Reference Measurement			20 MHz: I		
Channel ^{Note3}		4, 5, 6	5 MHz: R	2.11 TDD	
		, ,	10 MHz:	R.6 TDD	
			20 MHz: I	R.10 TDD	
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: O	P.20 FDD	
			10 MHz: C	P.10 FDD	
			20 MHz: C	P.17 FDD	
		4, 5, 6	5 MHz: C	_	
				OP.1 TDD	
			20 MHz: 0	OP.7 TDD	
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG_RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	_	8	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91	
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91	
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low		
Correlation Matrix Note7					
Note 1: Special subframe and upl					
Note 2: PRACH configurations are					
Note 3: DL RMCs and OCNG pat		fied in clauses A 3	3.1 and A 3.2 of TS 36.13	3 [15] respectively.	

- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. Note 6: They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.5.2 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

The handover delay can be expressed as: RRC procedure delay $+ T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 115$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.6.3.2 RRC Connection Mobility Control

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

Configuration	Description					
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only re	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310	T310		1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3 1, 2, 3	3000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR1	·
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle		S	1, 2, 3	OFF	
PRACH co	PRACH configuration		1, 2, 3	FR1	Table A.3.8.2.1-1
				PRACH	
				configurati	
				on 1	
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1		N/A			N/A	
		2	T	DDConf.1.	1	Т	DDConf.1.	1
		3	Т	DDConf.2.	1	Т	DDConf.2.	1
PDSCH RMC		1	S	R.1.1 FDD)	5	R.1.1 FD)
configuration								
		2		SR.1.1 TDD			R.1.1 TDI	
		3		SR.2.1 TDD			R.2.1 TDI	
RMSI CORESET		1		CR.1.1 FDD			R.1.1 FDI	
RMC configuration		2		CR.1.1 TDD			R.1.1 TDI	
		3		CR.2.1 TDD			R.2.1 TDI	
Dedicated CORESET		1		CR.1.1 FDI			CR.1.1 FD	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
		3		CR.2.1 TDI			CR.2.1 TD	
OCNG Pattern		1, 2, 3		defined in A			defined in A	
TRS configuration		1		RS.1.1 FD[RS.1.1 FD	
		2	T	RS.1.1 TDI)		RS.1.1 TD	
		3	T	RS.1.2 TDI)		TRS.1.2 TDD	
Initial DL BWP		1, 2, 3	[DLBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1, 2, 3	ULBWP.0.1 UI		ULBWP.0.1			
configuration								
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB	1		SSB	1
Ê s /I ot	dB	1	1.54	-infinity	-infinity	-3.79	4	4
		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
<i>6</i> ¢		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1	-		-98			
		2	-					
		3						
\hat{E}_{s}/N_{oc}	dB	1	7	-infinity	-infinity	4	4	4
		2	-					
N		3						
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94
		2	-91	-infinity	-infinity	-94	-94	-94
		3	-88	-infinity	-infinity	-91	-91	-91
lo	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/9.36 MHz	2	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59
	dBm/38.16 MHz	3	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagation		1, 2, 3			AWG	N		
Condition]					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $^{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re-establish_delay} = T_{UL_grant} + T_{UE_re-establish_delay}$$
.

Where:

 T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 1$

 $T_{identify_intra_NR} = 200 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell			
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD			
	duplex mode	duplex mode			
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD			
	duplex mode	duplex mode			
3 30 kHz SSB SCS, 40 MHz bandwidth, TDD		30 kHz SSB SCS, 40 MHz bandwidth, TDD			
	duplex mode	duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3 1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1, 2	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310	T310		1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3 1, 2, 3	5000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC conf	figuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle		S	1, 2, 3	OFF	
PRACH configuration			1, 2, 3	FR1 PRACH	Table A.3.8.2.1-1
				configurati on 1	
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	5	THIS IST THE SE TO GOLOGI THE

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
RF Channel Number		1, 2, 3		1			2		
TDD configuration		1		N/A			N/A		
		2	T	DDConf.1.1		Т	DDConf.1.	1	
		3	T	DDConf.2.1		Т	DDConf.2.	1	
PDSCH RMC		1	5	SR.1.1 FDD		2	R.1.1 FDD)	
configuration									
		2	5	SR.1.1 TDD		5	R.1.1 TDD)	
		3	5	SR.2.1 TDD		SR.2.1 TDD			
RMSI CORESET		1	(CR.1.1 FDD		CR.1.1 FDD			
RMC configuration		2	CR.1.1 TDD			CR.1.1 TDD			
		3	(CR.2.1 TDD		CR.2.1 TDD			
Dedicated CORESET		1		CR.1.1 FDI		CCR.1.1 FDD			
RMC configuration		2	С	CR.1.1 TDI)	CCR.1.1 TDD			
		3	С	CR.2.1 TDI)	CCR.2.1 TDD			
OCNG Pattern		1, 2, 3	OP.1	defined in A	.3.2.1	OP.1 c	defined in A	.3.2.1	
TRS configuration		1	Т	RS.1.1 FDI)	Т	RS.1.1 FDI)	
		2	TRS.1.1 TDD			T	RS.1.1 TDI)	
		3	TRS.1.2 TDD		Т	RS.1.2 TDI)		
Initial DL BWP		1, 2, 3				DLBWP.0.1			
configuration									
Initial UL BWP configuration		1, 2, 3		JLBWP.0.1		l	JLBWP.0.1		

T		1						
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB			SSB	
Ê s /I ot	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2					_	
		3						
$N_{oc}^{ m Note2}$	dBm/SCS	1		•	-98			
T oc		2			-98			
		3	-95					
N_{oc} Note2	dBm/15 kHz	1	-98					
T oc		2						
		3						
\hat{E}_{s}/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2		-	-	-		
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91
		2	-94	-infinity	-infinity	-infinity	-infinity	-91
		3	-91	-infinity	-infinity	-infinity	-infinity	-88
lo	dBm/9.36 MHz	1	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/9.36 MHz	2	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation		1, 2, 3	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $^{IV}_{oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; ms + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH} + T_{SI-NR} + T_{SI$$

 $N_{\text{freq}} = 2$

 $T_{identify_intra_NR} = 800 \text{ ms}$

 $T_{identify_inter_NR} = 800 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

C	onfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

	Parameter	Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3 1, 2, 3	Cell2	
Final	Active cell		1, 2, 3	Cell2	
condition					
RF Channe			1, 2, 3	1	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 µs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync
					indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications
					from lower layers
T310	T310		1, 2, 3	6000	Radio link failure timer configured by
					RLF-TimersAndConstants
T311		ms	1, 2, 3 1, 2, 3	3000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access
					procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3 1, 2, 3	OFF	
PRACH co	nfiguration		1, 2, 3	FR1	Table A.3.8.2.1-1
				PRACH	
				configurati	
			4.0.0	on 1	
T1		S	1, 2, 3 1, 2, 3	5	T: (d UE (1 (E) E
T2		S	1, 2, 3	6	Time for the UE to detect RLF
T3		S	1, 2, 3	3	

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1		N/A			N/A		
		2	TDDConf.1.1 TD			DDConf.1.1			
		3	Т	DDConf.2.	1	Т	DDConf.2.	1	
PDSCH RMC		1		SR.1.1 FDD)	5	SR.1.1 FDE)	
configuration									
		2		SR.1.1 TDD			SR.1.1 TDE		
		3		SR.2.1 TDD			SR.2.1 TDE		
RMSI CORESET		1		CR.1.1 FDC			CR.1.1 FDE		
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDE		
		3		CR.2.1 TDD			CR.2.1 TDE		
Dedicated CORESET		1		CR.1.1 FD		С	CR.1.1 FD	D	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD		
		3	С	CR.2.1 TDI)	С	CR.2.1 TD	D	
OCNG Pattern		1, 2, 3	OP.1 d	defined in A	.3.2.1	OP.1 c	defined in A	\.3.2.1	
Initial DL BWP		1, 2, 3	[DLBWP.0.1		[DLBWP.0.1		
configuration									
Initial UL BWP		1, 2, 3	ULBWP.0.1		ULBWP.0.1				
configuration									
RLM-RS		1, 2, 3		SSB		SSB			
Ê s /I ot	dB	1	4	-infinity	-infinity	-infinity	-infinity	4	
		2							
		3							
$N_{oc}^{}$ Note2	dBm/SCS	1			-98				
- · oc		2			-98				
		3			-95				
N_{oc} Note2	dBm/15 kHz	1			-98				
1 oc		2							
		3							
\hat{E}_{s}/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	4	
		2							
		3							
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-94	
		2	-94	-infinity	-infinity	-infinity	-infinity	-94	
		3	-91	-infinity	-infinity	-infinity	-infinity	-91	
lo	dBm/9.36 MHz	1	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59	
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59	
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-58.50	
Propagation Condition		1, 2, 3			AWG	iN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $^{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re_establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 800 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

A.6.3.2.2 Random Access

A.6.3.2.2.1 Contention based random access test in FR1 for NR standalone

A.6.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.1.1-2.

Table A.6.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE capability

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

	Parame	eter	Unit	Test-1	Comments
SSB Configu		Config 1		SSB pattern 1 in FR1	As defined in A.3.10,
002 00ga		Config 2		SSB pattern 2 in FR1	except for number of
		J 559 _			SSBs per SS-burst and
					SS/PBCH block index as
					below
Number of SSBs per SS-burst			2	Different from the	
	·				definition in A.3.10
SS/PBCH blo	ock index			0,1	Different from the
					definition in A.3.10
Duplex Mode	for Cell 1	Config 1		FDD	
		Config 2		TDD	
TDD Configu		Config 2		TDDConf.2.1	
CSI-RS for tr	acking	Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.2 TDD	
OCNG Patter				OP.1	As defined in A.3.2.1.
PDSCH para	meters	Config 1		SR.1.1 FDD	As defined in A.3.1.1.
Note 4		Config 2		SR.2.1 TDD	1
RMSI CORE	SET	Config 1		CR.1.1 FDD	
Reference C		Coming		CK.T.TFDD	
reference of	latifici	Config 2		CR.2.1 TDD	
D II (10)	DECET	_			
Dedicated Co Reference Co		Config 1		CCR.1.1 FDD	
Kelelelice Ci	larinei	Config 2		CCR.2.1 TDD	
ND DE Chan	NR RF Channel Number			1	
EPRE ratio o			dB	l l	
EPRE ratio o			dB		
		PBCH_DMRS	dB		
		DMRS to SSS	dB	0	
		o PDCCH_DMRS	dB	ď	
		DMRS to SSS	dB		
		o PDSCH_DMRS	dB		
El IXE latio o	\hat{E}_{s}/I_{ot}		dB	3	Power of SSB with index
SSB with		Config 1	dBm/15kHz	-98	0 is set to be above
index 0	N_{oc}	-	ubili/13ki12		configured rsrp-
		Config 2		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSR	RP Note 3	dBm/ SCS	-95	1
	\hat{E}_{s}/I_{ot}		dB	-17	Power of SSB with index
SSB with		Config 1	dBm/15kHz	-98	1 is set to be below
index 1	N_{oc}	Config 2	_	-101	configured rsrp-
	A /	•	in.		ThresholdSSB
	\hat{E}_s/N_{oc}	- Note 2	dB	-17	4
	SS-RSR	Kh More 2	dBm/ SCS	-115	
lo Note 2		Config 1	dBm	-65.3/9.36MHz	For symbols without SSB
10 2	Config 2			-62.2/38.16MHz	index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured U	Configured UE transmitted power (dBm	23	As defined in clause
$P_{\text{CMAX}, f, c}$)					6.2.4 in TS 38.101-1.
PRACH Conf	iguration			FR1 PRACH configuration 1	As defined in A.3. 8.
Propagation	Condition		_	AWGN	
			11. (11. 11	eated and a constant total transi	· · · · · · · · · · · · · · · · · · ·

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.6.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.6.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.6.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE capability

Table A.6.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

Parame	ter	Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB pattern 1 in	SSB pattern 1 in	As defined in
			FR1	FR1	A.3.10, except for
	Config 2		SSB pattern 2 in	SSB pattern 2 in	number of SSBs per
			FR1	FR1	SS-burst and
					SS/PBCH block
					index as below
Number of SSBs per SS	S-burst		2	2	Different from the
					definition in A.3.10
SS/PBCH block index			0,1	0,1	Different from the
					definition in A.3.10
CSI-RS Configuration	Config 1		N/A	CSI-RS.1.1 FDD	As defined in
	Config 2			CSI-RS.2.1 TDD	A.3.1.4

Duplex Mode	for Cell 1	Config 1		FDD	FDD	
		Config 2		TDD	TDD	Ţ
TDD Configura	ation	Config 2		TDDConf.2.1	TDDConf.2.1	
CSI-RS for tra	CSI-RS for tracking Config			TRS.1.1 FDD	TRS.1.1 FDD	
<u>[</u>		Config 2		TRS.1.2 TDD	TRS.1.2 TDD	
OCNG Patterr	Note 1			OP.1	OP.1	As defined in A.3.2.1.
RMSI CORES Reference Ch		Config 1		CR.1.1 TDD	CR.1.1 TDD	
I		Config 2		CR.2.1 TDD	CR.2.1 TDD	
Dedicated CO Reference Ch		Config 1		CCR.1.1 TDD	CCR.1.1 TDD	
		Config 2		CCR.2.1 TDD	CCR.2.1 TDD	
PDSCH paran	neters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in
Note 4		Config 2		SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
NR RF Chann	el Numbe	r		1	1	
EPRE ratio of			dB			
EPRE ratio of			dB			
EPRE ratio of			dB			
	EPRE ratio of PDCCH_DMRS to SSS		dB	0	0	
	EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS		dB			
			dB			
EPRE ratio of		PDSCH_DMRS	dB dB	0	2	Power of SSB with
SSB with	\hat{E}_{s}/I_{ot}	0		3	3	index 0 is set to be
index 0	N_{oc}	Config 1	dBm/15kHz	-98	-98	above configured
		Config 2		-101	-101	rsrp-ThresholdSSB
I	\hat{E}_s/N_{oc}		dB	3	3	
	SS-RSR	P Note 3	dBm/ SCS	-95	-95	
I	\hat{E}_{s}/I_{ot}		dB	-17	-17	Power of SSB with
SSB with	N_{oc}	Config 1	dBm/15kHz	-98	-98	index 1 is set to be below configured
index 1	oc .	Config 2		-101	-101	rsrp-ThresholdSSB
1	\hat{E}_s/N_{oc}	•	dB	-17	-17	, , , , , , , , , , , , , , , , , , , ,
I	SS-RSR	P Note 3	dBm/ SCS	-115	-115	
I Noto 2		Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
lo Note 2		Config 2		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].	
Configured UE transmitted power ($P_{\text{CMAX}, \text{f, c}}$)		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-	
PRACH Confi	guration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.
Propagation C	ondition		-	ÄWGN	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Voice

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.3 SA: RRC Connection Release with Redirection

A.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.1.2-1: Redirection from NR to NR test configurations

Co	nfig	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: Th	ne UE is only re	quired to be tested in one of the supported test configurations

Table A.6.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	2.3	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter		Unit	Cell 1		Cell 2		
		Unit	T1	T2	T1	T2	
NR RF Channel Numb	er			1		2	
Dupley mode	Config 1			FD)D		
Duplex mode	Config 2,3		TDD				
	Config 1			SSB.	SSB.1 FR1		
SSB Configuration	Config 2		SSB.1 FR1				
	Config 3			SSB.2	2 FR1		
	Config 1		TRS.1.1 FDD				
CSI-RS for tracking	Config 2		TRS.1.1 TDD				
	Config 3		TRS.1.2 TDD				
TDD configuration	Config 1		Not Ap		olicable		
TDD configuration	Config 2			TDDC	onf.1.1		

	Config 3			TDDC	onf.2.1		
	Config 1				B,c = 52		
BW _{channel}	Config 2	MHz					
DVV channel	Config 3	IVII IZ	10: N _{RB,c} = 52 40: N _{RB,c} = 106				
			40: N _{RB,c} = 106 10: N _{RB,c} = 52				
DIA/D DIA/	Config 1	N 41 1-					
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
DD 0 1	Config 3		$40: N_{RB,c} = 106$ Not Applicable				
DRx Cycle		ms		Not Ap	plicable		
	Config 1		SR.1.1 FDD				
PDSCH Reference measurement channel	Config 2	SR.1.1 TDD					
	Config 3			SR2.	1 TDD		
	Config 1			CR.1.	1 FDD		
CORESET Reference Channel	Config 2			CR.1.	1 TDD		
	Config 3		CR2.1 TDD				
OCNG Patterns			OCNG pattern 1				
Config 1,2			SMTC.1 FR1				
SMTC configuration	Config 3		SMTC.2 FR1				
PDSCH/PDCCH	Config 1,2		15 kHz				
subcarrier spacing	Config 3	kHz	30 kHz				
PUCCH/PUSCH	Config 1,2		15 kHz				
subcarrier spacing	Config 3	kHz	30 kHz				
PRACH configuration			FR1 PRACH configuration 1				
BWP configuration	Initial DL BWP		DLBWP.0.1				
	Dedicated DL BWP			DLBV	VP.1.1		
	Initial UL BWP			ULBV	VP.0.1		
	Dedicated UL BWP		ULBWP.1.1				
EPRE ratio of PSS to S							
EPRE ratio of PBCH DN EPRE ratio of PBCH to							
EPRE ratio of PDCCH [
EPRE ratio of PDCCH t	o PDCCH DMRS	dB	0				
EPRE ratio of PDSCH to EPRE ratio of PDSCH to		<u> </u>					
EPRE ratio of PDSCH to							
EPRE ratio of OCNG to							
1)		-ID /45111					
N _{oc} Note2		dBm/15kH z			98		
Note2 Config 1,2 Config 3		dBm/SCS			98 95		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	4	4	-infinity	4	
\hat{E}_s/N_{oc}		dB	4	4	-infinity	4	
Config 1,2		dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59	
Config 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49	
Propagation condition		-		AVV	/GN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	lo levels have been derived from other parameters for information purposes. They are not settable

A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection release redirect NR} = T_{RRC procedure delay} + T_{identify-NR} + T_{SI-NR} + T_{RACH}$$

where:

 $T_{RRC_procedure_delay} = 110$ msin the test.

 $T_{identify-NR} = 680 \text{ ms in the test.}$

 $T_{SI-NR} = 1280$ ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 170 \text{ ms in the test.}$

This gives a total of 2240 ms.

A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.2.3.2.2-2: General test parameters for Redirection from NR to E-UTRAN test case

Pai	Parameter		Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient	Filter coefficient		0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 us	Synchronous cells
T1		s	5 ps	Cyricinionous sens
T2		s	2.3	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Param	eter	Unit	Cell 1		
		Onit	T1	T2	
RF Channel Number	Config 1,4		1 FDD		
Duplex mode	Config 2,3,5,6	-	TDD		
	Config 1		SSB.1 FR1		
SSB Configuration	Config 2		SSB.1 F		
	Config 3		SSB.2 F		
CSL BS for tracking	Config 1	-	TRS.1.1 F		
CSI-RS for tracking	Config 2 Config 3	-	TRS.1.1 TDD TRS.1.2 TDD		
	Config 1,4		Not Applic		
TDD configuration	Config 2,5		TDDConf		
122 comigaration	Config 3,6	-	TDDConf		
	Config 1,4		10: N _{RB,c} :		
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} :		
ond.iii.di	Config 3,6		40: N _{RB,c} = 32		
	Config 1,4		10: N _{RB,c} = 100		
BWP BW	Config 2,5	MHz	10: N _{RB,c} = 52		
	Config 3,6		40: N _{RB,c} = 106		
DRx Cycle		ms	Not Applicable		
	Config 1,4	SR.1.1 FDD		DD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD		
	Config 3,6		SR2.1 TDD		
	Config 1,4		CR.1.1 FDD		
CORESET Reference Channel	Config 2,5		CR.1.1 TDD		
	Config 3,6		CR2.1 TI	OD	
OCNG Patterns	•		OCNG pati	tern 1	
OMTO	Config 1,2,4,5		SMTC.1 I	FR1	
SMTC configuration	Config 3,6	1 -	SMTC.2 I	FR1	
PDSCH/PDCCH	Config 1,2,4,5	1 1	15 kH:	Z	
subcarrier spacing	Config 3,6	kHz	30 kHz		
PUCCH/PUSCH	Config 1,2,4,5		15 kH:		
subcarrier spacing	Config 3,6	kHz	30 kHz		
PRACH configuration	- 3 - ,-	+	FR1 PRACH con		

BWP configuration Initial DL BWP			DLBW	/P.0.1		
		Dedicated DL BWP		DLBW	/P.1.1	
		Initial UL BWP		ULBW	/P.0.1	
		Dedicated UL BWP		ULBV	/P.1.1	
	of PSS to SS					
	of PBCH DM					
	of PBCH to F					
	of PDCCH D			0		
		PDCCH DMRS	dB			
	of PDSCH D					
	of PDSCH to					
		/IRS to SSS(Note 1)				
	of OCNG to	OCNG DMRS (Note				
1)			alDias /4 Eld I			
Note2			dBm/15kH z	-98		
Note2	Config 1,2,4	.5			98	
N oc Note2	Config 3,6	, -	dBm/SCS	-9	95	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	4	4	
\hat{E}_s/N_{oc}		dB	4	4		
IoNote3	Config 1,2,4	,5	dBm/ 9.36MHz	-64.59	-64.59	
	Config 3,6		dBm/ 38.16MHz	-58.49	-58.49	
Propagation	n condition		-	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.2.3.2.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

Parameter	Unit	Configuration	Се	II 2
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	2	2
Duplex mode		1, 2, 3	FD)D
		4, 5, 6	TE)D
TDD special subframe configuration ^{Note1}		4, 5, 6	6	3
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	•	I
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N	I _{RB,c} = 25
				$N_{RB,c} = 50$
			20 MHz: N	I _{RB,c} = 100
PRACH Configuration ^{Note2}		1, 2, 3		1
		4, 5, 6	5	3
PDSCH parameters:		1, 2, 3	5 MHz: I	R.7 FDD
DL Reference Measurement			10 MHz:	R.3 FDD
Channel ^{Note3}			20 MHz:	R.6 FDD
		4, 5, 6	5 MHz: I	R.4 TDD
			10 MHz:	R.0 TDD
			20 MHz:	R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: F	R.11 FDD
parameters:			-	R.6 FDD
DL Reference Measurement			20 MHz: I	R.10 FDD
Channel ^{Note3}		4, 5, 6	5 MHz: F	
			-	R.6 TDD
			20 MHz: I	R.10 TDD

OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OI 10 MHz: O	·-• ·
			20 MHz: O	P.17 FDD
		4, 5, 6	5 MHz: C	P.9 TDD
			10 MHz: 0	OP.1 TDD
			20 MHz: 0	OP.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6		
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB	dB)
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB				
OCNG_RA ^{Note4}				
OCNG_RB ^{Note4}				
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-98	
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	4
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76
Propagation Condition		1, 2, 3, 4, 5, 6	AW	_
Note 1: Special subframe and upli				
Note 2: PRACH configurations are				
Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.				
Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral				
density is achieved for all				
Note 5: Interference from other ce			ied in the test is assumed	

subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes.

A.6.3.2.3.2.3 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

NOTE: The redirection delay can be expressed as:

They are not settable parameters themselves.

 $T_{connection_release_redirect_E_UTRA} = T_{RRC_procedure_delay} + T_{identify_E_UTRA} + T_{SI_E_UTRA} + T_{RACH}$

where:

Note 6:

Note 7:

 $T_{RRC_procedure_delay} = 110 \text{ ms in the test.}$

 $T_{identify-E-UTRA} = 800 \text{ ms in the test.}$

 $T_{SI-E-UTRA} = 1280$ ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

 $T_{RACH} = 15$ ms in the test.

This gives a total of 2205 ms.

A.6.4 Timing

A.6.4.1 UE transmit timing

A.6.4.1.1 NR UE Transmit Timing Test for FR1

A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table A.6.4.1.1.1-1.

Table A.6.4.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE configur	is only required to be tested in one of the supported test ations

For this test a single NR cell is used. Table A.6.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.6.4.1.1.1-3.

Table A.6.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	
SSB ARFCN		1,2,3	1	1	
		1	Not Ap	plicable	
TDD configuration		2	TDDC	onf.1.1	
		3	TDDC	onf.2.1	
		1	10: N _R	RB,c = 52	
BW _{channel}	MHz	2	10: N _F	_{RB,c} = 52	
		3	40: N _{RI}	B,c = 106	
Initial BWP Configuration		1,2,3		VP.0.1 VP.0.1	
Dedicated BWP Configuration		1,2,3		VP.1.1 VP.1.1	
DRx Cycle	ms	1,2,3	N/A	DRX.8 ^{Note5}	
PDSCH Reference		1	SR.1.	SR.1.1 FDD	
measurement channel		2	SR.1.1 TDD		
		3	SR.2.1 TDD		
RMSI CORESET		1	CR.1.	.1 FDD	
Reference Channel		2	CR.1	.1 TDD	
		3	CR.2	.1 TDD	
Dedicated CORESET		1	CCR.1	.1 FDD	
Reference Channel		2		.1 TDD	
		3		2.1 TDD	
OCNG Patterns		1,2,3		P.1	
SSB configuration		1,2		1 FR1	
332 Soringulation		3	SSB.	2 FR1	
SMTC Configuration		1,2	SM	TC.1	
Sivire Configuration		3	SM	TC.2	
TDC configuration		1	TRS.1	.1 FDD	
TRS configuration		2	TRS.1	.1 TDD	

		3	TRS.1	.2 TDD
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH				
DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH				
DMRS to SSS				
EPRE ratio of PDCCH to	dB	1,2,3	0	0
PDCCH DMRS	. ab	1,2,0		
EPRE ratio of PDSCH				
DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH	1			
EPRE ratio of OCNG				
DMRS to SSS(Note 1)				
EPRE ratio of OCNG to				
OCNG DMRS (Note 1)				
N_{oc}	dBm/15 kHz	1,2,3	-98	-98
Note2	dBm/SCS	1,2	-98	-98
	ubili/SCS	3	-95	-95
Ê s /I ot		1,2,3	3	3
\hat{E}_{s}/N_{oc}		1,2,3	3	3
SS-RSRP ^{Note3}	4D/CCC	1,2	-95	-95
	dBm/SCS	3	-92	-92
Io ^{Note3}	dBm/9.36MHz	1,2	-65.2	-65.2
	dBm/38.1MHz	3	-59.2	-59.2
Propagation condition		1,2,3	AW	GN
SRS Config		1,2	SRSConf.1 ^{Note6}	SRSConf.3 ^{Note6}
		3	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: DRx related parameters are given in Table A.3.3.8-1
- Note 6: SRS configs are given in Table A.6.4.1.1.1-3

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	14	Matches N _{RB,c}
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

Table A.6.4.1.1.1-4: Void

A.6.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Setup NR PCell according to parameters given in Table A.6.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

Table A.6.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustment Value		
	Test1	Test2	
15	+64*64T _c	+32*64T _c	
30	+32*64T _c	+16*64Tc	

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.6.4.2 UE timer accuracy

A.6.4.3 Timing advance

A.6.4.3.1 SA FR1 timing advance adjustment accuracy

A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.6.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only required to be tested in one of the supported test configurations		

Table A.6.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	NTA_new = NTA_old for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T_A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192*T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter		Unit	Test		
T =		J.III	T1	T2	
Duplex mode	Config 1		FDI		
	Config 2,3		TDD		
	Config 1		Not Appl		
TDD configuration	Config 2		TDDCor		
	Config 3		TDDConf.2.1		
	Config 1		10: N _{RB,}		
BW _{channel}	Config 2	MHz	10: N _{RB} ,		
	Config 3		40: N _{RB,c}		
	Config 1		10: N _{RB,}	c = 52	
BWP BW	Config 2	MHz	10: N _{RB,0}	c = 52	
	Config 3		40: N _{RB,c}	= 106	
DRx Cycle		ms	Not Appl	icable	
PDSCH Reference	Config 1		SR.1.1	FDD	
measurement	Config 2		SR.1.1	TDD	
channel	Config 3		SR2.1	TDD	
DMOLOODEOET	Config 1		CR.1.1 FDD		
RMSI CORESET	Config 2		CR.1.1 TDD		
Reference Channel	Config 3		CR.2.1 TDD		
Dedicated	J				
CORESET	Config 1		CCR.1.1	FDD	
Reference Channel					
	Config 2		CCR.1.1	TDD	
	Config 3		CCR.2.1	TDD	
	Config 1,4		TRS.1.1		
TRS configuration	Config 2,5		TRS.1.1		
J	Config 3,6		TRS.1.2		
OCNG Patterns	,		OCNG pa		
SMTC	Config 1,2		SMTC.1		
configuration	Config 3		SMTC.2		
	Config 1,2		SSB.1		
SSB configuration	Config 3		SSB.2		
PDSCH/PDCCH	Config 1,2		15 kł		
subcarrier spacing	Config 3	kHz —	30 kl		
PUCCH/PUSCH	Config 1,2		15 kl		
subcarrier spacing	Config 3	─ kHz	30 kHz		
EPRE ratio of PSS to SSS		+	30 Ki	14	
EPRE ratio of PBCH		- 			
EPRE ratio of PBCH		dB	0		
EPRE ratio of PDCC		 	0		
EPRE ratio of PDCC		- 			
EFNE IALIO OI PDCC	I IO POCCH DIVIRS				

EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ration	o of OCNG DMRS to SSS(Note 1)		
EPRE ration	o of OCNG to OCNG DMRS (Note		
1)			
N Note2		dBm/15kH z	-98
Note2	Note2 Config 1,2		-98
N oc Note2	Config 3	dBm/SCS	-95
Ê s /I ot		dB	3
\hat{E}_{s}/N_{oc}		dB	3
IoNote3	Config 1,2	dBm/ 9.36MHz	-67.57
10	Config 3	dBm/ 38.16MHz	-62.58
Propagation	on condition	-	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment
c-SRS	Config 1,2	12	
0-010	Config 3	24	Frequency hopping is disabled
b-S	SRS	0	
b-ł	пор	0	
freqDoma	inPosition	0	Frequency domain position of SRS
freqDon	nainShift	0	
groupOrSequ	ienceHopping	neither	No group or sequence hopping
		sl5=2 for SCS	Once every 5 slots
SPS Pariodi	cityAndOffset	15kHz	
SK3-Felloui	CityAndOnset	sl5=4 for SCS	
		30kHz	
pathlossRe	pathlossReferenceRS		SSB #0 is used for SRS path loss estimation
usa	age	Codebook	Codebook based UL transmission
startP	osition	0	resourceMapping setting. SRS on last
nrofSy	mbols	n1	symbol of slot, and 1symbols for SRS
repetition	nFactor	n1	without repetition.
combO	ffset-n2	0	transmission Comb setting
cyclicS	Shift-n2	0	transmissionComb setting
nrofSR	S-Ports	port1	Number of antenna ports used for SRS
			transmission
Note: For further	er information see clau	use 6.3.2 in TS 38	.331 [2].

A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.6.5 Signalling characteristics

A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform interfrequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parame	eter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3		DLBWP.0.1
configuration			DEDVVI .O.1
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1
configuration			DLDVVF.1.1

UL initial BV		Config 1, 2, 3		ULBWP.0.1
configuration				OLDWI .O.1
UL dedicate		Config 1, 2, 3		ULBWP.1.1
configuration				
TDD Config	uration	Config 1		Not Applicable
		Config 2		TDDConf.1.1
		Config 3		TDDConf.2.1
RMSI CORE	SET	Config 1		CR.1.1 FDD
Reference C	Channel	Config 2		CR.1.1 TDD
		Config 3		CR.2.1 TDD
Dedicated C	ORESET	Config 1		CCR.1.3 FDD
Reference C		Coming 1		361411.6122
		Config 2	1	CCR.1.3 TDD
		Config 3	1	CCR.2.2 TDD
SSB Configu	ıration	Config 1		SSB.1 FR1
		Config 2		SSB.1 FR1
		Config 3		SSB.2 FR1
SMTC Confi	guration	Config 1, 2		SMTC.1
Sivine Conin	guration			
DD00LI/DD	2011	Config 3		SMTC.1
PDSCH/PD0		Config 1, 2		15 kHz
subcarrier s	pacing	Config 3		30 kHz
PRACH		Config 1, 2		Table A.3.8.2.1-1
Configuratio	n	Config 3		Table A.3.8.2.1-1
SSB index a	ssigned as	RLM RS		0
OCNG para		-		OP.1
CP length				Normal
Correlation I	Matrix and	Antenna		2x2 Low
Configuration		rantorina		ZAZ ZOW
Out of	DCI forma	at		1-0
sync		of Control OFDM		2
transmissi	symbols	or control of bivi		2
on	Aggregat	on level	CCE	8
parameter	Ratio of h	ypothetical	dB	4
S	PDCCH	RE energy to	ub	4
		SSS RE energy		
		ypothetical	dB	4
		DMRS energy to	ub	7
		SSS RE energy		
	_		.	DE0.1
İ	DMRS pr			REG bundle size
	granularit			
	REG bundle size			
	REG bun	0.00.20		6
DRX		410 0120		OFF
Gap pattern	ID			OFF gp0
	ID			OFF
Gap pattern Layer 3 filter	ID		me	OFF gp0 Enabled
Gap pattern Layer 3 filter T310 timer	ID		ms	OFF gp0 Enabled 0
Gap pattern Layer 3 filter T310 timer T311 timer	ID		ms ms	OFF gp0 Enabled 0 1000
Gap pattern Layer 3 filter T310 timer T311 timer N310	ID		t t	OFF gp0 Enabled 0 1000
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311	ID ring		t t	OFF gp0 Enabled 0 1000 1
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con	ID ring	Config 1	t t	OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311	ID ring	Config 1 Config 2	t t	OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con for CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3	t t	OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1	t t	OFF gp0 Enabled 0 1000 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con for CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1 Config 2	t t	OFF gp0 Enabled 0 1000 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con for CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1	t t	OFF gp0 Enabled 0 1000 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS con for CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1 Config 2	t t	OFF gp0 Enabled 0 1000 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS confor CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1 Config 2	ms	OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS confor CSI repo	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1 Config 2	ms	OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD O.2
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS confor CSI repo CSI-RS for t T1 T2	ID ring figuration rting	Config 1 Config 2 Config 3 Config 1 Config 2	ms s s s	OFF gp0 Enabled 0 1000 1 1 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0.2 0.48 0.48
Gap pattern Layer 3 filter T310 timer T311 timer N310 N311 CSI-RS confor CSI repor CSI-RS for t T1 T2 T3 D1	ID ring figuration rting racking	Config 1 Config 2 Config 3 Config 1 Config 2 Config 3	ms s s s s s	OFF gp0 Enabled 0 1000 1 1 1 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.2 TDD 0.2 0.48

period T1.
UE-specific PDCCH is not transmitted after T1 starts.

Note 2:

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

	Parameter		Unit		Test 1	
				T1	T2	Т3
EPRE rat	tio of PDC	CH DMRS to SSS	dB	4		
EPRE rat	EPRE ratio of PDCCH to PDCCH DMRS				0	
EPRE rat	tio of PBC	CH DMRS to SSS	dB			
EPRE rat	tio of PBC	CH to PBCH DMRS	dB			
EPRE rat	tio of PSS	to SSS	dB			
EPRE rat	tio of PDS	SCH DMRS to SSS	dB		0	
EPRE rat	tio of PDS	CH to PDSCH DMRS	dB			
EPRE rat	tio of OCN	NG DMRS to SSS	dB			
EPRE rat	tio of OCN	NG to OCNG DMRS	dB			
SNR on I	RLM-RS	Config 1	dB	1	-7	-15
		Config 2		1	-7	-15
		Config 3		1	-7	-15
N_{oc}		Config 1	dBm/		-98	
- · oc		Config 2	15kH		-98	
		Config 3	Z	-98		
N_{oc}		Config 1	dBm/		-98	
- · oc		Config 2	SCS		-98	
		Config 3			-95	
	ion condit				C 300ns 1	
Note 1:		shall be used such that t			•	
	and a constant total transmitted power spectral density is achieved for all OFDM symbols.					
Note 2:		nal contains PDCCH for	UEs othe	r than the	device unde	er test as
part of OCNG.						
Note 3:		els correspond to the sig				
Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 ar					NR2 and	
SNR3 respectively in Figure A.6.5.1.1.1-1.						
Note 5:		R values are specified for				
	least one band. For testing of a UE which supports 4RX on all bands, the					

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

SNR during T3 is A.3.6.

Field		Test 1	
		Value	
gapOffset		0	
Note:	Ensure that RLM RS is partially overlapped with measurement gap		

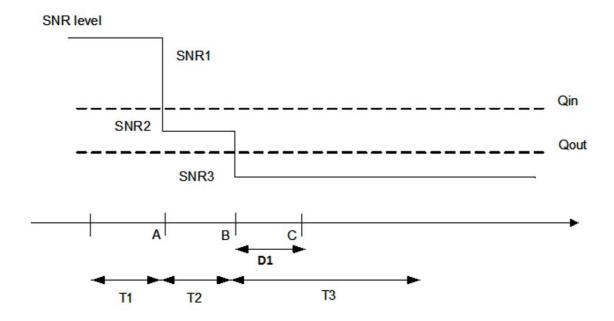


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configuration Description				
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz			
	s only required to pass in one of the supported test			

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Pai	ameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Numb	er		1
Duplex mode	Config 1		FDD
'	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2	Ī	10: N _{RB,c} = 52
	Config 3	Ī	40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3		
configuration	3 , ,		DLBWP.0.1
DL dedicated BWP	Config 1, 2, 3		DI DWD 4.4
configuration	3 , ,		DLBWP.1.1
UL initial BWP	Config 1, 2, 3		LII DWD o 4
configuration	Q , ,		ULBWP.0.1
UL dedicated BWP	Config 1, 2, 3		LII DWD 4.4
configuration			ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channe			CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated	Config 1		CCR.1.1 FDD
CORESET	25g .		001
Reference Channe	1		
	Config 2	1	CCR.1.1 TDD
	Config 3	1 1	CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
3	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC	Config 1, 2		SMTC.1
Configuration	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	•		
	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	Config 3		Table A.3.8.2.1-1
SSB index assigne	d as RLM RS		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix a	and Antenna		2x2 Low
Configuration			
n sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		

	Ratio of hypothetical PDCCH DMRS energy to average	dB	0		
	SSS RE energy				
	DMRS precoder		REG bundle size		
	granularity				
	REG bundle size		6		
Out of sync	DCI format		1-0		
transmission	Number of Control		2		
parameters	OFDM symbols				
	Aggregation level	CCE	8		
	Ratio of hypothetical	dB	4		
	PDCCH RE energy to				
	average SSS RE				
	energy				
	Ratio of hypothetical	dB	4		
	PDCCH DMRS				
	energy to average				
	SSS RE energy		REG bundle size		
	DMRS precoder		REG bundle size		
	granularity REG bundle size		6		
DRX	REG buildle Size		OFF		
Gap pattern ID			N.A.		
Layer 3 filtering			Enabled		
, c			Enabled		
T310 timer		ms	1000		
T311 timer		ms	1000		
N310			1		
N311			1		
CSI-RS	Config 1		CSI-RS.1.1 FDD		
configuration for	Config 2		CSI-RS.1.1 TDD		
CSI reporting	Config 3		CSI-RS.2.1 TDD		
CSI-RS for	Config 1, 4		TRS.1.1 FDD		
tracking	Config 2, 5		TRS.1.1 TDD		
	Config 3, 6		TRS.1.2 TDD		
T1		S	0.2		
T2		S	0.2		
T3		S	0.24		
T4		S	0.2		
T5		S	0.88		
D1		S	0.84		
Note 1. All configurations are assigned to the LIE prior to the start of time					

All configurations are assigned to the UE prior to the start of time period T1.

UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit			Test 1			
			T1	T2	Т3	T4	T5	
EPRE rat	EPRE ratio of PDCCH DMRS to SSS			0				
		CH to PDCCH DMRS	dB			0		
EPRE rat	io of PBCI	H DMRS to SSS	dB					
EPRE rat	io of PBC	to PBCH DMRS	dB					
EPRE rat	io of PSS	to SSS	dB					
EPRE rat	io of PDS0	CH DMRS to SSS	dB			0		
EPRE rat	io of PDS0	CH to PDSCH DMRS	dB					
EPRE rat	io of OCN	G DMRS to SSS	dB					
EPRE rat	io of OCN	G to OCNG DMRS	dB					
SNR on F	RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
		Config 2		1	-7	-15	-4.5	1
		Config 3		1	-7	-15	-4.5	1
N_{oc}		Config 1	dBm/	-98				
- 'oc		Config 2	15			-98		
		Config 3	kHz			-98		
N_{oc}		Config 1	dBm/	-98				
- 'oc		Config 2	SCS			-98		
		Config 3				-95		
Propagat	ion condition						100Hz	
Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for a OFDM symbols.					or all			
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.								
Note 3:		els correspond to the sig						
Note 4:								
		NR3, SNR4 and SNR5						
Note 5:	least one	values are specified for band. For testing of a ng T3 and T4 is modified	UE which	suppo	rts 4R	X on all	bands	

Table A.6.5.1.2.1-4: Void

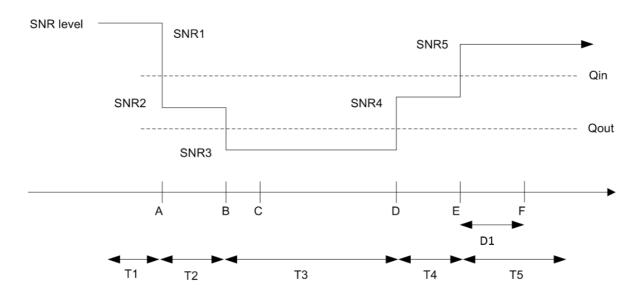


Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Numb	er		1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3		DLBWP.0.1
configuration			DEBWY 10.1
DL dedicated	Config 1, 2, 3		
BWP			DLBWP.1.1
configuration			
UL initial BWP	Config 1, 2, 3		ULBWP.0.1
configuration			0231111011
UL dedicated	Config 1, 2, 3		
BWP			ULBWP.1.1
configuration			

TDD Config 1			Not Applicable		
Configuration	Config 2				
Comigaration	Config 3		TDDConf.2.1		
RMSI CORESET	Config 1		CR.1.1 FDD		
Reference	Config 2		CR.1.1 TDD		
Channel	Config 3		CR.1.1 TDD CR.2.1 TDD		
Dedicated	Config 1		CCR.1.3 FDD		
CORESET	Coming i	CCK.1.3 FDD			
Reference					
Channel					
Onamici	Config 2		CCR.1.3 TDD		
	Config 3		CCR.2.2 TDD		
SSB	Config 1	SSB.1 FR1			
Configuration	Config 2		SSB.1 FR1		
Corniguration	Config 3		SSB.2 FR1		
SMTC	Config 1, 2		SMTC.1		
Configuration	Config 3		SMTC.1		
PDSCH/PDCCH	Config 1, 2		15 kHz		
subcarrier	Config 3		30 kHz		
spacing			T-1-1- A 0 0 0 4 4		
PRACH	Config 1, 2		Table A.3.8.2.1-1		
Configuration	Config 3		Table A.3.8.2.1-1		
SSB index assigned	d as RLM RS		0		
OCNG parameters	a ao mana		OP.1		
CP length			Normal		
Correlation Matrix a	and Antenna		2x2 Low		
Configuration	and Antenna		ZXZ LOW		
	DCI format		1-0		
	Number of Control		2		
	OFDM symbols		2		
	Aggregation level	CCE	8		
	Ratio of	dB	4		
	hypothetical	ub	4		
	PDCCH RE energy				
	to average SSS RE				
	energy				
l	Ratio of	dB	4		
	hypothetical	ub	7		
	PDCCH DMRS				
	energy to average				
	SSS RE energy				
	DMRS precoder		REG bundle size		
	granularity		TREO Buridio 0120		
	REG bundle size		6		
DRX Configuration			DRX.3		
Gap pattern ID			N.A.		
Layer 3 filtering			Enabled		
			Liabioa		
T310 timer		ms	0		
T311 timer		ms	1000		
N310			1		
N311			1		
CSI-RS	Config 1		CSI-RS.1.1 FDD		
configuration for	Config 2		CSI-RS.1.1 TDD		
CSI reporting	Config 3		CSI-RS.2.1 TDD		
CSI-RS for	Config 1		TRS.1.1 FDD		
tracking	Config 2		TRS.1.1 TDD		
	Config 3		TRS.1.2 TDD		
T1					
		S	0.2		
T2		S	0.2 0.68		
T2 T3		S	0.68		
T2 T3 D1					

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1		
			T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS		dB		4	
EPRE ratio of PDCCH to PDCCH DMRS		dB	0		
EPRE ratio of PBCH DMRS to SSS		dB			
EPRE ratio of PBCH to PBCH DMRS		dB			
EPRE ratio of PSS to SSS		dB		0	
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
Noc	Config 1	dBm/15	-98 -98 -98		
100	Config 2	kHz			
	Config 3				
N_{oc}	Config 1	dBm/S	-98		
	Config 2	CS	-98		
	Config 3			-95	
Propagation condition			TDL-C 300ns 100Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

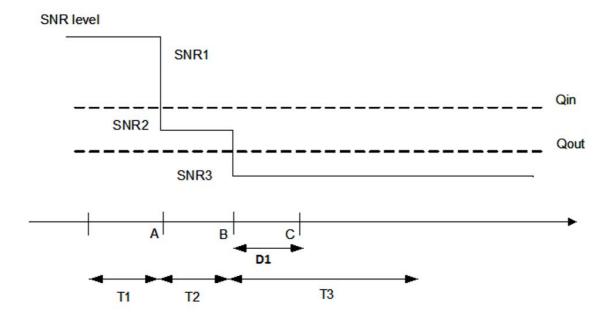


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
	ne UE is only required to pass in one of the supported test infigurations in FR1		

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Para	Parameter		Value	
i didilictei		Unit	Test 1	
			1001	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
'	Config 2, 3		TDD	
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52	
	Config 2		10: N _{RB,c} = 52	
	Config 3		40: N _{RB,c} = 106	
DL initial BWP	Config 1, 2, 3		DLBWP.0.1	
configuration			DLBVVP.U.1	
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1	
configuration			DLBVVP.1.1	
UL initial BWP	Config 1, 2, 3		ULBWP.0.1	
configuration			ULBVVP.U.1	
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1	
configuration	-			
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
RMSI CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated CORESE	T Config 1		CCR.1.1 FDD	
Reference Channel				
	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
SSB Configuration	Config 1		SSB.1 FR1	
	Config 2		SSB.1 FR1	
	Config 3		SSB.2 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 kHz	
subcarrier spacing	Config 3		30 kHz	
	•			
PRACH Configuration	n Config 1, 2		Table A.3.8.2.1-1	
	Config 3		Table A.3.8.2.1-1	
SSB index assigned	as RLM RS		0	
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix ar	nd Antenna		2x2 Low	
Configuration				
In sync	DCI format		1-0	
transmission	Number of Control		2	
parameters	OFDM symbols			
	Aggregation level	CCE	4	
	Ratio of hypothetical	dB	0	
	PDCCH RE energy to			
	average SSS RE			
	energy			

	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	0
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS		·
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		NEO buildle size
	REG bundle size		6
DRX Configuration	TLO bullule size		DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
Layer 3 lillering			Lilabieu
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting	Config 3		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
OSI IKO IOI WAOKIIIY	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.1 TDD
T1		-	0.2
T2		S	0.2
		S	0.64
T3		S	
T4		S	0.2
T5		S	0.88
D1		S	0.84

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1:

Note 2:

specified in clause A.3.6.

Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit	Test 1				
		T1	T2	T3	T4	T5	
EPRE ratio of PDC	dB			0			
EPRE ratio of PDC	CCH to PDCCH DMRS	dB			0		
EPRE ratio of PBC	CH DMRS to SSS	dB					
EPRE ratio of PBC	CH to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB			0		
EPRE ratio of PDS	SCH DMRS to SSS	dB					
EPRE ratio of PDS	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	NG DMRS to SSS	dB					
EPRE ratio of OCN	NG to OCNG DMRS	dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15			-98		
- 'oc	Config 2	kHz	-98				
	Config 3				-98		
N_{oc}	Config 1	dBm/S	-98				
- 'oc	Config 2	CS			-98		
	Config 3				-95		
Propagation condi-					·C 300ns 1		
	shall be used such that the					constant to	otal
			FDM symbo				
Note 2: The signal contains PDCCH for UEs oth					•	of OCNG.	
Note 3: SNR levels correspond to the signal t							
		T5 is denot	ed as SNR	1, SNR2, S	SNR3, SNR4	and	
	espectively in Figure A.6.5						_
Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For					⊢or		

Table A.6.5.1.4.1-4: Void Table A.6.5.1.4.1-5: Void

testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as

SNR level SNR1 SNR5 SNR2 SNR4 SNR3 D D1 T2 T3 T4 T5

Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

A.6.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

Configuration	Description	
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth	
Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number	T		1
Duplex mode	Config 1		FDD
TDD Configuration	Config 2, 3		TDD Not Applicable
TDD Configuration	Config 1		Not Applicable
	Config 2 Config 3		TDDConf.1.1 TDDConf.2.1
DL initial BWP	Config 3 Config 1, 2, 3		DLBWP.0.1
configuration			-
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD
	Config 2		CCR.1.3 TDD
	Config 3	}	CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
3	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for P	DCCH/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length	A		Normal
Correlation Matrix and			2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols	005	2
parameters	Aggregation level Ratio of hypothetical PDCCH RE	CCE	8 4
	energy to average CSI-RS RE	dB	4
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS	uБ	4
	RE energy DMRS precoder granularity		REG bundle size
	REG bundle size		REG buildle size
DRX	INLO DUTIDIE SIZE		0 OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD

T1	S	0.2	
T2	S	0.48	
T3	S	0.48	
D1	S	0.44	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit		Test 1		
			T1	T2	T3	
EPRE ratio of PDCCH DMRS to SSS		dB		4		
EPRE ratio of DMRS	of PDCCH to PDCCH	dB				
EPRE ratio o	of PBCH DMRS to	dB				
EPRE ratio of PBCH to PBCH DMRS		dB		0		
EPRE ratio of PSS to SSS		dB				
EPRE ratio of PDSCH DMRS to SSS		dB				
EPRE ratio o	of PDSCH to PDSCH	dB				
EPRE ratio o	of OCNG DMRS to	dB				
EPRE ratio o	of OCNG to OCNG	dB				
SNR on	Config 1	dB	1	-7	-15	
RLM-RS	Config 2		1	-7	-15	
	Config 3		1	-7	-15	
N _{oc} Config 1 Config 2 Config 3		dBm/15kHz	-98			
			-98			
				-98		
Propagation	condition			TDL-C 300ns 100Hz		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1	
rieid	Value	
gapOffset	0	
Note 1: Void		

Table A.6.5.1.5.1-4: Void

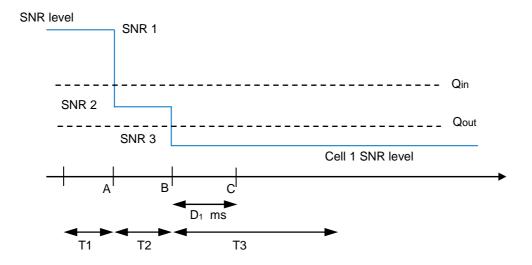


Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1 which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Con	nfiguration	Description	
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3		TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth	
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number	1		1
Duplex mode	Config 1		FDD
TDD 0	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DL initial BWP	Config 3 Config 1, 2, 3		TDDConf.2.1 DLBWP.0.1
configuration			-
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PI	DCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and			2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS	dB	4
	RE energy		
	DMRS precoder granularity		REG bundle size
ļ	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols	225	2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
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	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy DMRS precoder granularity	dB	0 REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer	T311 timer		1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
Note 1: UE-specific I	PDCCH is not transmitted after T1 star	ts.	

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to		dB			0		
SSS							
DMRS	of PDCCH to PDCCH	dB					
EPRE ratio SSS	of PBCH DMRS to	dB					
EPRE ratio DMRS	of PBCH to PBCH	dB			0		
EPRE ratio	of PSS to SSS	dB					
EPRE ratio SSS	of PDSCH DMRS to	dB					
EPRE ratio DMRS	of PDSCH to PDSCH	dB					
EPRE ratio SSS	of OCNG DMRS to	dB					
EPRE ratio DMRS	of OCNG to OCNG	dB					
SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15kHz			-98		
	Config 2				-98		
Config 3					-98		
Propagation condition			TDL-C 300ns 100Hz				
 Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time 							
period T1. Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.							

- Measurement gap configuration is assigned to the UE prior to the start of time period T1. The timers and layer 3 filtering related parameters are configured prior to the start of time period T1. Note 5:
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- SNR levels correspond to the signal to noise ratio over the SSS REs. Note 7:
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 Note 8: respectively in figure A.6.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.6.5.1.6.1-4: Void

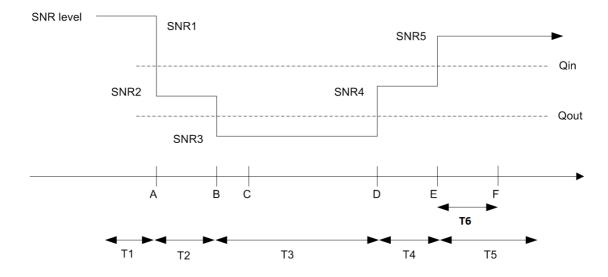


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and insync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Con	figuration	Description	
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth	
Note:	The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter	Unit	Value
		Test 1

A ations DC all		<u> </u>	Call 4
Active PCell RF Channel Number			Cell 1 1
Duplex mode	Config 1		FDD
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		Not Applicable
1DD Cornigaration	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP Config 1, 2, 3			DLBWP.0.1
configuration	, _, _, _,		
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD
reference onamie	Config 2		CCR.1.3 TDD
	Config 2		CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2]	SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
J	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PI	DCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and			2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols	005	2
parameters	Aggregation level Ratio of hypothetical PDCCH RE	CCE	<u>8</u> 4
	energy to average CSI-RS RE	dB	4
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS RE energy	αь	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX	1		DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2 Config 3		CSI-RS.1.1 TDD CSI-RS.2.1 TDD
T1	Coming O	S	0.2
T2		S	1.28
·-			1.20

T3		S	1.28
D1		S	1.24
Note 1:	Note 1: UE-specific PDCCH is not transmitted after T1 starts.		

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1		
			T1	T2	Т3
EPRE ratio of PDCCH DMRS to SSS		dB		4	
EPRE ratio of DMRS	of PDCCH to PDCCH	dB			
EPRE ratio o	of PBCH DMRS to	dB			
EPRE ratio of DMRS	of PBCH to PBCH	dB		0	
EPRE ratio	of PSS to SSS	dB			
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio of DMRS	of PDSCH to PDSCH	dB			
EPRE ratio o	of OCNG DMRS to	dB			
EPRE ratio of DMRS	of OCNG to OCNG	dB			
SNR on	Config 1	dB	1	-7	-15
RLM-RS	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/15kHz		-98	
	Config 2			-98	
Config 3				-98	
Propagation	condition		<u> </u>	TDL-C 300ns 100Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.6.5.1.7.1-4: Void

Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void

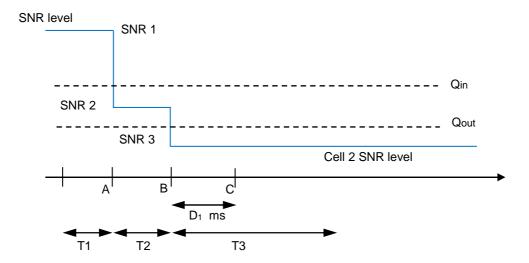


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Insync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1 which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description		
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3	TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number	1		1
Duplex mode	Config 1		FDD
TDD 0	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DL initial BWP	Config 3 Config 1, 2, 3		TDDConf.2.1 DLBWP.0.1
configuration			-
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for PI	DCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and			2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy Ratio of hypothetical PDCCH DMRS energy to average CSI-RS	dB	4
	RE energy		
	DMRS precoder granularity		REG bundle size
ļ	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols	225	2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
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	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
for CSI reporting	Config 2		CSI-RS.1.1 TDD
	Config 3		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
T4		S	0.2
T5		S	1.88
T6		S	1.84
Note 1: UE-specific I	PDCCH is not transmitted after T1 star	ts.	

Note 7:

Note 8:

Note 9:

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS		dB			0		
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio	o of PBCH DMRS to	dB					
EPRE ratio	o of PBCH to PBCH	dB			0		
EPRE ratio	o of PSS to SSS	dB					
EPRE ratio	o of PDSCH DMRS to	dB					
EPRE ratio	o of PDSCH to PDSCH	dB					
EPRE ratio	o of OCNG DMRS to	dB					
EPRE ratio	o of OCNG to OCNG	dB					
SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15kHz			-98		
1 'oc	Config 2				-98		
	Config 3				-98		
	on condition				L-C 300ns 10		
	OCNG shall be used suc			fully allocate	d and a const	ant total trans	mitted
	power spectral density is						
	The uplink resources for						
	NZP CSI-RS resource se	et configuration for CS	i reporting a	ire assigned	to the UE price	or to the start	of time
	period T1.	uration is assigned to	a tha LIC pria	r to the stort	of time period	J T4	
Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.				-1			
Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.				1.			

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1[A.3.6].

The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5

The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE

SNR levels correspond to the signal to noise ratio over the SSS REs.

respectively in figure A.6.5.1.8.1-1.

	Field	Test 1
	Value	
	gapOffset	0
Note 1:	Void	

Table A.6.5.1.8.1-4: Void

Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

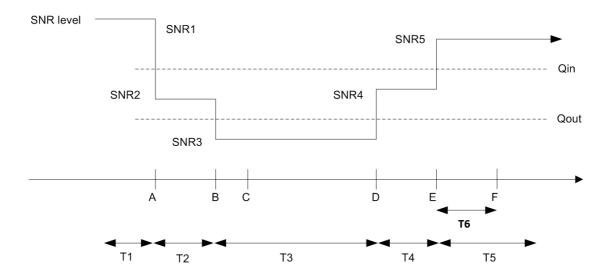


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2 Interruption

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.6.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2 and A 6.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD – FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – TDD duplex mode
3		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – FDD duplex mode
4		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD – TDD duplex mode
5		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD – TDD duplex mode
Note 1:		equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combinatio	ns which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configuration,	

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.6.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell1	Cell2
Frequency Range			FR1	FR1
Duplex mode Config 1			FDD	FDD
	Config 2,5		TDD	TDD
	Confiq 3		TDD	FDD
	Confiq 4		FDD	TDD
TDD configuration	Config 1		Not Applicable	Not Applicable
	Config 2		TDDConf.1.1	TDDConf.1.1
	Config 3		TDDConf.1.1	Not Applicable
	Confiq 4		Not Applicable	TDDConf.1.1
	Confiq 5		TDDConf.2.1	TDDConf.2.1
BW _{channel}	Config 1,2,3,4		Note 9	Note 9
	Config 5		Note 9	Note 9
BW _{occupied}	Config 1,2,3,4	RB	52 Note 7	52 Note 7
	Config 5		106 Note 8	106 Note 8
Initial DL BWP	Config 1,2,3,4		DLBWP.0.1	DLBWP.0.1
Configuration	Config 5		DLBWP.0.1	DLBWP.0.1
Dedicated DL BWP	Config 1,2,3,4		DLBWP.1.1	DLBWP.1.1
Configuration	Config 5		DLBWP.1.1	DLBWP.1.1
Initial UL BWP	Config 1,2,3,4		ULBWP.0.1	
Configuration	Config 5		ULBWP.0.1	
Dedicated UL BWP	Config 1,2,3,4		ULBWP.1.1	
Configuration	Config 5		ULBWP.1.1	
PDSCH Reference	Config 1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2		SR.1.2 TDD	SR.1.2 TDD
	Config 3		SR.1.2 TDD	SR.1.1 FDD
	Confiq 4		SR.1.1 FDD	SR.1.2 TDD
	Confiq 5		SR.2.1 TDD	SR.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD	TRS.1.1 FDD
	Config 2		TRS.1.1 TDD	TRS.1.1 TDD
	Config 3		TRS.1.1 TDD	TRS.1.1 FDD

		_			
	Confiq 4		TRS.1.1 FDD	TRS.1.1 TDD	
	Confiq 5		TRS.1.2 TDD	TRS.1.2 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	CR.1.1 FDD	
parameters	Config 2		CR.1.1 TDD	CR.1.1 TDD	
	Config 3		CR.1.1 TDD	CR.1.1 FDD	
	Config 4		CR.1.1 FDD	CR.1.1 TDD	
	Confiq 5		CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORESET	Config 1		CCR.1.1 FDD	CCR.1.1 FDD	
parameters	Config 2	1	CCR.1.1 TDD	CCR.1.1 TDD	
•	Config 3	1 -	CCR.1.1 TDD	CCR.1.1 FDD	
	Config 4		CCR.1.1 FDD	CCR.1.1 TDD	
	Config 5		CCR.2.1 TDD	CCR.2.1 TDD	
OCNG Patterns	Config 1,2,3,4		OP.1 ^{Note 7}	OP.1 Note 7	
CONC Latterns	Config 5		OP.1 Note 8	OP.1 Note 8	
SMTC Configuration	Corning 5		SMTC.1	SMTC.4	
	Carfig 4 0 0 4			SSB.5 FR1	
SSB Configuration	Config 1,2,3,4	<u> </u>	SSB.1 FR1		
O 1 : M : 1	Config 5		SSB.2 FR1	SSB.6 FR1	
Correlation Matrix and A	Antenna		1x2 Low	1x2 Low	
Configuration					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMR		4			
EPRE ratio of PBCH to PB		1			
EPRE ratio of PDCCH DM	RS to SSS	-		0	
EPRE ratio of PDCCH to P		dB	0		
EPRE ratio of PDSCH DM		- ub	0	0	
EPRE ratio of PDSCH to P		1			
EPRE ratio of OCNG DMR					
EPRE ratio of OCNG to OC		1			
Noc ^{Note 2}	, ,	dBm/15	-104	404	
		kHz	-104	-104	
SS-RSRP Note 3		dBm/15	0.7	0.7	
		kHz	-87	-87	
Ês/Iot		dB	17	17	
Ê _s /N _{oc}		dB	17	17	
Noc ^{Note 2}	Config 1,2,3,4	dBm/S	-104	-104	
1400		45,0	-101	-101	
	Config 5		101	101	
Io ^{Note3}		dBm/			
·-	Config 1,2,3,4	9.36MHz	-58.96	-58.96	
Config 5		dBm/		_	
		38.16MHz	-52.86	-52.86	
Time offset to Cell1 Note		μς		3	
Propagation Condition		μο	AWGN	AWGN	
Propagation Condition				AVVGIN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled within BW_{occupied}.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.
- Note 4: Void
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- Note 6: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of TS 38.213 [3].
- Note 7: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- Note 8: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- Note 9: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.6.5.2.1.2 Test Requirements

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-2.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3 SCell Activation and Deactivation Delay

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations are shown in table A.6.5.3.1.1-1 below. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot n + $\frac{T_{\text{HARQ}} + T_{\text{activation_time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot $n + \frac{T_{\text{HARQ}} + T_{\text{activation_time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot length}}$

 $\frac{T_{\text{HARQ}} + 3 \text{ms}}{\text{NR slot length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell

interruption due to activation of SCell shall occur in the slot $n + 1 + \frac{T_{\text{HARQ}}}{NR \text{ slot length}}$ to $n + 1 + \frac{T_{\text{HARQ}+3 \text{ ms}+T_X}}{NR \text{ slot length}} + \frac{T_{\text{HARQ}+3 \text{ ms}+T_X}}{NR \text{ slot length}}$

 $N_{\rm interruption}$, as defined in clause 8.3, where $N_{\rm interruption}$ is the interruption length given in section 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot m + $\frac{T_{\text{HARQ}+3ms}}{NR \, s \, lot \, length}$, as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot m + 1 + $\frac{T_{\text{HARQ}}}{NR \, s \, lot \, length}$ to m + 1 + $\frac{T_{\text{HARQ}+3ms}}{NR \, s \, lot \, length}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations

Co	nfig	Description		
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode		
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode		
3		NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is	s only required to be tested in one of the supported test configurations		
Note 2:		E is only required to be tested in one with smallest aggregated channel bandwidth from supported combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test		

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	ø	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	1	During this time the UE shall activate the SCell.
T3	S	1	During this time the UE shall deactivate the SCell.
T _{HARQ}	ms	k₁×NR slot length	k ₁ is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by <i>dl-DataToUL-ACK</i> , the value of k should be the minimum value defined in TS 38.213 [3] depends on UE's capability
TCSI_Reporting	ms	15	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]

Table A.6.5.3.1.1-3: Cell specific test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter		Unit	T1	Cell 1	Т3	T1	Cell 2	Т3
Dunlay made Config 1			FDD				12	13
Duplex mode	Config 2,3	╡	TDD					
	Config 1		Not applicable					
TDD configuration Config 2]	TDDConf.1.1					
	Config 3		TDDConf.2.1					
BW _{channel}	Config 1,2	MHz			No			
	Config 3				No			
BWoccupied	Config 1,2	RB				Note 5 Note 6		
Initial BWP configuration	Config 3					/P.0.2		
TCI state	<u> </u>					tate.0		
10101010	Config 1					.1 FDD		
TRS Configuration	Config 2	1			TRS.1	.1 TDD		
·	Config 3				TRS.1	.2 TDD		
PDSCH Reference	Config 1			SR.1.1 FD			-	
measurement channel	Config 2	_		SR.1.1 TD			-	
	Config 3			SR.2.1 TD			-	
Dedicated CORESET	Config 1	-		CCR.1.1 FE			-	
parameters	Config 2	-		CR.1.1 TE			-	
	Config 3 Config 1			CR.2.1 TC CR.1.1 FD			-	
RMSI CORESET	Config 1	┥		CR.1.1 FD			-	
parameters	Config 3	┪		CR.2.1 TD				
OCNG Patterns	Config 1,2			OTT.Z.T TD	OP.1	Note 5		
	Config 3,	1			OP.1	Note 6		
CCD Configuration	Config 1,2				SSB.			
SSB Configuration	Config 3				SSB.:			
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD					
for CSI reporting	Config 2			CSI-RS.1.1 TDD				
	Config 3		CSI-RS.2.1 TDD					
SMTC configuration			SMTC.1					
reportConfigType				periodic			N/A	
reportQuantity			С	ri-RI-PMI-C	QI		N/A	
CSI reporting	Config 1,2	slot		5			N/A	
periodicity	Config 3	3101		10			N/A	
	Config 1,2			2			N/A	
CSI reporting offset	Config 3	slot		4			N/A	
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DM		1						
EPRE ratio of PBCH to F		1						
EPRE ratio of PDCCH D]	0					
EPRE ratio of PDCCH to		↓ <u>.</u> │						
EPRE ratio of PDSCH D		dB						
EPRE ratio of PDSCH to		-						
1)	EPRE ratio of OCNG DMRS to SSS(Note							
EPRE ratio of OCNG to OCNG DMRS		┪ ┃						
(Note 1)								
Note2	Config 1,2	dBm/SC			-1	04		
N oc	Config 3	S			-1	01		
$\mathbf{\hat{E}_{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	17					
\hat{E}_s/N_{oc}		dB	17					
SS-RSRP ^{Note3}	Config 1,2 Config 3	dBm/SC S	-87 -84					
SCH_RP Note 3		dBm/15 kHz	-87					
lo Note3	Config 1,2	dBm/ 9.36MHz			-58	.96		

		Config 3	dBm/			
			38.16MH	-52.87		
			Z			
Propaga	tion condition		-	AWGN		
Note 1:		e used such that eved for all OFE		ally allocated and a constant total transmitted power spectral		
Note 2:	, , , , , , , , , , , , , , , , , , ,					
Note 3:	BW _{occupied} . te 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.					
Note 4:				igned to the UE prior to the start of time period T2.		
Note 5:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52 RBs) from F _{C,low} , and lo is independent of the BW _{channel} configured.					
Note 6:						

A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (n + 1 + $\frac{T_{HARQ} + 3 \, ms}{NR \, slot \, length}$). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot n + $\frac{T_{HARQ} + T_{activition_time} + T_{CSI_Reporting}}{NR \, slot \, length}$, $T_{activation_time} = T_{FirstSSB} + 5 ms$, as defined in clause 8.3.

N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot m + $\frac{T_{HARQ} + 3ms}{NR slot length}$, as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $n + 1 + \frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $n + 1 + \frac{T_{\text{HARQ}+3\,\text{ms}+T_X}}{\text{NR slot length}} + N_{\text{interruption}}$, as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot m + $1 + \frac{T_{HARQ}}{NR \ slot \ length}$ to m + 1 + $\frac{T_{HARQ} + 3 ms}{NR \ slot \ length}$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot $\frac{\frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \ slot \ length}$ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 320ms SCell measurement cycle

A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 320ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	320	

A.6.5.3.2.2 **Test Requirements**

NR slot length

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation time will be replaced with the value $T_{FirstSSB_MAX} + T_{rs} + 5ms$.

A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.1.1-1. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $\frac{T_{\text{HARQ}} + T_{\text{activtion_time}} + T_{\text{CSI_Reporting}}}{T_{\text{Reporting}}}$, as defined in clause 8.3. The UE shall start reporting CSI in PCell in slot n + 1 +

 $\frac{T_{\text{HARQ}+3\,ms}}{NR\,slot\,\,length}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell

interruption due to activation of SCell shall occur in the slot $n+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $m+1+\frac{T_{\text{HARQ}+3\,\text{ms}+T_{\text{X}}}}{\text{NR slot length}}+\frac{T_{\text{HARQ}+3\,\text{ms}+T_{\text{X}}}}{\text{NR slot length}}$

 $N_{\rm interruption}$, as defined in clause 8.3, where $N_{\rm interruption}$ is the interruption length given in section 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot n + THARQ+3ms NR slot length, as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur

in the slot $n+1+\frac{T_{HARQ}}{NR\,slot\,\,leng\,th}$ to $n+1+\frac{T_{HARQ}+3m\,s}{NR\,slot\,\,leng\,th}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.6.5.3.3.2 **Test Requirements**

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except Tactivation_time will be replaced with the value $T_{FirstSSB_MAX} + T_{SMTC_MAX} + 2*T_{rs} + 5ms$ as defined in clause 8.3.

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4: Void

A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A. 6.5.4.1.1-2, Table A. 6.5.4.1.1-3 and Table A. 6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	mode DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode

Note 1: The UE is only required to be tested in one of the supported test configurations

Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW_{channel}) defined in each test configuration,

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test	Value	Comment
	Offic	configuration		
RF Channel		Config 1,2,3, 4,	1, 2	Two radio channels are used for these two
Number		5, 6, 7, 8, 9		tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement gap		Config 1,2,3, 4,	OFF	
pattern Id		5, 6, 7, 8, 9		
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		
T1		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Configuration	Parameter	Unit	Test	Test 1	Test 2
Configuration					
S. b. f. f. s. p. S. b. f. f. s. p. S. b. f. f. s. p.	Channel number		Conf 1, 2, 3, 4,	1	1
DD configuration	Onamile namber				
BW_clarins BW_configuration BW_configu					
MHz	TDD configuration				
BWcharmoid BWchammoid BWchammoid Conf. 1, 5, 6 Note 6					
Descripted RB Conf. 1, 2, 3 Solve So	DW	N 41 1-			<u> </u>
BWoccapied RB	BVVchannel	IVIHZ			
Conf. 4, 5, 6 52 None 52 None 106 None 5	D\M	DD		F2 Note 4	Note of
Conf 7, 8, 9 106 Nome 5 1	DVV occupied	KD			
PDSCH reference measurement channel as defined in A.3.1.1 Conf.1, 2, 3 SR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1 FDD TR.1.1 FDD CR.1.1					
measurement channel as defined in A.3.1.1 Conf.4, 5, 6 SR.1.1 TDD SR.1.1 TDD RMSI CORESET reference measurement channel as defined in A.3.1.2 Conf.1, 2, 3 CR.1.1 FDD CR.1.1 FDD RMC CORESET reference measurement channel as defined in A.3.1.3 Conf.1, 2, 3 CCR.1.1 FDD CR.2.1 TDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CONF.2, 3 CCR.1.1 FDD CCR.1.1 FDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CONF.2, 3 CCR.1.1 FDD CCR.1.1 FDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CONF.2, 3, 4 CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CONF.2, 3, 4 CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Nove 1 channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TDD CCR.2.1 TDD CONG Settle Nove 1 channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TDD CCR.2.1 TDD CONF Settle Nove 1 channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TDD CCR.2.1 TDD CONF Settle Nove 1 channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TD	DD00H (
Conf 7, 8, 9 SR 2.1 TDD S					
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RMSI CORESET reference reference measurement channel as defined in A.3.1.2 Conf 1, 2, 3 CR.1.1 FDD CR.1.1 FDD RMC CORESET reference measurement channel as defined in A.3.1.2 Conf 1, 2, 3 CCR.1.1 FDD CR.2.1 TDD RMC CORESET reference measurement channel as defined in A.3.1.3 Conf 1, 2, 3 CCR.1.1 FDD CCR.1.1 FDD CONG Pattern Note 1 Conf 1, 2, 3, 4, 5, 6 CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Note 1 Conf 1, 2, 3, 4, 5, 6 OP.1 Note 4 OP.1 Note 4 SSB configuration Conf 1, 2, 3, 4, 5, 6 SSB.1 FR1 SSB.1 FR1 SSB configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 SSB.2 FR1 SSB.2 FR1 SMTC configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 SSB.2 FR1 SSB.2 FR1 SMTC.1 TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD Conf 2 TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD Conf 3 TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD Conf 4 TRS.1.1 TDD TRS.1.1 TDD TRS.1.2 TDD Conf 5 TRS.1.1 TDD TRS.1.2 TDD TRS.1.2 TDD Conf 6 TRS.1.2 TDD			COIII 7, 6, 9	SR 2.1 TDD	SR 2.1 TDD
reference measurement channel as defined in A.3.1.2 Conf 4, 5, 6 CR.1.1 TDD CR.1.1 TDD CR.1.1 TDD CR.2.2 TDD			Conf 1, 2, 3	CR.1.1 FDD	CR.1.1 FDD
measurement channel as defined in A.3.1.2 Conf 7, 8, 9 CR.2.1 TDD CR.2.1 TDD RMC CORESET reference measurement channel as defined in A.3.1.3 Conf 4, 5, 6 CCR.1.1 TDD CCR.1.1 TDD Conf 7, 8, 9 Conf 7, 8, 9 CCR.2.1 TDD CCR.2.1 TDD Conf 9 Assurement channel as defined in A.3.1.3 Conf 1, 2, 3, 4, 5, 6 OP.1 Note 4 OP.1 Note 4 Conf 1, 2, 3, 4, 5, 6 Conf 1, 2, 3, 4, SSB.1 FR1 SSB.1 FR1 SSB.1 FR1 SSB configuration Conf 1, 2, 3, 4, SSB.1 FR1 SSB.1 FR1 SSB.2 FR1 SMTC configuration Conf 1, 2, 3, 4, SSB.2 FR1 SSB.2 FR1 SSB.2 FR1 SMTC configuration Conf 1, 2, 3, 4, SSB.2 FR1 SMTC.1 SMTC.1 Conf 2 TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD Conf 3 TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 FDD Conf 4 TRS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD Conf 5 TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD Conf 6 TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD Conf 1, 2, 3, 4, Configuration Conf 1, 2, 3, 4, Sh.2, Sh.2, Sh.2				CR.1.1 TDD	CR.1.1 TDD
In A.3.1.2 Conf 1, 2, 3 CCR.1.1 FDD CCR.1.1 TDD CCR.2.1 TDD TRS.1.1 TDD TRS.1.1 TDD CCR.2.1 TDD TRS.1.1 TDD TRS.1.1 TDD CCR.2.1 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD CCR.2.1 TDD TRS.1.2 TDD	measurement				
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reference measurement channel as defined in A.3.1.3 Conf 7, 8, 9 CCR.2.1 TDD CCR.2.1 TDD CCR.2.1 TDD CNG Pattern Note 1 in A.3.1.3 Conf 1, 2, 3, 4, 5, 6 OP.1 Note 4 OP.1 Note 4 OP.1 Note 5 SSB configuration Conf 1, 2, 3, 4, 5, 6 SSB.1 FR1 SSB.1 FR1 SSB.1 FR1 SMTC configuration Conf 7, 8, 9 SSB.2 FR1 SSB.2 FR1 SSB.2 FR1 SMTC.1 Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 SMTC.1 SMTC.1 SMTC.1 SMTC.1 Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 SMTC.1 SMTC.1 SMTC.1 Conf 2 TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TS.6, 6,					
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channel as defined in A.3.1.3 CCR.2.1 TDD CCR.2.1 TDD OCNG Pattern Note 1 (2.3, 4, 5.6) Conff 1, 2, 3, 4, 5.6 OP.1 Note 5 OP.1 Note 5 SSB configuration Conf 1, 2, 3, 4, 5.6 SSB.1 FR1 SSB.1 FR1 SMTC configuration Conf 1, 2, 3, 4, 5.6, 7, 8, 9 SSB.2 FR1 SSB.2 FR1 SMTC configuration Conf 1, 2, 3, 4, 5.6, 7, 8, 9 SMTC.1 SMTC.1 Conf 2 TRS.1.1 FDD TRS.1.1 FDD Conf 2 TRS.1.1 FDD TRS.1.1 FDD Conf 3 TRS.1.1 FDD TRS.1.1 FDD Conf 4 TRS.1.1 FDD TRS.1.1 TDD Conf 5 TRS.1.1 TDD TRS.1.1 TDD Conf 6 TRS.1.1 TDD TRS.1.2 TDD Conf 7 TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD TRS.1.2 TDD DL initial BWP configuration 5, 6, 7, 8, 9 DLBWP.0.1 DLBWP.0.1 DL dedicated BWP configuration 5, 6, 7, 8, 9 DLBWP.1.1 DLBWP.1.1 DLBWP.1.1 DLBWP.1.1 ULBWP.1.1 EPRE ratio of PBCH to PBCH DDCCH DMRS to SSS EPR				CCR.1.1 IDD	CCR.1.1 IDD
In A.3.1.3			Cont 7, 8, 9	CCB 2.1 TDD	CCP 2.1 TDD
Conf				CCR.2.1 TDD	CCR.2.1 1DD
Seconfiguration			Conf 1, 2, 3, 4,	· N 4	
Config 7, 8, 9	OCNG Pattern Note 1			OP.1 Note 4	OP.1 Note 4
SSB configuration				OP.1 Note 5	OP.1 Note 5
SSB configuration				000 4 504	000 4 504
SMTC configuration	SSB configuration			55B.1 FR1	55B.1 FR1
SMITC Collinguration				SSB.2 FR1	SSB.2 FR1
Conf 1	SMTC configuration			SMTC.1	SMTC.1
Conf 3				TRS.1.1 FDD	TRS.1.1 FDD
Conf 4			Conf 2	TRS.1.1 FDD	TRS.1.1 FDD
Conf 5					
Conf 6					
Conf 7	CSI-RS for tracking				
Conf 8					
Conf 9					
DL initial BWP					
configuration 5, 6, 7, 8, 9 DLBWP.0.1 DLBWP.0.1 DL dedicated BWP configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 DLBWP.1.1 DLBWP.1.1 UL dedicated BWP configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 ULBWP.1.1 ULBWP.1.1 EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0 EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS 0 0 0 EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to 0 0 0	DL initial DWD			TR5.1.2 TDD	TRS.1.2 TDD
DL dedicated BWP configuration				DLBWP.0.1	DLBWP.0.1
configuration 5, 6, 7, 8, 9 DLBWP.1.1 DLBWP.1.1 UL dedicated BWP configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 ULBWP.1.1 ULBWP.1.1 EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH_DMRS Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0 EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to 0 0					
UL dedicated BWP configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 ULBWP.1.1 ULBWP.1.1 EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0 EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to 0 0				DLBWP.1.1	DLBWP.1.1
configuration 5, 6, 7, 8, 9 OLBWP.1.1 OLBWP.1.1 EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0 EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to 0 0					LII DIMD 4.4
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to	configuration	<u></u>		ULBWP.1.1	ULBWP.1.1
EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to	EPRE ratio of PSS				
PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to Conf 1, 2, 3, 4, 5, 6, 7, 8, 9					
SSS EPRE ratio of PBCH to PBCH_DMRS dB Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0 EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to 0 0 0					
EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to Conf 1, 2, 3, 4, 5, 6, 7, 8, 9					
to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to dB Cont 1, 2, 3, 4, 5, 6, 7, 8, 9 0 0					
EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to		۲D	Conf 1, 2, 3, 4,	0	0
PDCCH_DMRS to SSS EPRE ratio of PDCCH to		aR		U	U
EPRE ratio of PDCCH to					
EPRE ratio of PDCCH to					
PDCCH to					
	PDCCH_DMRS				

EPRE ratio of PDSCH_DMRS to SSS								
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSS								
EPRE ratio of OCNG to OCNG DMRS								
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102	
N_{oc} Note 2	dBm/ SCS	Conf 1,2,3,4,5,6		-102			-102	
	303	Conf 7,8,9		-99			-99	
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_{_s}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/	Conf 1,2,3,4,5,6	-86	-86	-86	-86	-86	-86
	SCS	Conf 7,8,9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1,2,3,4,5,6	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
IQ note o	dBm/ 38.16 MHz	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation		Conf 1, 2, 3, 4,		AWGN			AWGN	
Condition		5, 6, 7, 8, 9						
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2 1 x 2					

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N}$ to be fulfilled within BW_{occupied}.

NOTE 3: \hat{E}_{s}/I_{ot} , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.

NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.

NOTE 6: N_{RB,c} is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test			Test 2			
		Configuration	T1	T2	T3	T1	T2	Т3
Channel number		Conf 1, 2, 3, 4,		2			2	
		5, 6, 7, 8, 9						
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1			TDDConf.1.1	
		Conf 3, 6, 9		TDDConf.2	.1		TDDConf.2.1	
DM.	MHz	Conf 1, 4, 7		Note 6			Note 6	
BWchannel	IVITZ	Conf 2, 5, 8 Conf 3, 6, 9		Note 6			Note 6 Note 6	
BWoccupied	RB	Conf 1, 4, 7		52 Note 4			52 Note 4	
DVV occupied	IND	Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5	1		106 Note 5	
		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		100	
		Com 1, 4, 7	FR1-	A3-10	A3-10 in		G-FR1-	
			A3-10	in [13]	[13]	N/A	A3-10 in	N/A
			in [13]	[.0]	[]		[13]	
		Conf 2, 5, 8	Ğ-	G-FR1-	G-FR1-		C ED4	
PUSCH parameters			FR1-	A3-10	A3-10 in	N/A	G-FR1- A3-10 in	N/A
for NR UL carrier			A3-10	in [13]	[13]	IN/A	[13]	IN/A
			in [13]	0 /	0 == :		[.0]	
		Conf 3, 6, 9	G-	G-FR1-	G-FR1-		G-FR1-	
			FR1- A3-14	A3-14 in [13]	A3-14 in [13]	N/A	A3-14 in	N/A
			in [13]	111 [13]	[13]		[13]	
		Conf 1, 4, 7	Table	Table	Table			
		00111 1, 1, 1	8.3.3.1	8.3.3.1.	8.3.3.1.2			N1/A
			.2-1 in	2-1 in	-1 in [13]	N/A	N/A	N/A
			[13]	[13]				
		Conf 2, 5, 8	Table	Table	Table			
PUCCH parameters			8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
For NR UL carrier			.2-1 in	2-1 in	-1 in [13]			
		Conf 3, 6, 9	[13] Table	[13] Table	Table			
		Com 5, 6, 9	8.3.3.1	8.3.3.1.	8.3.3.1.2			
			.2-2 in	2-2 in	-2 in [13]	N/A	N/A	N/A
			[13]	[13]	[]			
		Conf 1, 4, 7		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
				in [13]		[13]	[13]	[13]
PUSCH parameters		Conf 2, 5, 8	N1/A	G-FR1-	N1/A	G-FR1-	G-FR1-	G-FR1-
for supplementary UL			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
UL		Conf 3, 6, 9		in [13] G-FR1-		[13] G-FR1-	[13] G-FR1-	[13] G-FR1-
		Com 5, 6, 9	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
			1 477	in [13]	1,7,1	[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
PUCCH parameters		Conf 2, 5, 8				Table	Table	Table
for supplementary UL			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
		Conf 3, 6, 9				Table	Table	Table
		00/11 0, 0, 9	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-2 in [13]	-2 in [13]	-2 in [13]
PDSCH reference		Conf 1, 4, 7		SR.1.1 FD	D		SR.1.1 FDD	
measurement		Conf 2, 5, 8		SR.1.1 TD	D		SR.1.1 TDD	
channel as defined		Conf 3, 6, 9		SR 2.1 TD	D		SR 2.1 TDD	
in A.3.1.1		0 (: : -						
	Conf 1, 4, 7				CR.1.1 FDD			
		Conf 2, 5, 8		CR.1.1 TD	טי		CR.1.1 TDD	1

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measurement channel as defined in A.3.1.2 Conf 1, 4, 7 CCR.1.1 FDD CR.2.1 TDD RMC CORESET reference measurement channel as defined in A.3.1.3 Conf 2, 5, 8 CCR.1.1 TDD CCR.1.1 TDD Management channel as defined in A.3.1.3 Conf 3, 6, 9 CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Nute 1 Conf 1, 2, 4, 5, 7, 8 Op.1 Nute 4 Op.1 Nute 4 CONG Pattern Nute 1 Conf 1, 2, 4, 5, 7, 8 Op.1 Nute 4 Op.1 Nute 4 SSB configuration Conf 1, 2, 4, 5, 7, 8 SSB.1 FR1 SSB.1 FR1 SSB configuration Conf 3, 6, 9 SSB.2 FR1 SSB.2 FR1 SSF ST I stacking Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1 TRS.1.1 FDD CSI-RS for tracking Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1 TRS.1.1 FDD CSI-RS for tracking Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 Conf 1 TRS.1.1 FDD Conf 2, 5, 6, 7, 8, 9 Conf 1 TRS.1.1 FDD Conf 2 Conf 3, 6, 9 Conf 3 TRS.1.2 TDD DL mittal BWP Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 DLBWP.0.1 DLBWP.0.1 DLBWP.0.1 DLBWP.0.1 DLBWP.0.1 DLBWP.0.1 <td>RMSI CORESET</td> <td></td> <td>Conf 3, 6, 9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	RMSI CORESET		Conf 3, 6, 9						
channel as defined in A.3.1.2 Conf 1.4.7 CCR.1.1 FDD CCR.1.1 FDD reference measurement channel as defined in A.3.1.3 Conf 3.6.9 CCR.2.1 TDD CCR.2.1 TDD CONG Pattern Note 1 (A.3.1.3) Conf 1.2.4.5. Op.1 Note 4 (Op.1 Note 5) Op.1 Note 5 (Op.1 Note 5) SSB configuration Conf 1.2.4.5. SSB.1 FR1 (SSB.1 FR1 (SSB.2						,			
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SSB configuration			Conf 1 2 4 5						
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SSB configuration					OP 1 Note 5			OP 1 Note 5	
SSB configuration									
Conf. 2, 3, 4,	SSB configuration				SSB.1 FR1			SSB.1 FR1	
SMTC configuration	oob comigaration		Conf 3 6 9		SSB 2 FR1	1		SSB 2 FR1	
CSI-RS for tracking									
Conf 1	SMTC configuration				SMTC.1			SMTC.1	
Conf 2	CSI-RS for tracking		0, 0, 1, 0, 0		Conf 1		-	TRS 1 1 FDI)
Conf 3									
Conf 4									
Conf 5									
Conf 6									
Conf 7									
Conf 8									
DL initial BWP									
Dititial BWP Configuration Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 DLBWP.0.1 DLBWP.0.1									
DL dedicated BWP Conf 1, 2, 3, 4, 5, 6, 7, 8, 9 DLBWP.1.1 DLBWP.1.1	DL initial RWP		Conf 1 2 3 4						
DL dedicated BWP configuration					DLBWP.0.	1		DLBWP.0.1	
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EPRE ratio of PBCH_DMRS									
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Note 2	dBm/		-102		100			
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$\frac{E_s/V_{oc}}{\hat{F}/I_{oc}}$ dB $\frac{5, 6, 7, 8, 9}{Conf 1, 2, 3, 4, 16}$ 16 16 16 16 16		300						-99	
Ê /I Note 3 dB Conf 1, 2, 3, 4, 16 16 16 16 16 16	\hat{F}/N	dВ		16	16	16	16	16	16
		GD.		10	10	10	10	10	10
-s/-ot $ -s/-ot$ $ -s/-ot$ $ -s/-ot$ $ -s/-ot$ $ -s/-ot$ $ -s/-ot$	Ê/I Note 3	dB		16	16	16	16	16	16
	s / Tot		5, 6, 7, 8, 9		.0	.0			

SS-RSRP Note 3	dBm/	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	SCS	Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
IQ nate o	dBm/ 38.16 MHz	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2		1 x 2			

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ij} to be fulfilled within BW_{occupied}.
- NOTE 3: \hat{E}_{s}/I_{ot} , Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.6.5.4.2 Void

A.6.5.5 Beam Failure Detection and Link recovery procedures

A.6.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.6.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.1.1-1, A.6.5.5.1.1-2, A.6.5.5.1.1-3 and A.6.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a

reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 1.

Table A.6.5.5.1.1-1: Supported test configurations for FR1 PCell

Cor	Configuration Description					
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth				
Note:	The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramet	Parameter		Value	Comment	
			Test 1		
Astino DCCall			Call 4		
Active PSCell RF Channel Number			Cell 1		
Duplex mode	Config 1		FDD		
Duplex mode	Config 2, 3		TDD		
BWchannel	Config 1	MHz	10: NRB,c = 52		
Byvorianner	Coming 1	IVII IZ	10. NIND,C = 32		
	Config 2		10: NRB,c = 52		
	Config 3		40: NRB,c = 106		
DL initial BWP	Config 1, 2,		DLBWP.0.1		
configuration	3		DEDWI .O.1		
oomigarano					
DL dedicated BWP	Config 1, 2,		DLBWP.1.1		
configuration	3				
UL initial BWP	Config 1, 2,		ULBWP.0.1		
configuration	3				
UL dedicated BWP	Config 1, 2,		ULBWP.1.1		
configuration	3				
TDD Configuration	Config 1		Not Applicable		
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
CORESET	Config 1		CR.1.1 FDD		
Reference Channel	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
SSB Configuration	Config 1		SSB.3 FR1		
	Config 2		SSB.3 FR1		
	Config 3		SSB.4 FR1		
SMTC Configuration	Config 1, 2		SMTC.1		
DD COLL/DD COLL	Config 3		SMTC.1		
PDSCH/PDCCH	Config 1, 2		15 KHz		
subcarrier spacing	Config 3		30 KHz		
PRACH	Config 1, 2		Table A.3.8.2.2-1		
Configuration Config 3			Table A.3.8.2.2-1		
SSB Index assigned as BFD RS (q ₀)			0		
SSB Index assigned as CBD RS (q ₁)			1		
	OCNG parameters		OP.1		
CP length	I A t		Normal		
Correlation Matrix and Configuration	i Antenna		2x2 Low		
Beam failure	DCI format		1-0		
_			· · · · · · · · · · · · · · · · · · ·		

detection				
a a c c c c c c c c c c c c c c c c c c	Number of		2	
transmission	Control			
parameters	OFDM			
parametere	symbols			
		CCE	8	
	Aggregation	CCE	0	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average SSS			
	RE energy			
	Ratio of	dB	0	
	hypothetical		_	
	PDCCH			
	DMRS energy			
	· · ·			
	to average SSS RE			
	energy		DE0 : : :	
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			OFF	
Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSync	Threshold		absent	When the
			G. 5 5 1 1 1	field is
				absent, the
				UE applies
				the value 0.
				(Table 8.1.1-
TI 1 1100D	0 " 1 0	ID /	00	1).
rsrp-ThresholdSSB	Config 1, 2	dBm/	-98	Threshold
				used for
	Config 3	SCS kHz	-95	
	Coning 3			Q _{in_LR_SSB}
nowerControlOffsetS	S			
powerControlOffsetS	S		db0	Used for
powerControlOffsetS	S			Used for deriving rsrp-
powerControlOffsetS	Ś			Used for deriving rsrp- ThresholdCS
			db0	Used for deriving rsrp-
powerControlOffsetS beamFailureInstance				Used for deriving rsrp- ThresholdCS I-RS see
			db0	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17
			db0	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of
			db0	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17
beamFailureInstance	MaxCount		db0 n1	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of
	MaxCount		db0	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of
beamFailureInstance	MaxCount		db0 n1	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of TS 38.321 [7
beamFailureInstance	MaxCount		db0 n1	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17
beamFailureInstance	MaxCount		db0 n1	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance	MaxCount		db0 n1	Used for deriving rsrp- ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17
beamFailureInstance beamFailureDetectio	MaxCount nTimer		n1 pbfd4	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS	MaxCount nTimer Config 1		n1 pbfd4 CSI-RS.1.1 FDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for	MaxCount nTimer Config 1 Config 2		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting	MaxCount nTimer Config 1 Config 2 Config 3		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for	MaxCount nTimer Config 1 Config 2 Config 3 Config 1		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for tracking	MaxCount nTimer Config 1 Config 2 Config 3 Config 1		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as RLM	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2		n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as RLM	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2	ms	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.1 TDD TRS.1.1 TDD	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
beamFailureInstance beamFailureDetectio CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as RLM RS	MaxCount Timer Config 1 Config 2 Config 3 Config 1 Config 2	ms	n1 pbfd4 CSI-RS.1.1 FDD CSI-RS.1.1 TDD TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0, 1	Used for deriving rsrp-ThresholdCS I-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of

T1	S	0.2	During this time the the UE shall be fully synchronize d to cell 1
T2	S	0.37	
T3	S	0.24	
T4	S	0	
T5	S	0.17	
D1	S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCC	EPRE ratio of PDCCH DMRS to SSS				0		
EPRE ratio of PDCC	H to PDCCH DMRS	dB					
EPRE ratio of PBCH	DMRS to SSS	dB					
EPRE ratio of PBCH	to PBCH DMRS	dB					
EPRE ratio of PSS to	SSS	dB					
EPRE ratio of PDSC	H DMRS to SSS	dB					
EPRE ratio of PDSC	H to PDSCH DMRS	dB					
EPRE ratio of OCNO	DMRS to SSS	dB					
EPRE ratio of OCNO	to OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3	,	-10	-10	10	10	10
SSB_RP of set q ₁	Config 1	dBm/	-108	-108	-88	-88	-88
-	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15			-98		
1 oc	-	KHz					
	Config 2				-98		
	Config 3				-98		
Propagation conditio	n			TDL-	C 300ns 1	00Hz	

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.

Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.

Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.

Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.1.1-4: Void

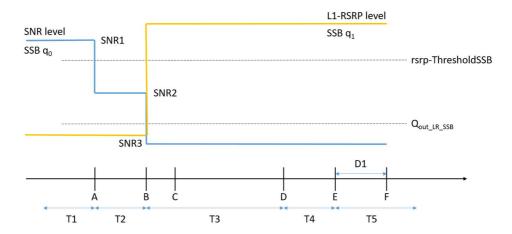


Figure A.6.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Coi	nfiguration	Description			
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Value	Comment	
Parameter		Onit	Test 1	Comment
			16211	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
Dapiex mode	Config 2,		TDD	
	3		100	
BWchannel	Config 1	MHz	10: NRB,c =	
			52	
	Config 2		10: NRB,c =	
			52	
	Config 3		40: NRB,c =	
DI 1 W I DIMB	0 " 1		106	
DL initial BWP	Config 1,		DLBWP.0.1	
configuration	2, 3			
DL dedicated BWP	Config 1,		DLBWP.1.1	
configuration	2, 3			
_				
UL initial BWP	Config 1,		ULBWP.0.1	
configuration	2, 3			
UL dedicated BWP	Config 1,		ULBWP.1.1	
configuration	2, 3		OLDWI .I.I	
Johngaration	2, 0			
TDD Configuration	Config 1		Not	
			Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1,		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1,		15 KHz	
subcarrier spacing	2			
	Config 3		30 KHz	
PRACH	Config 1,		Table	
Configuration	2		A.3.8.2.2-1	
	Config 3		Table	
			A.3.8.2.2-1	
SSB Index assigned a	s BFD RS		0	
(q ₀)				
SSB Index assigned a	s CBD RS		1	
(q ₁)			25 :	
OCNG parameters			OP.1	
CP length			Normal	

1		1	T .	
Correlation Matrix	and Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
paramotoro	symbols			
		CCE	0	
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average SSS			
	RE energy			
	Ratio of	dB	0	
	hypothetical	G G	· ·	
	PDCCH			
	DMRS			
	energy to			
	average SSS			
	RE energy			
	DMRS		REG bundle	
	precoder		size	
	granularity		0.20	
	REG bundle		6	
	size		O	
DRX	3120		DRX.7	A.3.3.7
Gap pattern ID			N.A.	71.0.0.7
rlmInSyncOutOfS	uncThrochold		Absent	When the
Tillillisylicoulois	yricimeshold		Absent	
				field is
				absent, the
				UE applies
				the value 0.
				(Table 8.1.1-
				1).
rsrp-		dBm/S	-98	Threshold
ThresholdSSB		CS kHz		used for
THIOGHOIGOD		00 111 12	-95	
				Q _{in_LR_SSB}
powerControlOffs	etSS		db0	Used for
				deriving rsrp-
				ThresholdCS
				I-RS
beamFailureInsta	nceMayCount		n1	see
Dearin andrenista	ICEIVIAXCOUTIL		111	
i				clause 5.17
				clause 5.17 of
	- -			clause 5.17 of TS 38.321 [7]
beamFailureDetec	ctionTimer		pbfd4	clause 5.17 of TS 38.321 [7] see
beamFailureDetec	ctionTimer		pbfd4	clause 5.17 of TS 38.321 [7]
beamFailureDetec	ctionTimer		pbfd4	clause 5.17 of TS 38.321 [7] see clause 5.17 of
	ctionTimer		pbfd4	clause 5.17 of TS 38.321 [7] see clause 5.17
beamFailureDetec			·	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS	ctionTimer Config 1		pbfd4 CSI-RS.1.1 FDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for			CSI-RS.1.1	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS	Config 1		CSI-RS.1.1 FDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for			CSI-RS.1.1 FDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for	Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for	Config 1		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting	Config 1 Config 2 Config 3		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting	Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting	Config 1 Config 2 Config 3 Config 1		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting	Config 1 Config 2 Config 3 Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking	Config 1 Config 2 Config 3 Config 1		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking	Config 1 Config 2 Config 3 Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as	Config 1 Config 2 Config 3 Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking	Config 1 Config 2 Config 3 Config 1 Config 2		CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as	Config 1 Config 2 Config 3 Config 1 Config 2	ms	CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD 0, 1	clause 5.17 of TS 38.321 [7] see clause 5.17 of
CSI-RS configuration for CSI reporting CSI-RS for tracking SSB Index assigned as RLM RS	Config 1 Config 2 Config 3 Config 1 Config 2	ms	CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD TRS.1.1 FDD TRS.1.1 TDD TRS.1.2 TDD	clause 5.17 of TS 38.321 [7] see clause 5.17 of

T1	S	1	During this time the the UE shall be fully synchronized to cell 1
T2	S	5.17	
T3	S	3.24	
T4	S	0	
T5	S	1.97	
D1	S	1.93	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH	EPRE ratio of PDCCH DMRS to SSS				0		
EPRE ratio of PDCCH	to PDCCH DMRS	dB					
EPRE ratio of PBCH D	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SSS	dB					
EPRE ratio of PDSCH	DMRS to SSS	dB					
EPRE ratio of PDSCH	to PDSCH DMRS	dB					
EPRE ratio of OCNG D	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set qo	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1	dBm/	-108	-108	-88	-88	-88
	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15 KHz			-98		
	Config 2				-98		
	Config 3				-98		
Propagation condition				TDL	-C 300ns 1	00Hz	•

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.2.1-4: Void

Table A.6.5.5.2.1-5: Void

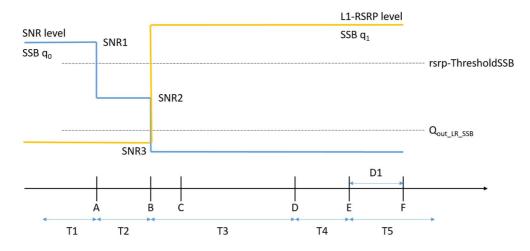


Figure A.6.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.6.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.3.1-1, A.6.5.5.3.1-2, and below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Confi	iguration	Description			
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Pa	Parameter		Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Nur			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
CORESET	Config 1		CR.1.1 FDD	A.3.1.2
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
Ü	Config 3		SSB.4 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	1
PDSCH/PDC	Config 1, 2		15 KHz	
	<u> </u>			
CH subcarrier spacing	Config 3		30 KHz	
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration			configuration 4	
	signed as beam failur	е	0	
detection RS in				
OCNG paramete	•		OP.1	A.3.2.1
CP length			Normal	,
Correlation Matr	ix and Antenna		2x2 Low	
Configuration	ix and America		ZAZ LOW	
Beam failure	DCI format		1-0	
detection	Number of Control		2	
transmission	OFDM symbols		2	
parameters	Aggregation level	CCE	8	
parameters	Ratio of hypothetica		0	
	PDCCH RE energy		U	
	to average CSI-RS			
	RE energy			
		. 15		
	Ratio of hypothetica	ıl dB	0	
	PDCCH DMRS			
	energy to average			
	CSI-RS RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle size		6	
DRX			OFF	
Gap pattern ID			N.A.	
osi DC Indov posignad os condidate				N
csi-RS-Index as	signed as candidate		1	1.4
beam detection	RS in set q ₁		1	
csi-RS-Index as beam detection rlmInSyncOutOf	RS in set q ₁		1 absent	When the field is
beam detection	RS in set q ₁		· 	
beam detection	RS in set q ₁		· 	When the field is absent, the UE
beam detection	RS in set q ₁		· 	When the field is absent, the UE
beam detection	RS in set q ₁ SyncThreshold	dBm/	· 	When the field is absent, the UE applies the value 0.
beam detection rlmInSyncOutOf	RS in set q ₁ SyncThreshold Config 1, 2	dBm/ SCS kHz	absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for
beam detection rlmlnSyncOutOf rsrp- ThresholdSSB	RS in set q ₁ SyncThreshold Config 1, 2 Config 3		-98 -95	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB
beam detection rlmlnSyncOutOf	RS in set q ₁ SyncThreshold Config 1, 2 Config 3		absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving
beam detection rlmlnSyncOutOf rsrp- ThresholdSSB	RS in set q ₁ SyncThreshold Config 1, 2 Config 3		-98 -95	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving
beam detection rlmlnSyncOutOf rsrp- ThresholdSSB	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS		-98 -95	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS see clause 5.17 of
rsrp- ThresholdSSB powerControlOff	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS anceMaxCount		-98 -95 db0	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS
rsrp- ThresholdSSB powerControlOff	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS anceMaxCount		-98 -95 db0	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS see clause 5.17 of TS 38.321 [7]
rsrp- ThresholdSSB powerControlOff	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS anceMaxCount ectionTimer		-98 -95 db0	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of
rsrp- ThresholdSSB powerControlOff beamFailureInst beamFailureDet	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS anceMaxCount ectionTimer ration for Config 1	SCS kHz	absent -98 -95 db0 n1 pbfd4 CSI-RS.1.2 FDD	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of TS 38.321 [7]
rsrp- ThresholdSSB powerControlOff beamFailureInst	RS in set q ₁ SyncThreshold Config 1, 2 Config 3 fsetSS anceMaxCount ectionTimer	SCS kHz	-98 -95 db0 n1 pbfd4	When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Threshold used for Qin_LR_SSB Used for deriving rsrp-ThresholdCSI-RS see clause 5.17 of TS 38.321 [7] see clause 5.17 of TS 38.321 [7]

CSI reporting	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
TRS configuration	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index assigned	Config 1		CSI-RS.1.2 FDD	A.3.14
as RLM RS	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	0.2	During this time the
				the UE shall be fully
				synchronized to cell
				1
T2		S	0.18	
T3		S	0.14	
T4	•	S	0	
T5	•	S	0.08	
D1	•	S	0.04	
Note 1: LIE-specific PD	CCH is not tran	nemitted afte	r T1 starts	

Table A.6.5.5.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Par	ameter	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio of PDC	EPRE ratio of PDCCH DMRS to SSS				0		
EPRE ratio of PDC	CH to PDCCH DMRS	dB					
EPRE ratio of PBCI	H DMRS to SSS	dB					
EPRE ratio of PBCI	H to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB					
EPRE ratio of PDS0	CH DMRS to SSS	dB					
EPRE ratio of PDS0	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	G DMRS to SSS	dB					
EPRE ratio of OCN	G to OCNG DMRS	dB					
SNR_CSI-RS of	Config 1	dB	5	-3	-12	-12	-12
set q ₀	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of	Config 1	dB	-10	-10	10	10	10
set q ₁	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set	Config 1	dBm/	-108	-108	-88	-88	-88
q ₁	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc}	Config 1	dBm/15			-98		
¹ 'oc		KHz					
	Config 2				-98		
	Config 3				-98		
Propagation conditi	on			TDL	-C 300ns 1	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.3.1-4: Void
Table A.6.5.5.3.1-5: Void

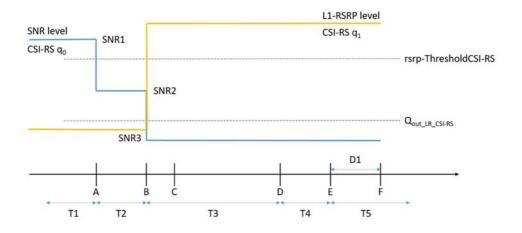


Figure A.6.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.4.1-1, A.6.5.5.4.1-2, A.6.5.5.4.1-3, and A.6.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

Configu	ıration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth		
Note: Th	Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Value	Comment
		Test 1	

A ative DCall		I	Call 4	
Active PCell			Cell 1	
RF Channel Number	0		1	
Duplex mode	Config 1		FDD	
TDD	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
0005057	Config 3		TDDConf21	1010
CORESET	Config 1		CR.1.1 FDD	A.3.1.2
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	
PDSCH/PDCC	Config 1, 2		15 KHz	
H subcarrier spacing	Config 3		30 KHz	
	-			
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration			configuration 4	
csi-RS-Index assigned			0	
detection RS in set qo				
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and	l Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
	symbols			
parameters	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical	42		
	PDCCH RE			
	energy to			
	average CSI-RS			
	RE energy			
	Ratio of	dB	0	
	hypothetical	uБ	U	
	PDCCH DMRS			
	energy to			
	average CSI-RS RE energy			
	DMRS precoder		REG bundle size	
			REG buildle Size	
	granularity REG bundle size			
DDV	REG buridle size		6 DDV 7	A 2 2 7
DRX Con pottorn ID			DRX.7	A.3.3.7
Gap pattern ID	d P. L. (N.A.	
csi-RS-Index assigned			1	
beam detection RS in				1A/I (1 / / 1 1 1
rlmInSyncOutOfSync7	nresnold		absent	When the field is
				absent, the UE
				applies the value 0.
	0	-ID /	00	(Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/	-98	Threshold used for
	Config 3	SCS kHz	-95	Q _{in_LR_} SSB
powerControlOffsetSS	3		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInstanceI	MaxCount		n1	see clause 5.17 of
				TS 38.321 [7]
beamFailureDetection	Timer		pbfd4	see clause 5.17 of
				TS 38.321 [7]
CSI-RS	Config 1		CSI-RS.1.2 FDD	A.3.14
configuration				.1
	-	•	•	•

		7		
for q₀ and q₁	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS	Config 1		CSI-RS.1.1 FDD	A.3.14.1
configuration	Config 2		CSI-RS.1.1 TDD	
for CSI reporting	Config 3		CSI-RS.2.1 TDD	
TRS	Config 1		TRS.1.1 FDD	
configuration	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
CSI-RS-Index	Config 1		CSI-RS.1.2 FDD	
assigned as	Config 2		CSI-RS.1.2 TDD	
RLMRS	Config 3		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the
				the UE shall be fully
				synchronized to cell
To		_	0.07	1
T2		S	8.37	
T3		S	6.44	
T4		S	0	
T5		S	1.97	
D1		S	1.93	
Note 1: UE-specifi	c PDCCH is not trans	smitted after T1	starts.	_

Table A.6.5.5.4.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DM	dB			0			
EPRE ratio of PDCCH to PDCCH DMRS		dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PB	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMI	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to OC	EPRE ratio of OCNG to OCNG DMRS						
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set q ₁	Config 1	dB/	-110	-110	-88	-88	-88
	Config 2	SCS kHz	-110	-110	-88	-88	-88
	Config 3		-107	-107	-85	-85	-85
N_{oc} Config 1		dBm/15			-98		
1 oc		KHz					
	Config 2				-98		
	Config 3				-98		
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

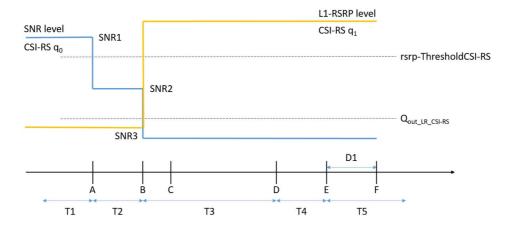


Figure A.6.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.6.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6 Active BWP switch

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.6.5.6.1.1.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

773

- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after bwp-InactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations

774

	Config	Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD -FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – TDD duplex mode
3		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD – FDD duplex mode
4		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD – TDD duplex mode
5		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD - TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combination	ons which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configuration	

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.6.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell2

Fraguancy Panas			FR1	FR1
Frequency Range Duplex mode	Config 1	+	FR1 FDD	FRI
Duplex mode		┥		
	Config 2,5	┥	TDD	TDD
	Config 3	_	TDD	FDD
TDD assettment	Config 4	+	FDD Not Applicable	TDD
TDD configuration	Config 1	┦	Not Applicable	Not Applicable
	Config 2	_	TDDConf.1.1	TDDConf.1.1
	Config 3	-	TDDConf.1.1	Not Applicable
	Config 4	↓	Not Applicable	TDDConf.1.1
	Config 5		TDDConf.1.2	TDDConf.1.2
BW _{channel}	Config 1,2,3,4		Note 7	Note 7
	Config 5		Note 7	Note 7
BWoccupied	Config 1,2,3,4	RB	52 Note 5	52 Note 5
•	Config 5	1 -	106 Note 6	106 Note 6
Active BWP ID	Comigo		1, 2	3
Initial DL BWP Configura	ation	+	1, Z	P.0.2 ^{Note4}
			DLBW	P.0.2 ^{Note4}
Initial UL BWP Configura		+	DLBWP.0.2 ^{Note4}	
Active DL BWP-0 Config		+ +		N.A.
Active DL BWP-1 Config		 	N.A.	DLBWP.1.1 ^{Note4}
Active DL BWP-2 Config			N.A.	DLBWP.1.3 ^{Note4}
Active UL BWP-0 Config			ULBWP.0.2 ^{Note4}	N.A.
Active UL BWP-1 Config	guration		N.A.	ULBWP.1.1 ^{Note4}
Active UL BWP-2 Config			N.A.	ULBWP.1.3 ^{Note4}
PDSCH Reference	Config 1	+ +	SR.1.1 FDD	SR.1.1 FDD
measurement channel	Config 2	┥	SR.1.1 TDD	SR.1.1 TDD
modernion chamio	Config 3	1	SR.1.1 TDD	SR.1.1 FDD
	Config 4	┥	SR.1.1 FDD	SR.1.1 TDD
	Config 5	-	SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET	Config 1	+	CR.1.1 FDD	CR.1.1 FDD
parameters	Config 2	┥	CR.1.1 TDD	CR.1.1 TDD
Paramere19	Config 3	┥	CR.1.1 TDD	CR.1.1 FDD
		-		
	Config 4	┥	CR.1.1 FDD CR.2.1 TDD	CR.1.1 TDD CR.2.1 TDD
Dodinated CODECET	Config 5	+		
Dedicated CORESET	Config 1	┥	CCR.1.2 FDD	CCR.1.2 FDD
parameters	Config 2	┥	CCR.1.2 TDD	CCR.1.2 TDD
	Config 3	_	CCR.1.2 TDD	CCR.1.2 FDD
	Config 4	┥	CCR.1.2 FDD	CCR.1.2 TDD
00N0 P-#	Config 5	+	CCR.2.4 TDD	CCR.2.4 TDD
OCNG Patterns	Config 1,2,3,4			1 Note 5
000 0 "	Config 5			1 Note 6
SSB Configuration	Config 1,2,3,4	-		.1 FR1
	Config 5			.2 FR1
			SMTC.1	
SMTC Configuration				
Correlation Matrix and A	Intenna			TC.1 2 Low
Correlation Matrix and A Configuration			1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS	SS	dB		
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM	SS MRS to SSS	dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to I	SS MRS to SSS PBCH DMRS	dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH E	SS MRS to SSS PBCH DMRS DMRS to SSS	dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDCCH to	SS MRS to SSS PBCH DMRS DMRS to SSS o PDCCH DMRS	dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio page 12 to 15 t	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS	dB - - -	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH EPRE ratio of PDSCH EPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of PDSCH to	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH	dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE ratio PDSCH EPRE r	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH	_ dB _ - - - -	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DEPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1)	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note	_ dB _ - - -	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note	_ dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DEPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1)	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note	_ dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH EPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note OCNG DMRS	dB dB	1x2	2 Low
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to I EPRE ratio of PDCCH DEPRE ratio of PDCCH to I EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to I EPRE ratio of PDSCH to I EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1)	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note OCNG DMRS Config 1,2,3,4		0 -104	2 Low 0 -104
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1) Noc Note 2	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note OCNG DMRS	dBm/SCS	-104 -101	-104 -101
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1) Noc Note 2	SS MRS to SSS PBCH DMRS DMRS to SSS O PDCCH DMRS DMRS to SSS O PDSCH MRS to SSS(Note OCNG DMRS Config 1,2,3,4		0 -104	2 Low 0 -104
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1) Noc Note 2 Noc Note 2	SS MRS to SSS PBCH DMRS DMRS to SSS D PDCCH DMRS DMRS to SSS D PDSCH MRS to SSS(Note OCNG DMRS Config 1,2,3,4 Config 5	dBm/SCS dBm/15KH z	-104 -101 -104	-104 -104 -104
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH EEPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1) Noc Note 2	SS MRS to SSS PBCH DMRS DMRS to SSS D PDCCH DMRS DMRS to SSS D PDSCH MRS to SSS(Note OCNG DMRS Config 1,2,3,4 Config 5	dBm/SCS	-104 -101 -104 -87	-104 -104 -104 -87
Correlation Matrix and A Configuration EPRE ratio of PSS to SS EPRE ratio of PBCH DM EPRE ratio of PBCH to EPRE ratio of PDCCH to EPRE ratio of PDCCH to EPRE ratio of PDSCH DEPRE ratio of PDSCH DEPRE ratio of PDSCH to EPRE ratio of OCNG DM 1) EPRE ratio of OCNG to (Note 1) Noc Note 2 Noc Note 2	SS MRS to SSS PBCH DMRS DMRS to SSS D PDCCH DMRS DMRS to SSS D PDSCH MRS to SSS(Note OCNG DMRS Config 1,2,3,4 Config 5	dBm/SCS dBm/15KH z	-104 -101 -104	-104 -104 -104

Io ^{Note3}	Config 1,2,3,4	dBm/ 9.36MHz	-58.96	-58.96
	Config 5	dBm/ 38.16MHz	-52.86	-52.86
Propagation Condition			AWGN	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled within BWoccupied.
- Note 3 SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
- Note 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- Note 6: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- Note 7: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k_1$).

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k₁ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k_1$), ($j+T_{BWPswitchDelay}+k_1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.1.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the cell are specified in Table A.6.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts.

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell1's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell1's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.6.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is only required to be tested in one of the supported test configurations.		
Note 2:	A UE which fulfil	s the requirements in test case A.6.5.6.1.1 can skip the test cases in A.6.5.6.1.2.	

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range	-		FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
BW _{channel}	Config 1		10 MHz: N _{RB,c} = 52
	Config 2	1	10 MHz: N _{RB,c} = 52
	Config 3		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2
Initial DL BWP			DLBWP.0.2 Note 4
Configuration	Config 1,2,3		22377 .0.2
Active DL BWP-1			DLBWP.1.1 Note 4
Configuration	Config 1,2,3		DEBWI .I.I
Active DL BWP-2			DLBWP.1.3 Note 4
	Config 1,2,3		DLBWP.1.3
Configuration Initial UL BWP	-		ULBWP.0.2 Note 4
	Config 1,2,3		OLBVP.0.2
Configuration Active UL BWP-1			ULBWP.1.1 Note 4
	Config 1,2,3		ULBWP.1.1 Note 4
Configuration			LU DVA/D 4 0 Note 4
Active UL BWP-2	Config 1,2,3		ULBWP.1.3 Note 4
Configuration			00.11.500
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.2 FDD
parameters	Config 2		CCR.1.2 TDD
	Config 3		CCR.2.4 TDD
OCNG Patterns	<u>. </u>		OP.1
SSB Configuration	Config 1,2		SSB.1 FR1
3	Config 3		SSB.2 FR1
SMTC Configuration	J -		SMTC.1
Correlation Matrix and Antenna			1x2 Low
Configuration			
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
EPRE ratio of PSS to SS		dB	0
EPRE ratio of PBCH DM		- GD	
EPRE ratio of PBCH to F		-	
EPRE ratio of PDCCH D		1	
EPRE ratio of PDCCH to		1	
EPRE ratio of PDSCH D			
EPRE ratio of PDSCH to		-	
EPRE ratio of OCNG DMRS to SSS(Note			
1)		4	
EPRE ratio of OCNG to OCNG DMRS			
(Note 1)	<i>"</i> 10	-ID (C.C.)	101
1	onfig 1,2	dBm/SCS	-104
C	onfig 3		-101
N _{oc} Note 2		dBm/15kH	-104
		Z	
SS-RSRP Note 3 Config 1,2		dBm/SCS	-87
Config 3			-84
Ê _s /I _{ot}			17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Confir 4.0	dBm/	-58.96
	Config 1,2	9.36MHz	
	Confirmo	dBm/	-52.86
	Config 3	38.16MHz	
	•		

Propagat	tion Condition		AWGN
Note 1:	OCNG shall be used such that bot	th cells are full	y allocated and a constant
	total transmitted power spectral de		
Note 2:	Interference from other cells and r	noise sources r	not specified in the test is
	assumed to be constant over subo	arriers and tim	ne and shall be modelled as
	AWGN of appropriate power for N	oc to be fulfille	d.
Note 3:	SS-RSRP and lo levels have beer	derived from	other parameters for
	information purposes. They are no		
Note 4:	For unpaired spectrum, a DL BWF	is linked with	an UL BWP. DLBWP.0.2 is
	linked with ULBWP.0.2; DLBWP.1	.1 is linked wit	h ULBWP.1.1; DLBWP.1.3 is
	linked with ULBWP.1.3 defined in	clause 12 of T	S 38.213 [3].

A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, kI is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.2 RRC-based Active BWP Switch

A.6.5.6.2.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.6.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.2.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of Cell are specified in Table A.6.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in Cell 1.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in Cell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the

PCell from the first UL slot that occurs after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length}$ +

k1 on BWP-1 of final condition. The UE shall be continuously scheduled on PCell's BWP-1 starting from the the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations in SA scenario

Config	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.6.5.6.2.1.1-2: General test parameters for DL BWP switch in SA scenario

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

Parameter	Unit	Cell 1

Erocuo	Pongo			ED4	
Frequency Range Config 1			FR1		
Duplex mode		Config 1	4	FDD TDD	
TDD configuration		Config 2,3	 		
טט contigu	ııalıON	Config 1		Not Applicable	
		Config 2	4	TDDConf.1.1	
DW		Config 3	-	TDDConf.2.1	
BW _{channel}		Config 1	-	10 MHz: N _{RB,c} = 52	
		Config 2	-	10 MHz: N _{RB,c} = 52	
A (: 514:5	15	Config 3		40 MHz: N _{RB,c} = 106	
Active BWP		0		1	
Initial DL BV		Config 1,2, 3		DLBWP.0.2	
Configuratio		Confin 4 0 0		LILDWD O O	
Initial UL BV		Config 1,2, 3		ULBWP.0.2	
Configuratio		Config 1 0 0	-	DLBWP.1.3	
Initial Condition	Active DL BWP-1	Config 1, 2, 3		DLBVVP.1.3	
Condition	Configurat				
	ion				
	Active UL	Config 1, 2, 3	+	ULBWP.1.3	
	BWP-1	Coming 1, 2, 3		ULDVVP.1.3	
	Configurat ion				
Final	Active DL	Config 1, 2, 3	+	DLBWP.1.1	
Condition	BWP-1	Ournig 1, 2, 3		DLDVVF.1.1	
Condition	Configurat				
	ion				
	Active UL	Config 1, 2, 3	+	ULBWP.1.1	
	BWP-1	Coming 1, 2, 3		ULDVVP.1.1	
Configurat					
PDSCH Ref		Config 1	+	SR.1.1 FDD	
measureme	nt channel	Config 2		SR.1.1 TDD	
DMCI COD	CCT	Config 3	 	SR2.1 TDD	
RMSI CORESET		Config 1		CR.1.1 FDD	
parameters		Config 2	-	CR.1.1 TDD	
Dedicated CORESET		Config 3	-	CR2.1 TDD	
	OKESE1	Config 1	4	CCR.1.2 FDD	
parameters		Config 2	-	CCR.1.2 TDD	
OCNO D-#	2 10 0	Config 3	-	CCR.2.4 TDD	
OCNG Patte		Config 1 2	-	OP.1	
SSB Configu	uration	Config 1,2	4	SSB.1 FR1	
OMTO O		Config 3		SSB.2 FR1	
SMTC Confi		Confirm 4		SMTC.1	
TRS Configu	uration	Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.1 TDD	
A := 4	·	Config 3		TRS.1.2 TDD	
Antenna Co			-	1x2 Low	
Propagation		0	in.	AWGN	
	of PSS to SS		dB	0	
	of PBCH DM		-		
	of PBCH to P		-		
	of PDCCH DI		4		
EPRE ratio of PDCCH to PDCCH DMRS			4		
EPRE ratio of PDSCH DMRS to SSS			4		
EPRE ratio of PDSCH to PDSCH			4		
EPRE ratio of OCNG DMRS to SSS(Note 1)			1		
EPRE ratio of OCNG to OCNG DMRS(Note					
1)			ID (2.2.2	45.	
N _{oc} Note 2		Config 1,2	dBm/SCS	-104	
		Config 3		-101	
SS-RSRP No	ote 3	Config 1,2	dBm/SCS	-87	
_		Config 3		-84	
Ês/Iot			dB	17	
Ês/Noc			dB	17	
Io ^{Note3}	<u> </u>	Config 1,2	dBm/	-58.96	
i i			9.36MHz		

		Config 3	dBm/	-52.86
			38.16MHz	
Note 1:				y allocated and a constant red for all OFDM symbols.
Note 2:	assumed to be		carriers and tim	not specified in the test is ne and shall be modelled lled.
Note 3:				other parameters for meters themselves.
Note 4:	is linked with L	pectrum, a DL BWF JLBWP.0.2; DLBWF Jinked with ULBWP	P.1.1 is linked v	

A.6.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the PCell from the first DL slot that occurs right after the begining of slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for PCell from

the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6 Measurement procedure

A.6.6.1 Intra-frequency Measurements

A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intrafrequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

C	onfiguration	Description		
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	Note: The UE is only required to be tested in one of the supported test configurations.			

Table A.6.6.1.1.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
-		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test	Ce	Cell 1 T1 T2		II 2	
		configuration	T1			T2	
TDD configuration		1	TN	I/A	TN/A		
		2	TDDC	onf.1.1	TDDC	onf.1.1	
		3	TDDC		TDDC	onf.2.1	
PDSCH RMC		1	SR.1.	1 FDD	N.	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD	1		
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.	1 TDD	CR.1.	1 TDD	
configuration		3	CR.2.	1 TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1	.1 TDD	CCR.1	.1 TDD	
configuration		3	CCR.2			.1 TDD	
OCNG Patterns		1, 2, 3	OP.1		OF	P.1	
TRS		1	TRS.1.1 FDD		N.	/A	
Configuration		2	TRS.1	.1 TDD	N.	/A	
		3	TRS.1.2 TDD		N	/A	
IInitial BWP		1, 2, 3	DLBWP.0.1		DLBW		
configuration			ULBWP.0.1			/P.0.1	
Active DL BWP		1, 2, 3	DLBWP.1.1		DLBV	/P.1.1	
configuration		4.0.0	LUDIA	/D 4 4		/D 4 4	
Active UL BWP		1, 2, 3	ULBWP.1.1		ULBW	/P.1.1	
configuration RLM-RS		1, 2, 3	SSB		90	SB.	
	dBm/SCS	1, 2, 3	SSB SSB -98		30		
$N_{oc}^{}$ Note 2	ubili/303	2			-98 -98		
		3	-98				
37	dBm/15 kHz	1			-93 -98		
$N_{oc}^{}$ Note 2	GDIII/ 10 KI IZ	2	1		50		
		3					
			l				

\hat{E}_{s}/I_{ot}	dB	1	4	-1.46	-Infinity	-1.46
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		2				
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
L_s/V_{oc}		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation		1, 2, 3		AV	VGN	•
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.2 SA event triggered reporting tests without gap under DRX

A.6.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.2.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.2.2-1, A.6.6.1.2.2-2 and A.6.6.1.2.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.2.2-1: Supported test configurations

Configuration	Description		
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations.			

Table A.6.6.1.2.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test configur	Value		Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
SSB configuration		1	SSB.1 FR1		
		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
		2	SMTC.1		
		3	SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.7	
Time offset between serving		1	3 ms		Asynchronous cells.
and neighbour cells					The timing of Cell 2 is 3ms later
					than the timing of Cell 1.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Cell	1	Cell 2		
		configuration	T1	T2	T1	T2	
TDD configuration		1	TN//	4	TN		
		2	TDDCor	nf.1.1	TDDC	onf.1.1	
		3	TDDCor	nf.2.1	TDDC	onf.2.1	
PDSCH RMC		1	SR.1.1 FDD		SR.1.1 FDD N/A		
configuration		2	SR.1.1 TDD SR.2.1 TDD				
		3					
RMSI CORESET		1	CR.1.1	FDD	CR.1.	1 FDD	
RMC		2	CR.1.1	TDD	CR.1.	1 TDD	
configuration		3	CR.2.1	TDD	CR.2.	1 TDD	
Dedicated		1	CCR.1.1	FDD	CCR.1	.1 FDD	
CORESET RMC		2	CCR.1.1 TDD		CCR.1.1 TDD		
configuration		3	CCR.2.1 TDD		CCR.2.1 TDD		
OCNG Patterns		1, 2, 3	OP.1		OF	P.1	
TRS configuration		1	TRS.1.1	TRS.1.1 FDD		/A	
		2			N/A		
		3	TRS.1.2	TDD	N.	/A	
IInitial BWP		1, 2, 3	DLBWF	-	DLBW		
configuration			ULBWF		ULBW	_	
Active DL BWP		1, 2, 3	DLBWF	P.1.1	DLBW	/P.1.1	
configuration		4.0.0	LII DIA/E	244	LUDIA	/D 4 4	
Active UL BWP configuration		1, 2, 3	ULBWF	2.1.1	ULBW	/P.1.1	
RLM-RS		1, 2, 3	SSE	3	SS	SR	
	dBm/SCS	1, 2, 3	331		-98	טכ	
N_{oc} Note 2	abili, ooo	2	-		-98		
		3	-95				
M. W. O	dBm/15 kHz	1			-98		
N_{oc} Note 2	SDITT TO KITZ	2					
		3					

$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
$\mathbf{L}_{s}/\mathbf{I}_{ot}$		2				
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
L_s/I_{oc}		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation		1, 2, 3		AV	VGN	•
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.2.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX

A.6.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.3.1-1 and A.6.6.1.3.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.3.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations.

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
		2	CSI-RS.1.2 TDD resource #0	
		3	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX	ms	1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

TDD	D D D D D D D D D D D D D D D D D D D	
configuration 2 TDDConf.1.1 TDDConf.2.1 PDSCH RMC 1 SR.1.1 FDD N/A configuration 2 SR.1.1 TDD N/A RMSI CORESET 1 CR.1.1 FDD CR.1.1 FDI RMC 2 CR.1.1 TDD CR.1.1 TDI configuration 3 CR.2.1 TDD CR.2.1 TDI Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TDD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	D D D D D D D D D D D D D D D D D D D	
3	D D D D D D D D D D D D D D D D D D D	
3	D D D DD DD	
configuration 2 SR.1.1 TDD RMSI CORESET 1 CR.1.1 FDD CR.1.1 FDI RMC 2 CR.1.1 TDD CR.1.1 TDI configuration 3 CR.2.1 TDD CR.2.1 TDI Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TDD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	D D DD DD DD	
3 SR.2.1 TDD	D D DD DD DD	
3 SR.2.1 TDD RMSI CORESET 1 CR.1.1 FDD CR.1.1 FDI RMC 2 CR.1.1 TDD CR.1.1 TDI configuration 3 CR.2.1 TDD CR.2.1 TDI Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TDD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	D D DD DD DD	
RMSI CORESET 1 CR.1.1 FDD CR.1.1 FDI RMC 2 CR.1.1 TDD CR.1.1 TDI configuration 3 CR.2.1 TDD CR.2.1 TDI Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TDD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	D D DD DD DD	
RMC configuration 2 CR.1.1 TDD CR.1.1 TDI Dedicated CORESET RMC configuration 1 CCR.1.1 FDD CCR.1.1 FD CONG Patterns 2 CCR.1.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS configuration 2 TRS.1.1 FDD N/A	D D DD DD DD	
configuration 3 CR.2.1 TDD CR.2.1 TDI Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TDD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	D DD DD DD	
Dedicated 1 CCR.1.1 FDD CCR.1.1 FD CORESET RMC 2 CCR.1.1 TD CCR.1.1 TD configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	DD DD DD	
CORESET RMC configuration 2 CCR.1.1 TDD CCR.1.1 TD OCNG Patterns 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS configuration 1 TRS.1.1 FDD N/A TRS.1.1 TDD N/A	DD DD	
configuration 3 CCR.2.1 TDD CCR.2.1 TD OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A	DD	
OCNG Patterns 1, 2, 3 OP.1 OP.1 TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A		
TRS 1 TRS.1.1 FDD N/A configuration 2 TRS.1.1 TDD N/A		
configuration 2 TRS.1.1 TDD N/A		
3 TRS.1.2 TDD N/A		
IInitial BWP 1, 2, 3 DLBWP.0.1 DLBWP.0.	1	
configuration ULBWP.0.1 ULBWP.0.	ULBWP.0.1	
Active DL BWP 1, 2, 3 DLBWP.1.2 DLBWP.1.	DLBWP.1.1	
configuration		
Active UL BWP 1, 2, 3 ULBWP.1.2 ULBWP.1.	1	
configuration		
RLM-RS 1, 2, 3 CSI-RS SSB MNote 3 dBm/SCS 1 -98		
N_{oc} Note 2 dBm/SCS 1 -98		
2 -98		
3 -95		
N_{oc} Note 2 dBm/15 kHz 1 -98		
2		
3		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$ dB 1 4 -1.46 -Infinity -1	1.46	
2		
3		
\hat{E}_s/N_{oc} dB 1 4 4 -Infinity	4	
2		
3		
	.94	
	94	
	91	
	2.25	
	2.25	
	6.16	
Propagation 1, 2, 3 AWGN Condition 1, 2, 3 AWGN Note 1: The resources for unlink transmission are assigned to the LIE prior to the start of time perior		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

C	Configuration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re-	quired to be tested in one of the supported test configurations.

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value				Comment
			Test 1	Test 2			
Active cell		1, 2, 3	Cell 1				
Neighbour cell		1, 2, 3	Cell 2		Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2				
Measurement gap type		1, 2, 3	Per-UE gaps				
Measurement gap repitition periodicity	ms	1, 2, 3	40				
Measurement gap length	ms	1, 2, 3		6			
Measurement gap offset	ms	1, 2, 3	39				
SSB configuration		1	SSB	.1 FR1			
		2	SSB	.1 FR1			
		3	SSB	.2 FR1			

SMTC configuration		1	CI/	ITC.2			
SWITC configuration		1					
		2		ITC.1			
		3		ITC.1			
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0				
		2	CSI-RS.1.2 T	DD resource #0			
		3	CSI-RS.2.2 T	DD resource #0			
A3-Offset	dB	1, 2, 3	-4.5				
CP length		1, 2, 3	Normal				
Hysteresis	dB	1, 2, 3	0				
Time To Trigger	S	1, 2, 3	0				
Filter coefficient		1, 2, 3	0		0		L3 filtering is not used
DRX		1, 2, 3	DRX.1 DRX.7				
Time offeet between coming		4	2		A supplier on a constant		
Time offset between serving		1	3 ms		Asynchronous cells.		
and neighbour cells					The timing of Cell 2 is 3ms later		
					than the timing of Cell 1.		
		2	3 μs		3 µs		Synchronous cells
		3	3 μs				Synchronous cells
T1	S	1, 2, 3		5			
T2	S	1, 2, 3	5	10			

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test	Ce	II 1	Ce	II 2
		configuration	T1	T2	T1	T2

TDD		1	TN	I/A	TN	I/A	
configuration		2		onf.1.1		onf.1.1	
oormgara		3		onf.2.1	TDDC		
PDSCH RMC		1		1 FDD		/A	
configuration		2	SR.1	1 TDD			
ga.a		3		1 TDD			
RMSI CORESET		1		1 FDD	CR.1.	1 FDD	
RMC		2	CR.1.1 TDD CR.1.1 TDD				
configuration		3	CR.2.1 TDD				
Dedicated		1		.2 FDD		.1 FDD	
CORESET RMC		2		.2 TDD		.1 TDD	
configuration		3		.1 TDD		.1 TDD	
OCNG Patterns		1, 2, 3	OF OF			P.1	
TRS		1, 2, 3		.1 FDD		/A	
configuration		2		.1 FDD .1 TDD		/A /A	
Comiguration		3					
IInitial BWP		1, 2, 3	TRS.1.2 TDD DLBWP.0.1 DLI			N/A LBWP.0.1	
configuration		1, 2, 0	ULBWP.0.1 ULBWP.0.1				
Active DL BWP		1, 2, 3	DLBWP.1.2 DLBWF		/P.1.1		
configuration		, _, _,					
Active UL BWP		1, 2, 3	ULBV	/P.1.2	ULBW	/P.1.1	
configuration							
RLM-RS		1, 2, 3	CSI	-RS	SS	SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1	-98				
		2	-98				
		3	-95				
N_{oc} Note 2	dBm/15 kHz	1		-	98		
		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
		2					
		3					
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25	
_	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16	
Propagation Condition		1, 2, 3		AV	VGN		

Note 1: Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Table A.6.6.1.4.2-1 Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.1.4.2-4: Void

Table A.6.6.1.4.2-5: Void

A.6.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	S	1	5	

Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 1 Cell 2			II 2	
		configuration	T1	T2	T1	T2	
TDD configuration		1	N	N/A N/A			
PDSCH RMC		1	SR.1.	1 FDD	N/	/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	CR.1.	1 FDD	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	CCR.1	.1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1		OP.1 OP.1			
TRS configuration		1				N/A	
IInitial BWP		1	DLBWP.0,1 DLBWP				
configuration				ULBWP.0.1 U		ULBWP.0.1	
Active DL BWP		1	DLBWP.1.1 DLBWP.		/P.1.1		
configuration							
Active UL BWP		1	ULBWP.1.1 ULBWP.1		/P.1.1		
configuration							
RLM-RS		1	SSB SSB			SB	
N_{oc} Note 2	dBm/SCS	1	-98				
N_{oc} Note 2	dBm/15 kHz	1	-98				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94 -94 -Infinity		-94		
lo	dBm/9.36 MHz	1			-62.25		
Propagation		1	AWGN				
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading

A.6.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.6.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.6.2-1 and A.6.6.1.6.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.6.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.6.2-2: General test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	S	1	5	

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	Cell 1		ell 2	
	configuration		T1	T2	T1	T2	
TDD configuration		1	N,	/A	N	N/A	
PDSCH RMC		1	SR.1.	1 FDD	N	/A	
configuration							
RMSI CORESET		1	CR.1.1 FDD		CR.1.1 FDD		
RMC							
configuration							
Dedicated		1	CCR.1.2 FDD		CCR.1	.1 FDD	
CORESET RMC							
configuration							
OCNG Patterns		1	OP.1		OP.1		
TRS configuration		1	TRS.1.1 FDD		N	/A	
Ilnitial BWP		1	DLBWP.0.1 DLBWP.0.		VP.0.1		
configuration			ULBW	/P.0.1	ULBV	VP.0.1	

Active DL BWP		1	DLBV	VP.1.2	DLBW	/P.1.1
configuration						
Active UL BWP		1	ULBWP.1.2 ULBWP.1.1			/P.1.1
configuration						
RLM-RS		1	CSI	-RS	SS	SB
N_{oc} Note 2	dBm/SCS	1		-	.98	
Note 2	dBm/15 kHz	1	-98			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
Propagation		1		AV	VGN	
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2 Inter-frequency Measurements

A.6.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.6.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.1.1-1, A.6.6.2.1.1-2 and A.6.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations				
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell				

Table A.6.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0 4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	S	Config 1,2,3	1	1	

Table A.6.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Pa	arameter	Unit	Test	Ce	II 1	Cel	I 2		
			configuratio n	T1	T2	T1	T2		
NR RF Cha	nnel Number		Config 1,2,3	1		2	2		
Duplex mod	le		Config 1			FDD			
			Config 2,3			TDD			
TDD configu	uration		Config 1	Not Applicable					
3			Config 2	TDDConf.1.1					
			Config 3	TDDConf.2.1					
BW _{channel}		MHz	Config 1,2	10: N _{RB,c} = 52					
			Config 3 40: N _{RB,c} =			_{RB,c} = 106	_{B,c} = 106		
BWP BW		MHz	Config 1,2	10: N _{RB,c} = 52					
			Config 3	40: N _{RB,c} = 106		_{RB,c} = 106			
BWP	Initial DL BWP			DLBWP.0.1 NA		A			
configurati	Initial UL BWP		Config 1, 2,	ULBW	/P.0.1	N.	A		
on	Dedicated DL BWP		3	DLBWP.1.1		N.	A		

BWP	Dedicated UL							
Config 2	BWP							
Config 2	TRS configuration		Config 1	TRS.1.	1 FDD		NA	
Config 3			Config 2	TRS.1.	1 TDD		NA	
A.32.1.1 (OP.1) PDSCH Reference Config 1			Config 3	TRS.1.	2 TDD		NA	
PDSCH Reference measurement channel			Config 1,2,3	OF	P.1	C)P.1	
Measurement channel			Config 1	SR.1.	1 FDD		-	
RMSI CORESET Reference	measurement channel		•			•		
Config 2				SR.2.	1 TDD	1		
Dedicated CORESET Config 1 CCR.1.1 FDD	RMSI CORESET Reference			CR.1.1	1 FDD		-	
Dedicated CORESET Reference Channel	Channel		Config 2]		
Reference Channel			Config 3	CR.2.	1 TDD			
Config 3			Config 1	CCR.1	.1 FDD			
SSB parameters								
Config 2 SSB.1 FR1 SSB.5 FR1								
Config 3 SSB.2 FR1 SSB.6 FR1	SSB parameters							
SMTC configuration defined in A.3.11								
In A.3.11	OMTO serfice defined							
PDSCH/PDCCH subcarrier spacing								
Spacing Config 3 30		l/U-		SIVI	U.1			
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EPRE ratio of PDSCH to PDSCH to PDSCH	EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3	0 0			0	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	to SSS EPRE ratio of PDSCH to							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	EPRE ratio of OCNG DMRS to SSS(Note 1)							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	N_{oc}	kHz		-98			-98	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Note2							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-KSKP Note 3							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ĉ/r							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\mathbf{E}_{\mathrm{s}}/1_{\mathrm{ot}}$	UD		4	4	-iriiiriity	,	
Io ^{Note3} dBm/9. Config 1,2 -64.59 -64.59 -70.05 -62.26 dBm/38 Config 3 -58.49 -58.49 -63.94 -56.15	\hat{E}_s/N_{ac}	dB		4	4	-Infinity	7	
dBm/38 Config 3 -58.49 -58.49 -63.94 -56.15	Io ^{Note3}	dBm/9.	_					
			Config 3	-58.49	-58.49	-63.94	-56.15	
Propagation Condition Config 1,2,3 AWGN AWGN	Propagation Condition		Config 1,2,3	AW	GN	A۱	VGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{oc}}$ to be
	fulfilled.
Note 3:	SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.6.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.2.1-1, A.6.6.2.2.1-2 and A.6.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description			
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations				
Note 2:	Note 2: target NR cell has the same SCS, BW and duplex mode as NR serving cell				

Table A.6.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3		1,	, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	0 4			As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39 9				
A3-Offset	dB	Config 1,2,3	-6				
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms		The timing of		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3μs			Synchronous cells.	
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	1.1	11	1.1	11	

Table A.6.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2	
		configuratio	T1	T2	T1	T2
		n				

NR RF Chanr	nel Number		Config 1,2,3	1	2
Duplex mode			Config 1	F	<u> </u>
			Config 2,3		TDD
TDD configura	ation		Config 1		pplicable
•	G		Config 2		Conf.1.1
			Config 3		Conf.2.1
BW _{channel}		MHz	Config 1,2		RB,c = 52
DIA/D DIA/			Config 3		RB,c = 106
BWP BW		MHz	Config 1,2 Config 3		I _{RB,c} = 52
BWP	Initial DL BWP		Config 1, 2,	DLBWP.0.1	RB,c = 106 NA
configuratio	IIIIIIIIII DE DVVI		3	DEDVVI .U.1	IVA
n	Initial UL BWP		Config 1, 2,	ULBWP.0.1	NA
	Dedicated DL BWP			DLBWP.1.1	NA
1	Dedicated UL BWP			ULBWP.1.1	NA
TRS configura	ation		Config 1	TRS.1.1 FDD	NA
			Config 2	TRS.1.1 TDD	NA
			Config 3	TRS.1.2 TDD	NA
OCNG Patter	ns defined in		Config 1,2,3	OP.1	OP.1
A.3.2.1.1 (OP	2.1)		3 , ,=		
PDSCH Refe	rence		Config 1	SR.1.1 FDD	-
measurement channel			Config 2	SR.1.1 TDD	
			Config 3	SR.2.1 TDD	
RMSI CORESET Reference Channel			Config 1	CR.1.1 FDD	-
			Config 2	CR.1.1 TDD	
<u> </u>	DE055		Config 3	CR.2.1 TDD	
Dedicated CORESET Reference Channel			Config 1	CCR.1.1 FDD	-
			Config 2	CCR.1.1 TDD	
000			Config 3	CCR.2.1 TDD	200 5 504
SSB parameters			Config 1	SSB.1 FR1	SSB.5 FR1
			Config 2 Config 3	SSB.1 FR1 SSB.2 FR1	SSB.5 FR1 SSB.6 FR1
SMTC configuration defined			Config 1	SMTC.2	SMTC.5
in A.3.11	diation defined		Config 2, 3	SMTC.1	SMTC.4
	CH subcarrier	kHz	Config 1,2	2	15
spacing			Config 3		30
EPRE ratio of	PSS to SSS				
EPRE ratio of to SSS	PBCH DMRS				
	PBCH to PBCH				
	PDCCH DMRS				
EPRE ratio of PDCCH to PDCCH DMRS			Config 1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
	of OCNG DMRS				
EPRE ratio of OCNG to					
OCNG DMRS			_		
Note2		dBm/15 kHz	Config 1,2,3	-98	-98
Note2		dBm/S	Config 1,2	-98	-98
		CS	Config 3	-95	-95

SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	'GN	A۱	VGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.6.6.2.2.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3 Value	Test2&4 Value	Comment
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	ms1	ms1	38.331 [2]
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.6.6.2.2.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]

A.6.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only re	The UE is only required to be tested in one of the supported test configurations				
Note 2:	2: target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati	Test 1	Test 2	
		on			
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	1.1	1	

Table A.6.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Cell 1 Cell 2					
			configuratio n	T1	T2	T1	T2		
NR RF Chan	RF Channel Number		IR RF Channel Number		Config 1,2,3		1		2
Duplex mode			Config 1		F	DD			
			Config 2,3			DD			
TDD configur	ation		Config 1			oplicable			
			Config 2 Config 3			Conf.1.1 Conf.2.1			
BW _{channel}		MHz	Config 1,2			RB,c = 52			
D V Chamilei			Config 3			B,c = 106			
BWP BW		MHz	Config 1,2		10: N	RB,c = 52			
	T		Config 3			_{B,c} = 106			
BWP	Initial DL BWP				VP.0.1		NA		
configuratio n	Initial UL BWP Dedicated DL		Config 1 2		VP.0.1 VP.1.1		NA NA		
"	BWP		Config 1, 2, 3	DLBV	VP.1.1		NA		
	Dedicated UL BWP				VP.1.1		NA		
TRS configur	ation		Config 1		.1 FDD		NA		
			Config 2		.1 TDD		NA		
OCNG Patter	ns defined in		Config 3 Config 1,2,3		.2 TDD P.1	,	NA DP.1		
A.3.2.1.1 (OF	P.1)		_				JF.1		
PDSCH Refe			Config 1		1 FDD		-		
measuremen	t channel		Config 2		1 TDD				
			Config 3		1 TDD				
	SET Reference		Config 1	CR.1.1 FDD CR.1.1 TDD			-		
Channel			Config 2		1 TDD 1 TDD				
Dedicated CORESET			Config 3 Config 1		.1 FDD		-		
Reference Channel			_						
			Config 2 Config 3		.1 TDD .1 TDD				
SSB parameters			Config 1		1 FR1	SSF	3.5 FR1		
o o o parameter			Config 2		1 FR1		3.5 FR1		
			Config 3		2 FR1	SSB.6 FR1			
	uration defined		Config 1		TC.2		MTC.5		
in A.3.11			Config 2, 3	SM	ΓC.1		MTC.4		
	CH subcarrier	kHz	Config 1,2			<u>15</u> 30			
spacing	f PSS to SSS		Config 3		•	30 			
	f PBCH DMRS								
to SSS EPRE ratio o	f PBCH to PBCH								
DMRS EPRE ratio o	f PDCCH DMRS								
to SSS									
EPRE ratio of PDCCH to PDCCH DMRS			Config 1,2,3		0		0		
EPRE ratio of PDSCH DMRS to SSS									
EPRE ratio of PDSCH to PDSCH									
EPRE ratio of OCNG DMRS									
to SSS(Note 1) EPRE ratio of OCNG to									
OCNG DMRS (Note 1)		dBm/15		_(98		-98		
N oc		kHz				-90			
N_{oc} Note2		dBm/S CS	Config 1,2 Config 3				-98 -95		
SS-RSRP Note	3	dBm/S	Config 1,2	-94	-94	-Infinity	-95 -91		
30 1.01.1		CS	Config 3	-9 1	-9 1	-Infinity	-88		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	Config 1,2,3	4	4	-Infinity	7		
		1				·	1		

\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.4	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	/GN	A'	WGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.6.1-1, A.6.6.2.6.1-2 and A.6.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only re	The UE is only required to be tested in one of the supported test configurations				
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1,2,3		1,	2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2,3		NR cell	1 (Pcell))	NR Cell 1 is on NR RF channel
							number 1.
Neighbour cell		Config 1,2,3		NR	cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	()	2	4	As specified in clause 9.1.2-1.
Measurement gap		Config 1,2,3	3	9		9	
offset							
A3-Offset	dB	Config 1,2,3		-	6		
Hysteresis	dB	Config 1,2,3		()		
CP length		Config 1,2,3		Nor	mal		
TimeToTrigger	S	Config 1,2,3		()		
Filter coefficient		Config 1,2,3		()		L3 filtering is not used
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.7	.1	.7	
Time offset between		Config 1		3 ו	ms		Asynchronous cells.
serving and neighbour						The timing of Cell 2 is 3ms later	
cells							than the timing of Cell 1.
		Config 2,3	3 μs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	1.3	13.5	1.3	13.5	

Table A.6.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Test Cell 1		Cell 2		
		configuratio	T1 T2		T1	T2	
		n					

NR RF Chan	nel Number		Config 1,2,3		1		2
Duplex mode			Config 1		-	<u> </u> FDD	
Bupiex mode	,		Config 2,3			TDD	
TDD configu	TDD configuration		Config 1		Not Applicable		
J			Config 2			Conf.1.1	
			Config 3		TDD	Conf.2.1	
BW _{channel}		MHz	Config 1,2			I _{RB,c} = 52	
			Config 3			RB,c = 106	
BWP BW		MHz	Config 1,2			$I_{RB,c} = 52$	
	1		Config 3			RB,c = 106	
BWP	Initial DL BWP			DLBW			NA
configurati	Initial UL BWP		0 " 1 0	ULBW			NA
on	Dedicated DL BWP		Config 1, 2, 3	DLBW	/P.1.1		NA
	Dedicated UL BWP			ULBW	/P.1.1		NA
TRS configur			Config 1	TRS.1.	1 FDD		NA
Tree connigati	idion		Config 2	TRS.1.			NA
			Config 3	TRS.1.			NA
OCNG Patte	rns defined in		Config 1,2,3				-
A.3.2.1.1 (OF				OF	P.1)P.1
PDSCH Refe	· ·		Config 1	SR.1.			-
measuremen			Config 2	SR.1.		_	
			Config 3	SR2.1		4	
PMSI CORE	SET Reference		Config 1	CR.1.			-
Channel	SET Reference		Config 2	CR.1.		_	_
Onamo			Config 3	CR2.1		_	
Dedicated Co			Config 1	CCR.1			_
Reference C	hannel		,				
			Config 2	CCR.1			
CCD noromo	toro		Config 3	CCR.2 SSB.		CCD	3.5 FR1
SSB parame	SSB parameters		Config 1 Config 2	SSB.			3.5 FR1
			Config 3	SSB.			3.6 FR1
SMTC confid	guration defined		Config 1	SMT			MTC.5
in A.3.11	jaration domina		Config 2, 3	SMT			MTC.4
-	CCH subcarrier	kHz	Config 1,2	<u> </u>			
spacing			Config 3			30	
EPRE ratio c	of PSS to SSS		Ğ				
	of PBCH DMRS						
to SSS	of PBCH to PBCH						
DMRS							
	of PDCCH DMRS						
to SSS EPRE ratio of	of PDCCH to						
PDCCH DMF			Config 1,2,3	()		0
	of PDSCH DMRS						
to SSS EPRE ratio o	of PDSCH to						
PDSCH							
	of OCNG DMRS						
	to SSS(Note 1) EPRE ratio of OCNG to						
OCNG DMR							
Note2		dBm/15 kHz		-9	98	,	-98
Note2		dBm/S	Config 1,2		98		-98
	in 2	CS	Config 3	-9			-95
SS-RSRP Not	le 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
. ,		CS	Config 3	-91	-91	-Infinity	-88
$\hat{E}_{_{s}}/I_{_{ot}}$		dB	Config 1,2,3	4	4	-Infinity	7
\hat{E}_{s}/N_{oc}		dB	Config 1,2,3	4	4	-Infinity	7

Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26
	dBm/38 .16MHz	Config 3	-58.49	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	GN	A۱	VGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

A.6.6.3 Inter-RAT Measurements

A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment				
NR RF Channel Number		1	1 NR carrier frequency is used in the test				
LTE RF Channel Number		1	1 LTE carrier frequency is used in the test				
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.1.1-2 and A.6.6.3.1.1-3.					
Active cell		Cell 1	Cell 1 is on RF channel number 1				
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2				
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per- UE gap pattern.				
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1				
Inter-RAT E-UTRAN measurement quantity		RSRP	Measurement quantity for Cell 2				
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2				
b2-Threshold2EUTRA	dBm	-97	E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2				
Hysteresis	dB	0					
TimeToTrigger	S	0					
Filter coefficient		0	L3 filtering is not used				
DRX		OFF	OFF				
T1	S	5					
T2	S	5					
Note 1: Values are defined in Table A.6.6.3.1.1-3							

Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

Parameter		Parameter Unit		Cell 1		
				T1	T2	
RF channel number			1, 2, 3, 4, 5, 6		1	
Duplex mode			1, 2, 3		FDD	
			4, 5, 6		TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDD	Conf.1.1	
	SCS=30 KHz		3, 6	TDD	Conf.2.1	
BW _{channel}		MHz	1, 4	10: $N_{RB,c} = 52 (FDD)$		
			2, 5	10: N _{RB,c} = 52 (TDD)		
			3, 6	40: N _{RB,c} = 106 (TDD)		
PDSCH reference m	easurement		1, 4	SR.	1.1 FDD	
channel			2, 5	SR.	1.1 TDD	
			3, 6	SR.	2.1 TDD	
RMSI CORSET refe	RMSI CORSET reference channel		1, 4	CR.	1.1 FDD	
			2, 5	CR.	1.1 TDD	
			3, 6 CR.2.		2.1 TDD	
Dedicated CORSET	reference channel		1, 4	CCR	1.1.1 FDD	

	Í			
		2, 5		.1.1 TDD
		3, 6		.2.1 TDD
BWP configurations Initial DL BWP		1, 2, 3, 4, 5, 6		BWP.0.1
Dedicated DL BWP		1, 2, 3, 4, 5, 6		3WP.1.1
Initial UL BWP		1, 2, 3, 4, 5, 6		BWP.0.1
Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULE	BWP.1.1
OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6	(OP.1
SMTC configuration		1, 2, 3, 4, 5, 6	SI	MTC.1
SSB configuration		1, 2, 4, 5	SSI	3.1 FR1
		3, 6	SSI	3.2 FR1
CSI-RS for tracking		1, 4	TRS	.1.1 FDD
<u>-</u>		2, 5	TRS	.1.1 TDD
		3, 6	TRS	.1.2 TDD
b2-Threshold1	-ID	1, 2, 4, 5		-98
	dBm	3, 6		-95
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to				
PDCCH_DMRS	dB	dB		0
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N _{oc} ^{Note2}	dBm/15 KHz	1, 2, 3, 4, 5, 6		
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-106
IVoc.		3, 6		-103
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	18	-2
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	18	-2
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108
		3, 6	-85	-105
Io ^{Note3}	dBm/9.36 MHz	1, 2, 4, 5	-59.98	-75.92
IU	dBm/38.16 MHz	3, 6	-53.88	-69.82
Propagation condition		1, 2, 3, 4, 5, 6	TDL-C 3	00ns 100Hz
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x2 Low	
Matrix				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: Ê_s/I_{ot}, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} 10 MHz: N _{RB,t}	

			20 MHz: N _{RB} ,	_ 100
DDCCH parameters		1, 2, 3	5 MHz: R.7	
PDSCH parameters:		1, 2, 3		
DL Reference Measurement Channel ^{Note2}			10 MHz: R.3	
Channel		4.5.0	20 MHz: R.6	
		4, 5, 6	5 MHz: R.4	
			10 MHz: R.0	
			20 MHz: R.3	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.1	
parameters:			10 MHz: R.6	
DL Reference Measurement			20 MHz: R.1	
Channel ^{Note2}		4, 5, 6	5 MHz: R.1 ⁻	
			10 MHz: R.6	6 TDD
			20 MHz: R.1	0 TDD
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.2	0 FDD
			10 MHz: OP.	10 FDD
			20 MHz: OP.	17 FDD
		4, 5, 6	5 MHz: OP.	9 TDD
			10 MHz: OP.	.1 TDD
			20 MHz: OP.	.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6		
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB	dB		0	
PDCCH RA			•	
PDCCH_RB				
PDSCH RA				
PDSCH_RB	 			
OCNG RA ^{Note3}				
OCNG_RBNote3				
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-106	
Ê _s /N _{oc}	dBill/13ki12	1, 2, 3, 4, 5, 6	-106 -Infinity 19	
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	19
RSRPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87
SCH_RP ^{Note5}	dBm/15kHz		-Infinity	-87
	dBm/9MHz	1, 2, 3, 4, 5, 6	-78.22+10log (N _{RB,c} /50)	-87 -59.16+10log (N _{RB,c}
Io ^{Note5}	dBm/9ivinz	1, 2, 3, 4, 5, 6	-78.22+1010g (INRB,c /50)	/50)
Propagation Condition		1, 2, 3, 4, 5, 6	ETU70)
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lo	W
Correlation Matrix				
			-	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle

Supported test configurations are shown in table A.6.6.3.2.1-1. General test parameters are provided in Table A.6.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.2.1-3 and A.6.6.3.2.1-4, respectively.

Table A.6.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1	Test 2	Comment
		Value		
NR RF Channel Number		1		1 NR carrier frequency is used in the test
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified	d in Tables	
		A.6.6.3.2.1-	-2 and	
		A.6.6.3.2.1-	-3.	
Active cell		Cell 1		Cell 1 is on RF channel number 1
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE
				gap pattern.
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP		Measurement quantity for Cell 2
measurement quantity				
b2-Threshold1	dBm	Note 1		SS-RSRP threshold for SS-RSRP
				measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97		E-UTRAN RSRP threshold for SS-RSRP
				measurement on cell1 for event B2
Hysteresis	dB	0		
TimeToTrigger	S	0		
Filter coefficient		0		L3 filtering is not used
DRX		DRX.1	DRX.7	DRX cycle configurations DRX.1 and DRX.7
				are defined in Table A.3.3.1-1 and Table
				A.3.3.7-1 respectively.
T1	S	5		
T2	S	5	15	
Note 1: Values are define	ed in Table	A.6.6.3.2.1-3	3	

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Parameter		Unit	Configuration	(Cell 1
				T1	T2
RF channel number	er		1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 2, 3		FDD
			4, 5, 6		TDD
TDD Configuration	SCS=15 KHz		2, 5	TDD	Conf.1.1
	SCS=30 KHz		3, 6	TDI	Conf.2.1
BW _{channel}		MHz	1, 4	10: N _{RB}	,c = 52 (FDD)
			2, 5	10: N _{RB}	,c = 52 (TDD)
			3, 6	40: N _{RB,}	c = 106 (TDD)
PDSCH reference	measurement		1, 4	SR	.1.1 FDD
channel			2, 5	SR	.1.1 TDD
			3, 6	SR	.2.1 TDD
RMSI CORSET re	erence channel		1, 4	CR	.1.1 FDD
			2, 5	CR	.1.1 TDD
			3, 6		.2.1 TDD
Dedicated CORSE	T reference channel		1, 4	CCR.1.1 FDD	
			2, 5	CCF	R.1.1 TDD
			3, 6		R.2.1 TDD
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.0.1
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DL	BWP.1.1
	Initial UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.0.1
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	UL	BWP.1.1
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6		OP.1
SMTC configuration	n		1, 2, 3, 4, 5, 6		MTC.1
SSB configuration			1, 2, 4, 5	SS	B.1 FR1
			3, 6	SS	B.2 FR1
CSI-RS for tracking	9		1, 4	TRS	3.1.1 FDD
			2, 5	TRS	S.1.1 TDD
			3, 6	TRS	3.1.2 TDD
b2-Threshold1		dBm	1, 2, 4, 5		-98

		3, 6		-95	
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG DMRS					
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-106		
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-106	
		3, 6	-103		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	18	-2	
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	18	-2	
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108	
		3, 6	-85	-105	
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-108	
		3, 6	-85	-105	
	dBm/9.36	1, 2, 4, 5	-59.98	-75.92	
IoNote3	MHz				
10	dBm/38.16	3, 6	-53.88	-69.82	
	MHz				
Propagation condition		1, 2, 3, 4, 5, 6		TDL-C 300ns 100Hz	
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x	2 Low	
Matrix					
Note 1: OCNG shall be used such that spectral density is achieved to			constant total tra	ansmitted power	

spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

 \hat{E}_s/I_{ot} , SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information Note 3: purposes. They are not settable parameters themselves.

Table A.6.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	2		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100		
PDSCH parameters: DL Reference Measurement Channel ^{Note2}		1, 2, 3	5 MHz: R.7 10 MHz: R.3 20 MHz: R.6	FDD	
		4, 5, 6	5 MHz: R.4 10 MHz: R.0 20 MHz: R.3	TDD	
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement		1, 2, 3	5 MHz: R.11 10 MHz: R.6 20 MHz: R.10	FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 10 MHz: R.6 20 MHz: R.10	TDD	

	1, 2, 3	5 MHz: OP.2	20 FDD		
	, _, _	10 MHz: OP.10 FDD			
		20 MHz: OP.17 FDD			
	4, 5, 6				
	, ,	10 MHz: OP	.1 TDD		
		20 MHz: OP	.7 TDD		
dB	1, 2, 3, 4, 5, 6	0			
dBm/15kHz	1, 2, 3, 4, 5, 6	-106			
dB	1, 2, 3, 4, 5, 6	-Infinity	19		
dB	1, 2, 3, 4, 5, 6	-Infinity	19		
dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87		
dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity -87			
dBm/9MHz	1, 2, 3, 4, 5, 6	-78.22+10log (N _{RB,c} /50) -59.16+10log (N _{RB,c} /50)			
	1, 2, 3, 4, 5, 6	,			
	1, 2, 3, 4, 5, 6				
	dBm/15kHz dB dB dBm/15kHz dBm/15kHz dBm/9MHz	dBm/15kHz 1, 2, 3, 4, 5, 6 dB 1, 2, 3, 4, 5, 6 dB 1, 2, 3, 4, 5, 6 dB 1, 2, 3, 4, 5, 6 dB 1, 2, 3, 4, 5, 6 dBm/15kHz 1, 2, 3, 4, 5, 6 dBm/9MHz 1, 2, 3, 4, 5, 6 dBm/9MHz 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	dBm/15kHz 1, 2, 3, 4, 5, 6		

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes.
- They are not settable parameters themselves.

 Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25]

A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.4 L1-RSRP measurement for beam reporting

A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.6.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.1.1-1.

Table A.6.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description			
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only	Note: The UE is only required to be tested in one of the supported test configurations			

A.6.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.1.2-1 and Table A.6.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chariner	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD
Chame	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Chame	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
Illitial BVVI Collingulation	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
ū			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD

DRX configuration	1~3		Off
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	1-3	ub.	O
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~3		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SSI	B#0	SSI	B#1
Parameter	Config	Onit	T1	T2	T1	T2
$N_{oc}^{$	1~3	dBm/15kHz		-94	.65	
№ Note2	1,2	dBm/SSB SCS		-94	.65	
$N_{oc}^{}$ Note2	3 dBm/55B 5C5			-91	.65	
\hat{E}_{s}/I_{ot}	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
COD IVOIVI	3	ubili/oob ooo	-91.65	-91.65	-Infinity	-88.65
lo Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10 110	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{oc}	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy

requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.6.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.2.1-1.

Table A.6.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations

A.6.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.2.2-1 and Table A.6.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Channel	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD
Chame	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Chame	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1

OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
Initial BWT Configuration	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		DRX.3
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to		42	Ü
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSSNote 1			1
	<u> </u>		
EPRE ratio of OCNG to OCNG DMRS Note 1			

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SSI	B#0	SSI	3#1
rarameter	Coming	Offic	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~3	dBm/15kHz		-94	.65	
$N_{oc}^{ m Note2}$	1,2 dBm/SSB SCS			-94	.65	
TV _{oc}	3	dbiii/33b 3C3		-91	.65	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
COD NOIN	3	dBill/OOB CCC	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84

\hat{E}_s/N_{oc}		1~3	dB	0	0	-Infinity	3
Note 1:	Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period				ne period		
Note 2:			ells and noise sources no s and time and shall be me	•			

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.6.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.3.1-1.

Table A.6.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only re	ote: The UE is only required to be tested in one of the supported test configurations		

A.6.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.3.2-1 and Table A.6.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1

	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
DDCCII D-f	1		SR.1.1 FDD
PDSCH Reference measurement	2		SR.1.1 TDD
channel	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Charine	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1
Initial BWT Goringulation	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		Off
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
qcl-Info	1~3		SSB#0 for resource#0
·			SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	S	5
EPRE ratio of PSS to SSS	<u> </u>		
EPRE ratio of PBCH DMRS to SSS	<u> </u>		
EPRE ratio of PBCH to PBCH DMRS	<u> </u>		
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
· ·			i

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
N_{oc} Note1	1~3	dBm/15kHz	-94.65		
$N_{oc}^{ m Note1}$	1,2	dBm/SSB SCS	-94.65		
TV _{oc}	3	UBIII/33B 3C3	-91.65		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	3	
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65	
Note2	3	ubiii/33b 3C3	-91.65	-88.65	
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93	
10	3	dBm/38.16 MHz	-57.59	-55.84	
\hat{E}_s/N_{oc}	1~3	dB	0	3	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.6.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.4.1-1.

Table A.6.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only r	ote: The UE is only required to be tested in one of the supported test configurations		

A.6.6.4.4.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.4.2-1 and Table A.6.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
·	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
DDSCH Potoronoo mooguroment	1		SR.1.1 FDD
PDSCH Reference measurement channel	2		SR.1.1 TDD
Channel	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2	1	CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CODECET Deference	1		CCR.1.1 FDD
Dedicated CORESET Reference Channel	2		CCR.1.1 TDD
Channel	3	1	CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3	1	CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1
Illitial BWF Colliguration	1~3		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
-			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
gcl-Info	1~3		SSB#0 for resource#0
qormio	1~3		SSB#1 for resource#1

reportSlotOffsetList	1~3	slots	8
T1	1~3	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS			
Note 1			
Propagation condition	1~3		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
N_{oc} Note1	1~3	dBm/15kHz	-94.65		
$N_{oc}^{ m Note1}$	1,2	dBm/SSB SCS	-94.65		
TV _{oc}	3	UBIII/33B 3C3	-91.65		
\hat{E}_{s}/I_{ot}	1~3	dB	0	3	
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65	
Note2	3	ubiii/33b 3C3	-91.65	-88.65	
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93	
10	3	dBm/38.16 MHz	-57.59	-55.84	
\hat{E}_s/N_{oc}	1~3	dB	0	3	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 2: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.6.7.1 SS-RSRP

A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		l lmi4	Test 1		Tes	st 2	Test 3		
	eter 	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
Cell ID SSB ARFCN			489	0	489	0	489	0 0	
	Config 1		life	eq1	fre FD		fre	q ı	
Duplex mode	Config 2,3				TD				
	Config 1				Not App	olicable			
TDD configuration	Config 2				TDDC	onf.1.1			
	Config 3				TDDC	onf.2.1			
	Config 1				10: N _{RE}	s,c = 52			
BW _{channel}	Config 2	MHz			10: N _{RE}	s,c = 52			
	Config 3]			40: N _{RB,c} = 106				
	Config 1				10: N _{RE}	_{3,c} = 52			
BWP BW	Config 2				10: N _{RE}	_{B,c} = 52			
	Config 3				40: N _{RB}	,c = 106			
Downlink initial BWP cor	nfiguration				DLBW	/P.0.1			
Downlink dedicated BWI	configuration				DLBW	/P.1.1			
Uplink initial BWP config	uration				ULBW	/P.0.1			
Uplink dedicated BWP c					ULBW	/P.1.1			
TRS configuration			TRS.1.	NA	TRS.1	NA	TRS.1.	NA	
	Config 1		1 FDD		.1		1 FDD		
			TRS.1.	NA	FDD TRS.1	NA	TRS.1.	NA	
	Config 2		1 TDD		.1		1 TDD		
			TRS.1.	NA	TDD TRS.1	NA	TDC 1	NA	
	Config 3		2 TDD	INA	.2	INA		INA	
	3 -		TDD						
DRX Cycle	1	ms	Not Applicable					Т	
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	_	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD		
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-	
	Config 3		CR2.1 TDD		CR2.1 TDD		1 FDD TRS.1. 1 TDD TRS.1. 2 TDD SR.1.1 FDD SR.1.1 TDD SR2.1 TDD CR.1.1 FDD CR.1.1		
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD				
Control channel RMC	Config 2		CCR.1. 1 TDD	_	CCR.1. 1 TDD	-		-	
	Config 3		CCR2.1 TDD		CCR2. 1 TDD				
		1							
SSB configuration	Config 1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1		SSB.1 FR1	

		Config 2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1		
		Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1		
Time offee	t with Cell 1	Config 1	ms	-	3	-	3	-	3		
Time onse	t with Cell 1	Config 2,3	μs	-	3	-	3	ı	3		
SMTC con	figuration	Config 1			SMTC.2						
		Config 2,3				SMT					
OCNG Pat	terns	T 0 " 1 0				OCNG p					
PDSCH/PI		Config 1,2	kHz			15 I					
subcarrier	<u> </u>	Config 3		30kHz					Τ		
	o of PSS to SS o of PBCH DM										
	EPRE ratio of PBCH to PBCH DMRS										
	of PDCCH D										
		PDCCH DMRS	dB	0	0	0	0	0	0		
	of PDSCH Do of PDSCH to										
		MRS to SSS(Note 1)									
		OCNG DMRS (Note									
1)	Т	ND EDD ED4 A									
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6				00		-114			
		NR_FDD_FR1_B						-113.5			
		NR_TDD_FR1_C						-113			
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-10	06	-8	38	_11	2.5		
		NR_FDD_FR1_E,									
		NR_TDD_FR1_E						-112			
		NR_FDD_FR1_G	15 (4.514)					-1	11		
N oc Note2		NR_FDD_FR1_H	dBm/15Kh Z					-11	0.5		
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-1	14		
		NR_FDD_FR1_B						-11	3.5		
	0 " 0	NR_TDD_FR1_C		N	ot			-1	13		
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		applica	ble ^{Note 5}	-{	94	-11	2.5		
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12		
		NR_FDD_FR1_G						-	11		
		NR_FDD_FR1_H							0.5		
	Config 1,2			-10	06	-8	38		ie as I5kHz		
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-1	11		
		NR_FDD_FR1_B						-11	0.5		
N oc Note2		NR_TDD_FR1_C	dBm/SCS	N	ot			-1	10		
	Config 3	NR_FDD_FR1_D,		applica	ble ^{Note 5}	-6	91	-10	9.5		
		NR_TDD_FR1_D NR_FDD_FR1_E,		' '				-1	09		
		NR_TDD_FR1_E						L '			
		NR_FDD_FR1_G							08		
		NR_FDD_FR1_H						-10	7.5		

$\hat{\mathbf{E}}/\mathbf{I}_{\mathrm{ot}}$			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
\hat{E}_{s}/N_{oc}			dB	6	1	6	1	3	0
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						- 111.00	114.00
		NR_FDD_FR1_B					07	- 110.50	- 113.50
		NR_TDD_FR1_C						- 110.00	- 113.00
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-100	-105	-82	-87	109.50	112.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						109.00	112.00
		NR_FDD_FR1_G						108.00	111.00
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS					107.50	110.50
e3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	u=, 000			-85		108.00	- 111.00
		NR_FDD_FR1_B						- 107.50	- 110.50
		NR_TDD_FR1_C		Not	Not applic			- 107.00	- 110.00
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		applica ble ^{Note 5}	able ^{Not}		-90	- 106.50	- 109.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						106.00	109.00
		NR_FDD_FR1_G						105.00	108.00
		NR_FDD_FR1_H						- 104.50	- 107.50
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-80	0.03
		NR_FDD_FR1_B							.53
	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/	-70	.09	-52.09			5.53
	,	NR_TDD_FR1_D NR_FDD_FR1_E,	9.36MHz	-70.09		-52.09		-78	3.03
		NR_TDD_FR1_E NR_FDD_FR1_G						-77	7.03
Io ^{Note3}		NR_FDD_FR1_H							5.53
		NR_FDD_FR1_A, NR_TDD_FR1_A						-73	.94
		NR_FDD_FR1_B						-73	5.44
	Config 3	NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/	No	ot	-51	.99		94 44
	3 -	NR_TDD_FR1_D NR_FDD_FR1_E,	38.16MHz	applicat	DIE Note 3-				.94
		NR_TDD_FR1_E NR_FDD_FR1_G							.94
		NR_FDD_FR1_H							.44

Propagat	tion condition	-	AWGN
Antenna	configuration		1x2
Note 1:	density is achieved for all OFDM sy	mbols.	allocated and a constant total transmitted power spectral
Note 2:			of specified in the test is assumed to be constant over JGN of appropriate power for $N_{\rm oc}$ to be fulfilled.
Note 3:	SS-RSRP and lo levels have been of settable parameters themselves.	derived from o	ther parameters for information purposes. They are not
Note 4:	SS-RSRP minimum requirements a receiver antenna port.	re specified as	ssuming independent interference and noise at each
Note 5:	Subtest 1 is not used when testing v		
Note 6:	The test configuration excludes sup this release of the specification	port for band r	n51 and it is not required to run this test on band n51 in

A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only red	juired to be tested in one of the supported test configurations in each supported band

A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1	Test 2		2
Parameter	Coning	Unit	Cell 1	Cell 2	Cell 1	Cell 2

SSB ARFCI	N	1~3		freq1	freq2	freq1	freq2	
336 ARFCI	IN .	1~3		10: N _{RB,c}		10: N _{RB,0}		
BW _{channel}		2	MHz	10: N _{RB,C}		10: N _{RB} ,		
DVVChanner		3	1711 12	40: N _{RB,c}		40: N _{RB,c}		
		1		FDE		FDI		
Duplex mod	la	2		TDE		TDI		
Duplex mod	16	3		TDE		TDI		
		1		N/A		N/A		
TDD configu	uration	2		TDDCor		TDDCor		
TDD comig	uration	3		TDDCor		TDDCor		
		1		SR.1.1 FDD	11.2.1	SR.1.1 FDD	11.2.1	
PDSCH Ref	ference	2	1	SR.1.1 TDD	-	SR.1.1 TDD		
measureme	ent channel		-	SR.1.1 TDD	-	SR.2.1 FDD	-	
		3				_		
RMSI CORI	ESET Reference	2	-	CR.1.1 FDD CR.1.1 TDD	-	CR.1.1 FDD CR.1.1 TDD	-	
Channel					+		-	
		3		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated C	CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Reference 0	Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
		3		CCR.2.1 TDD	<u> </u>	CCR.2.1 TDD	<u> </u>	
005 "		1	-	SSB.1		SSB.1		
SSB configu	uration	2	-	SSB.1		SSB.1		
00::0 =		3		SSB.2		SSB.2		
OCNG Patte	erns	1~3		OP.	1	OP.	1	
		1		TRS.1.1 FDD		TRS.1.1		
					╡	FDD TRS.1.1		
TRS configu	uration	2		TRS.1.1 TDD - TRS.1.2 TDD		TDD		
		3				TRS.1.2 TDD	-	
Initial BWP	Configuration	1~3		DLBWF		DLBWP.0.1 ULBWP.0.1		
Dedicated F	BWP configuration	1~3		ULBWF DLBWF	P.1.1	DLBWF	P.1.1	
Dedicated BWF configuration				ULBWF	² .1.1	ULBWF	2.1.1	
1					2	- 3		
Time offset	with Cell 1	1	ms	-	3	-		
Time offset	with Cell 1	2,3	ms μs	-	3	-	3	
		-		- - SMTC	3	- - SMT0	3	
Time offset		2,3		-	3	- SMTC	3	
SMTC confi	guration	2,3		- SMTC	3		3	
SMTC confi	guration	2,3		- SMTC	3		3	
SMTC confi	guration f PSS to SSS f PBCH DMRS to	2,3		- SMTC	3		3	
SMTC confi	guration f PSS to SSS	2,3		- SMTC	3		3	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS	guration f PSS to SSS f PBCH DMRS to	2,3		- SMTC	3		3	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS	f PSS to SSS f PBCH DMRS to	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 C.2 C.1	
SMTC confi EPRE ratio of EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH	2,3		- SMTC	3		3	
SMTC confi EPRE ratio of EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG to OCNG	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 C.2 C.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG to OCNG NR_FDD_FR1_A,	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 0.2 0.1	
SMTC confi EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS	f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG to OCNG	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 C.2 C.1	
EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSSNote of SSSN	f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH DMRS to f OCNG DMRS to f OCNG DMRS to f OCNG to OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5	2,3 1 2,3	μѕ	- SMTC	3 0.2 0.1	SMTC	3 C.2 C.1 0	
EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSSNote 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH TO PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMT0	3 C.2 C.1 0	
EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSSNote of SSSN	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH TO PDSCH f OCNG DMRS to f OCNG DMRS to NR_FDD_FR1_A, NR_TDD_FR1_A, NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C	2,3 1 2,3	μs dB	- SMTC	3 0.2 0.1	SMTC 0	3 C.2 C.1 0 -115 -114.5 -114	
SMTC confi EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH TO PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMTC $(N_{oc} ext{ for Channel 2})$	3 C.2 C.1 0	
EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSSNote 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMTC 0	3 C.2 C.1 0 -115 -114.5 -114	
EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSSNote 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_D, NR_FDD_FR1_D, NR_FDD_FR1_D, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMTC $(N_{oc} ext{ for Channel 2})$	3 C.2 C.1 0 -115 -114.5 -114 -113.5 -113	
SMTC confi EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSSNote 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMTC $(N_{oc} ext{ for Channel 2})$	3 C.2 C.1 0 -115 -114.5 -114 -113.5 -113 -112	
SMTC confi EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS Note 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG to OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B	2,3 1 2,3	μs dB	SMTC	3 0.2 0.1	SMTC $(N_{oc} ext{ for Channel 2})$	3 C.2 C.1 0 -115 -114.5 -114 -113.5 -113 -112 -111.5	
SMTC confi EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of DMRS EPRE ratio of SSSNote 1 EPRE ratio of DMRS Note 1	guration f PSS to SSS f PBCH DMRS to f PBCH to PBCH f PDCCH DMRS to f PDCCH to PDCCH f PDSCH DMRS to f PDSCH DMRS to f PDSCH to PDSCH f OCNG DMRS to f OCNG DMRS to f OCNG TO OCNG NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	2,3 1 2,3	μs dB	SMTC	3 2.2 2.1 0	SMTC $(N_{oc} ext{ for Channel 2})$	3 C.2 C.1 0 -115 -114.5 -114 -113.5 -113 -112	

	NR_FDD_FR1_B NR_TDD_FR1_C						-114.5 -114
	NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,					(N_{oc} for Channel 2	-113.5 -113
	NR_TDD_FR1_E NR_FDD_FR1_G					+8dB)	-112
	NR_FDD_FR1_H NR_FDD_FR1_A,						-111.5 -112.00
	NR_TDD_FR1_A						
	NR_FDD_FR1_B NR_TDD_FR1_C					(N_{aa} for	-111.50 -111.00
	NR_FDD_FR1_D, NR_TDD_FR1_D			-91.65		Channel 2	-110.50
	NR_FDD_FR1_E, NR_TDD_FR1_E					+oub)	-110.00
	NR_FDD_FR1_G NR_FDD_FR1_H				10 13		-109.00 -108.50
	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	10	10	13	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5						-118.00
	NR_FDD_FR1_B					(RSRP for Cell 2	-117.50
	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5 -84.65 (RSRP for Cell 2 +25dB) -	-117.00				
	NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E					+25 dB)	-116.50 -116.00
66	NR_FDD_FR1_G NR_FDD_FR1_H	_E	-115.00				
SS- RSRP ^{Note3}	NR_FDD_FR1_A, NR_TDD_FR1_A		ł				-114.50 -115.00
	NR_FDD_FR1_B	3				(Danna	-114.50
	NR_TDD_FR1_C NR_FDD_FR1_D,			-81.65		(RSRP for Cell 2	-114.00 -113.50
	NR_TDD_FR1_D NR_FDD_FR1_E,					+25dB)	-113.00
	NR_TDD_FR1_E NR_FDD_FR1_G					(RSRP for Cell 2	-112.00
	NR_FDD_FR1_H NR_FDD_FR1_A,						-111.50 -85.28
	NR_TDD_FR1_A NOTE 5, NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C		dBm/			Channel 2 +8dB) (Noc for Channel 2 +8dB) 13 (RSRP for Cell 2 +25dB)	-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2	9.36MH z	-56.28			-83.78
	NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G						-83.28 -82.28
Io ^{Note3}	NR_FDD_FR1_H						-81.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5,						-79.19
	NR_FDD_FR1_B NR_TDD_FR1_C		dBm/			(In for	-78.69 -78.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3	38.16M Hz	-50.19		Channel 2	-77.69
	NR_FDD_FR1_E, NR_TDD_FR1_E		1 12			. 17.70017	-77.19
	NR_FDD_FR1_G NR_FDD_FR1_H						-76.19 -75.69
	\hat{E}_s/N_{oc}	1~3	dB	10	10	13	-3
	ation condition a configuration	1~3 1~3	-	AWGN 1x2			
Antenn	a comiguration	ા~ડ	l	١٨∠		I XZ	_

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power
	for N_{oc} to be fulfilled.
Note 3:	RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

A.6.7.1.3 Void

A.6.7.2 SS-RSRQ

A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Paran	notor.	Unit	Tes	st 1	Tes	st 2	Te	st 3	
Paran	ieter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			fre	q1	fre	q1	freq1		
Duplex mode	Config 1				FDD				
Duplex mode	Config 2,3				TD	TDD			
	Config 1				Not App	licable			
TDD configuration	Config 2				TDDCo	nf.1.1			
	Config 3				TDDCo	nf.2.1			
	Config 1				10: N _{RB} ,	c = 52			
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52						
	Config 3				40: N _{RB,0}	= 106			
Gap Pattern ID					0				
	Initial DL BWP	DLBWP.0.1							
BWP configuration	Dedicated DL BWP				DLBW	P.1.1			

	Initial UL BWP				ULBW	P.0.1		
	Dedicated UL BWP				ULBW	P.1.1		
DRX Cycle	DWF	ms			Not App	licable		
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1. 1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1. 1 TDD	-
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1. 1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1. 1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2. 1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR. 1.1 FDD	
Control Channel RMC	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR. 1.1 TDD	-
	Config 3		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR. 2.1 TDD	
	Config 1		TRS.1.1 FDD		TRS.1.1 FDD		TRS.1. 1 FDD	
TRS Configuration	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD	
OCNG Patterns					OP.	. 1		
SS-RSSI-Measurement					Not App	licable		
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
Time onset with och 1	Config 2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1				SMT	C.2		
Civi o comiguration	Config 2,3				SMT	C.1		
SSB configuration	Config 1,2				SSB.1	FR1		
33B configuration	Config 3				SSB.2	FR1		
CSI-RS for tracking	Config 1				TRS.1.1	1 FDD		
	Config 2				TRS.1.1	1 TDD		
	Config 3				TRS.1.2	2 TDD		
PDSCH/PDCCH	Config 1,2	LU-			15 k	Hz		
subcarrier spacing	Config 3	kHz			30kl	Hz		
EPRE ratio of PSS to SS								
EPRE ratio of PBCH DM EPRE ratio of PBCH to								
EPRE ratio of PDCCH D								
EPRE ratio of PDCCH to	PDCCH DMRS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH to		QD						
EPRE ratio of PDSCH to EPRE ratio of OCNG DM								
EPRE ratio of OCNG to								
1)								

	1			1		1		ı	
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-1	14
		NR_FDD_FR1_B						-11	3.5
		NR_TDD_FR1_C							13
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-8	35	-10	01	-11	2.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12
		NR_FDD_FR1_G						-1	11
Note2		NR_FDD_FR1_H	dBm/15kH					-11	0.5
a. oc		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	Z					-1	14
		NR_FDD_FR1_B						-11	3.5
	0 " 0	NR_TDD_FR1_C						-1	13
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		-91		-		-11	2.5
		NR_FDD_FR1_E,						4	40
		NR_TDD_FR1_E							12
		NR_FDD_FR1_G							11
		NR_FDD_FR1_H NR_FDD_FR1_A,						-11	0.5
		NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B							3.5
	0	NR_TDD_FR1_C				4.	04		13
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D		-8	55	-10	01		2.5 12
		NR_FDD_FR1_E,							11
		NR_TDD_FR1_E						-11	0.5
		NR_FDD_FR1_G							
N Note2		NR_FDD_FR1_H NR_FDD_FR1_A,	dBm/SCS						
		NR_TDD_FR1_A						-1	11
		NR_FDD_FR1_B							0.5
	Config 2	NR_TDD_FR1_C			.0			-1	10
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		-8	88	-	•	-10	9.5
		NR_FDD_FR1_E,						-109	
		NR_TDD_FR1_E							
		NR_FDD_FR1_G NR_FDD_FR1_H							08 7.5
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		NIX_I DD_I IXI_II	dB	-1.	76	-4	.7	-546	-5.46
\hat{E}_s/N_{oc}			dB	3	3	-2.9	-2.9	-4	-4
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D,		-82	-82	-103.9	-103.9	-117	-117
	Coming 1,2	NR_TDD_FR1_D		-02	-02	-103.9	-103.9	-116.5	-116.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-116	-116
SS- RSRP ^{Note}		NR_FDD_FR1_G	dBm/SCS					-115	-115
3		NR_FDD_FR1_H	GD/11/000					-114.5	-114.5
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
	Config 3	NR_TDD_FR1_C		-85	-85	-	-	-114	-114
		NR_FDD_FR1_D, NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-113	-113
	<u> </u>	INIT I DD_I KI_E		<u> </u>	l	<u> </u>	<u> </u>	I .	

		NR_FDD_FR1_G						-112	-112
		NR_FDD_FR1_H						-111.5	-111.5
	I	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6							
SS-RSRQ	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
		NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H							
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-83	3.5
		NR_FDD_FR1_B						-83	
		NR_TDD_FR1_C dBm/				-82.5			
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	9.36MHz	-50		-70		-82	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-81.5	
		NR_FDD_FR1_G						-80	0.5
Io ^{Note3}		NR_FDD_FR1_H						-8	80
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-77	7.4
		NR_FDD_FR1_B NR_TDD_FR1_C	dBm/						6.9 6.4
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D	38.16MHz	-5	0	-		-75	5.9
		NR_FDD_FR1_E, NR_TDD_FR1_E						-75	5.4
		NR_FDD_FR1_G							1.4
Propagation	n condition	NR_FDD_FR1_H	-	AWGN	AWGN	AWGN	AWGN	AWG N	3.9 AWG N
	onfiguration			1x2	1x2	1x2	1x2	1x2	1x2
	density is ach	e used such that both ieved for all OFDM sy	mbols.						
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over									

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Darama	tor	l lmi4	Te	st 1	Tes	st 2	Tes	st 3
Parame	eter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2 freq2
SSB ARFCN	T = " .		freq1					
Duplex mode	Config 1 Config 2,3	-	FDD TDD					
	Config 1				Not App			
TDD configuration	Config 2				TDDCc			
3	Config 3	-	TDDConf.2.1					
	Config 1				10: N _{RB}	s,c = 52		
BW _{channel}	Config 2	MHz			10: N _{RB}	s,c = 52		
	Config 3				40: N _{RB} ,	c = 106		
Gap pattern ID	Config 1,2,3				0)		
	Config 1				10: N _{RB}	s,c = 52		
BWP BW	Config 2		10: N _{RB,c} = 52					
	Config 3		40: NRB,c = 106					
DRX Cycle		ms	Not Applicable					
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	_
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD	

		Config 1		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1. 1 FDD	
TRS Confi	guration	Config 2		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-
		Config 3		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD	•
OCNG Pat	tterns				OCNG pattern 1				l
T: "	0 !! 4	Config 1	ms	-	3	-	3	-	3
Time offse	t with Cell 1	Config 2,3	μs	-	3	-	3	-	3
CMTC con	figuration	Config 1			I	SMTC p	attern 2		
SMTC con	nguration	Config 2,3				SMTC p			
SSB config	guration	Config 1,2				SSB patter			
CSI-RS for		Config 3 Config 1			•	SSB patter TRS.1.		1	
031-10	Hacking	Config 2				TRS.1.			
		Config 3				TRS.1.			
PDSCH/PI	DCCH	Config 1,2	1.11=			15 k	κHz		
subcarrier	spacing	Config 3	kHz			30 k	Ήz		
	of PSS to SSS								
	of PBCH DMRS of PBCH to PBC								
	of PDCCH DMR								
EPRE ratio	of PDCCH to PD	OCCH DMRS	dB	0	0	0	0	0	0
	of PDSCH DMR of PDSCH to PD								
	of OCNG DMRS								
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1)							
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B						-1 ⁻	
N oc Note2	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D	dBm/15kHz	-80).18	-10	ne	-1°	
oc oc	Coming 1,2	NR_TDD_FR1_D	abili, fortiz		7.10		00	-11	4.5
		NR_FDD_FR1_E							
		NR_TDD_FR1_E						-114	
		NR_FDD_FR1_G NR_FDD_FR1_H						-113 -112.5	
		NR_FDD_FR1_A NR_TDD_FR1_A						-11.	2.5
		NOTE 6						-1 ⁻	
		NR_FDD_FR1_B						-11	
Note2	Config 3	NR_TDD_FR1_C NR_FDD_FR1_D	dBm/15kHz	-86	6.27	-1	12	-1°	15
IV oc	Coming 5	NR TDD FR1 D	dbiii/15ki iz	-00	0.21	-1	13	-11	4.5
		NR_FDD_FR1_E							-
		NR_TDD_FR1_E						-1°	
		NR_FDD_FR1_G						-1°	
		NR_FDD_FR1_H NR_FDD_FR1_A						-11:	2.5
		NR_TDD_FR1_A						-1°	16
		NR_FDD_FR1_B						-11	
		NR_TDD_FR1_C						-1 ⁻	15
NI-1-0	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D		-80).18	-10	06	11	15
N oc Note2		NR_FDD_FR1_E	dBm/15kHz					-11	4.0
		NR_TDD_FR1_E						-1 ⁻	14_
		NR_FDD_FR1_G						-1	13
		NR_FDD_FR1_H						-11	2.5
	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		-83	3.27	-1	10		40
		1	1	I		ı		-11	13

		NR_FDD_FR1_B						-112	2.5
		NR_TDD_FR1_C						-11	
		NR_FDD_FR1_D							
		NR_TDD_FR1_D						-11°	1.5
		NR_FDD_FR1_E NR_TDD_FR1_E						-11	11
		NR_FDD_FR1_G						-11	
		NR_FDD_FR1_H						-10	
\hat{E}_{s}/I_{ot}			dB		.75	-1.		3	-1.75
\hat{E}_{s}/N_{oc}		NR_FDD_FR1_A	dB	-1	.75	-1.	/5	3	-1.75
		NR_TDD_FR1_A NOTE 6						-113	- 117.7 5
		NR_FDD_FR1_B						-112.5	- 117.2 5
		NR_TDD_FR1_C						-112	- 116.7 5
	Config 1,2	NR_FDD_FR1_D NR_TDD_FR1_D		-81.93	-81.93	- 107.75	- 107.75	-111.5	- 116.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.7 5
		NR_FDD_FR1_G						-110	- 114.7 5
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS					-109.5	- 114.2 5
e3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	3511/000					-110	- 114.7 5
		NR_FDD_FR1_B						-109.5	- 114.2 5
		NR_TDD_FR1_C						-109	- 113.7 5
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	- 111.75	- 111.75	-108.5	- 113.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.7 5
		NR_FDD_FR1_G						-107	- 111.7 5
		NR_FDD_FR1_H						-106.5	111.2 5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							
SS-RSRQ ^I	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76
		NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E							Т
		NR_FDD_FR1_G							
		NR_FDD_FR1_H							
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-83.28	- 85.83
Io ^{Note3}	Config 1,2	NR_FDD_FR1_B	dBm/SCS		50	-75	.83	-82.78	- 85.33
		NR_TDD_FR1_C						-82.28	84.83

	NR_FDD_FR1_D NR_TDD_FR1_D						-81.78	- 84.33
	NR_FDD_FR1_E NR_TDD_FR1_E						-81.28	- 83.83
	NR_FDD_FR1_G						-80.28	- 82.83
	NR_FDD_FR1_H						-79.78	- 82.33
	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-77.19	- 79.73
	NR_FDD_FR1_B						-76.69	- 79.23
	NR_TDD_FR1_C						-76.19	- 78.73
Config 3	NR_FDD_FR1_D NR_TDD_FR1_D			50	-76	.73	-75.69	- 78.23
	NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	- 77.73
	NR_FDD_FR1_G						-74.19	- 76.73
	NR_FDD_FR1_H						-73.69	- 76.53
Propagation condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna configuration	a used such that both		1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.3 SS-SINR

A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Paran	neter	Unit	Test		Test	
	ietei	Unit	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Config 1		freq		freq DD	1
Duplex mode	Config 1 Config 2,3				DD DD	
	Config 1				oplicable	
TDD configuration	Config 2				onf.1.1	
·	Config 3			TDDC	Conf.2.1	
Downlink initial BWP co	onfiguration			DLB	WP.0.1	
Downlink dedicated BW			DLB\	WP.1.1		
Uplink initial BWP confi	guration			ULB\	WP.0.1	
Uplink dedicated BWP	configuration			ULB\	WP.1.1	
DRX Cycle configuration	n	ms		Not Ap	oplicable	
TRS configuration	Config 1		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD	
	Config 1		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-
channel	Config 3		SR.2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	
	Config 3		CR.2.1 TDD		CR.2.1 TDD	
	Config 1		CCR.1.1 FDD		CCR.1.1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD	
OCNG Patterns				0	P.1	
SS-RSSI-Measuremen	t			Not Ap	oplicable	
Time offset with Cell	Config 1	ms	-	3	-	3
1	Config 2,3	μs	-	3	-	3
01/70 (' '	Config 1			SM	ITC.2	
SMTC configuration	Config 2,3				ITC.1	
	Config 1,2				.1 FR1	
SSB configuration	Config 3				.2 FR1	
	Config 1,2	kHz			15	

PDSCH/PI	DCCH	Confin 2				20	
subcarrier	spacing	Config 3				30	
	of PSS to SSS of PBCH DMF		1				
	of PBCH to Pl		-				
	of PDCCH DN						
		PDCCH DMRS	dB	0	0	0	0
	of PDSCH DN						
	of PDSCH to I	RS to SSS(Note 1)	-				
		CNG DMRS (Note 1)					
		NR_FDD_FR1_A,			ı	-110	6
		NR_TDD_FR1_A					
		NOTE 6	<u> </u>				_
		NR_FDD_FR1_B	-			-115	
Note2		NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/15kH	0,	.	-11: -114	
N oc Note2		NR_TDD_FR1_D,	z	-93)	-114	.5
		NR_FDD_FR1_E,	-			-114	4
		NR_TDD_FR1_E					•
		NR_FDD_FR1_G				-11:	3
		NR_FDD_FR1_H				-112.5	
	Config 1,2			-93	3	Same as	
	Corning 1,2	T				15 kl	Ηz
		NR_FDD_FR1_A,				444	0
		NR_TDD_FR1_A				-11:	3
		NR_FDD_FR1_B				-112	5
Note2		NR_TDD_FR1_C	dBm/SCS				2
oc oc	Config 3	NR_FDD_FR1_D,		-90)	444	_
		NR_TDD_FR1_D				-111	.5
		NR_FDD_FR1_E,				-11 ⁻	1
		NR_TDD_FR1_E					•
			1			4.4	
		NR_FDD_FR1_G				-110	
Ê /I			dB	0	-3 10	-109	.5
$\frac{\hat{E}_{s}/I_{ot}}{\hat{F}_{s}/N}$		NR_FDD_FR1_G	dB dB	0	-3.19	-109 -5.46	.5 -5.46
$\frac{\hat{E}_{s}/I_{ot}}{\hat{E}_{s}/N_{oc}}$		NR_FDD_FR1_G NR_FDD_FR1_H	dB dB	0 4.54	-3.19 2.66	-109	.5
		NR_FDD_FR1_G	+			-109 -5.46	.5 -5.46
		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A	+			-109 -5.46 -4	.5 -5.46 -4
	Config	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C	+			-109 -5.46 -4 -120	.5 -5.46 -4 -120
	Config	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	+		2.66	-109 -5.46 -4 -120 -119.5 -119	-5.46 -4 -120 -119.5 -119
	Config 1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	+	4.54		-109 -5.46 -4 -120 -119.5	.5 -5.46 -4 -120 -119.5
		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	+	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119	-5.46 -4 -120 -119.5 -119
Ê , /N oc		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E	+	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118	-5.46 -4 -120 -119.5 -119 -118.5
Ê , /N oc		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	dB	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117	-5.46 -4 -120 -119.5 -119 -118.5 -118
Ê , /N oc SS- RSRPNot		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E	+	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118	-5.46 -4 -120 -119.5 -119 -118.5
Ê , /N oc		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_FDD_FR1_A, NR_TDD_FR1_A	dB	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117	-5.46 -4 -120 -119.5 -119 -118.5 -118
Ê , /N oc SS- RSRPNot		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dB	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117
Ê , /N oc SS- RSRPNot		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E, NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dB	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116.5
Ê , /N oc SS- RSRPNot		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	dB	4.54	2.66	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_D	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -117 -116.5 -116 -115.5	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116.5 -116.5 -116.5
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116.5
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -115.5 -115 -114
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_TDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -117 -116.5 -117 -116.5 -116 -115.5	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -116.5 -115.5
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -115.5 -115 -114
Ê , /N oc SS- RSRPNot	1,2	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -115.5 -115 -114
Ê s /N oc SS- RSRPNot e3	Config 3	NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_TDD_FR1_C	dB dBm/SCS	-88.46 -85.46	- 90.34 - 87.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5
Ê , /N oc SS- RSRPNot	Config 3	NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_TDD_FR1_C	dB	-88.46	2.66 - 90.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116.5 -115.5 -115 -114
Ê s /N oc SS- RSRPNot e3	Config 3	NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_FDD_FR1_C NR_TDD_FR1_C	dB dBm/SCS	-88.46 -85.46	- 90.34 - 87.34	-109 -5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5	-5.46 -4 -120 -119.5 -119 -118.5 -118 -117 -116.5 -116 -115.5 -115 -114 -113.5

		NR_FDD_FR1_E,				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H				
		NR_FDD_FR1_A,			-85.51	
		NR_TDD_FR1_A NOTE 6				
		NR_FDD_FR1_B			-85.01	
	Config	NR_TDD_FR1_C			-84.51	
		NR_FDD_FR1_D,	dBm/	-57.5	-84.01	
	1,2	NR_TDD_FR1_D	9.36MHz			
		NR_FDD_FR1_E,			-83.51	
		NR_TDD_FR1_E				
		NR_FDD_FR1_G			-82.51	
Io ^{Note3}		NR_FDD_FR1_H			-82.01	
		NR_FDD_FR1_A,			-79.41	
		NR_TDD_FR1_A NOTE 6				
		NR_FDD_FR1_B			-78.91	
		NR_TDD_FR1_C	dBm/		-78.41	
	Config 3	NR_FDD_FR1_D,	38.16MHz	-51.41	-77.91	
		NR_TDD_FR1_D	30. TOIVII 12			
		NR_FDD_FR1_E,			-77.41	
		NR_TDD_FR1_E				
		NR_FDD_FR1_G			-76.41	
		NR_FDD_FR1_H			-75.91	
Propagatio	n condition		-	AWGN		
Antenna co	onfiguration		-	1x2		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

		11-2		Test 1		Test 2		Test 3	
Parame	ter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1		freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode	Config 1	_			FD				
	Config 2,3				TE				
	Config 1	_			Not App				
TDD configuration	Config 2	_			TDDC				
	Config 3				TDDC				
Downlink initial BWP con	figuration				DLBW				
Downlink dedicated BWF	configuration				DLBW				
Uplink initial BWP config	uration				ULBW				
Uplink dedicated BWP co	onfiguration				ULBW	/P.1.1			
DRX Cycle configuration		ms			Not App	olicable			
Gap pattern ID			0	-	0	-	0	-	
TRS Configuration	Config 1		TRS.1.		TRS.1.1		TRS.1.1		
Tivo Comiguration			1 FDD TRS.1.	-	FDD TRS.1.1		FDD TRS.1.1		
	Config 2		1 TDD	-	TDD	-	TDD	-	
	Config 3		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD		
			SR.1.1		SR.1.1		SR.1.1		
	Config 1		FDD		FDD		FDD		
PDSCH Reference			SR.1.1		SR.1.1		SR.1.1		
measurement channel	Config 2		TDD	-	TDD	-	TDD	-	
	0 " 0		SR2.1		SR2.1		SR2.1		
	Config 3		TDD		TDD		TDD		
	Config 1		CR.1.1		CR.1.1		CR.1.1		
	Config 1		FDD	-	FDD	-	FDD		
RMSI CORESET	Config 2		CR.1.1		CR.1.1		CR.1.1		
Reference Channel	Coning 2		TDD		TDD		TDD		
	Config 3		CR2.1		CR2.1		CR2.1		
	Coming C		TDD		TDD		TDD		
	Config 1		CCR.1.		CCR.1.1		CCR.1.1		
		_	1 FDD		FDD	 	FDD		
Dedicated CORESET	Config 2		CCR.1.	-	CCR.1.1	-	CCR.1.1 TDD	-	
Reference Channel		_	1 TDD	-	TDD	<u> </u>			
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2.1 TDD		
00NO D-#	-		1100			1	100		
OCNG Patterns					OF				
SS-RSSI-Measurement	Confin 4				Not App		1		
Time offset with Cell 1	Config 1 Config 2,3	ms	-	3	-	3	-	3	
OMEO C	Config 1	μS			SMTC p				
SMTC configuration Config 2,3					SMTC p	attern 1			
SSB configuration	Config 1,2			·	SSB.				
	Config 3				SSB.2	2 FR1			
	Config 1,2	kHz			15				

PDSCH/PD	OCCH														
	subcarrier spacing			30											
EPRE ratio of PSS to SSS															
	EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS														
			-												
	of PDCCH to PE		dB	0	0	0	0	0	0						
	of PDSCH DMR								,						
	of PDSCH to PD														
	of OCNG DMRS														
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1) NR_FDD_FR1_A													
		NR_TDD_FR1_A						-119	9.5						
		NR_FDD_FR1_B						-11							
Noto?		NR_TDD_FR1_C						-118	3.5						
N Note2	Config 1,2	NR_FDD_FR1_D	dBm/15kHz	-8	8	-108	3.5	-11	8						
		NR_TDD_FR1_D						• •							
		NR_FDD_FR1_E						-117	7.5						
		NR_TDD_FR1_E						111	. F						
		NR_FDD_FR1_G NR_FDD_FR1_H						-116 -11							
		ואר_רטט_רגו_ח						-11	O						
Note2	Config 1,2		-88				-88 -108.5		3.5	Same as 15k					
IV oc		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS					-116	6.5						
		NR_FDD_FR1_B NR_TDD_FR1_C						-116 -115.5							
	Config 3	NR_FDD_FR1_D		-8	-85 -105.5										
	oomig o	NR_TDD_FR1_D					-11	5							
		NR_FDD_FR1_E					4.4	4.5							
		NR_TDD_FR1_E												-114	1.5
		NR_FDD_FR1_G												-114	4.5
		NR_FDD_FR1_H]					-11	3						
\hat{E}_s/I_{ot}			dB	-1.75	-1.75	20	20	-4.0	-4.0						
\hat{E}_s/N_{oc}		NR_FDD_FR1_A	dB	-1.	75	20)	-4.0							
		NR_TDD_FR1_A NOTE 6						-123.5							
		NR_FDD_FR1_B						-12							
	0	NR_TDD_FR1_C			75		_	-122	2.5						
	Config 1,2	NR_FDD_FR1_D		-89.75		-88	.5	-12	22						
		NR_TDD_FR1_D NR_FDD_FR1_E	1												
		NR_TDD_FR1_E						-12 ²	1.5						
SS-		NR_FDD_FR1_G						-120).5						
RSRP		NR_FDD_FR1_H	dBm/SCS					-12							
Note3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-120							
	0 " -	NR_FDD_FR1_B		_		_	_	-12							
	Config 3	NR_TDD_FR1_C		-86	.75	-85	.5	-119	9.5						
		NR_FDD_FR1_D NR_TDD_FR1_D						-11	9						
		NR_FDD_FR1_E NR_TDD_FR1_E						-118.5							

		NR_FDD_FR1_G				-117.5	
		NR_FDD_FR1_H				-117	
,		NR_FDD_FR1_A					
		NR_TDD_FR1_A					
		NOTE 6					
		NR_FDD_FR1_B					
00 0111011	0403	NR_TDD_FR1_C				4.0	
SS-SINR ^N	otes	NR_FDD_FR1_D	dB	-1.75	20	-4.0	
		NR_TDD_FR1_D NR_FDD_FR1_E					
		NR_FDD_FR1_E					
		NR FDD FR1 G					
		NR_FDD_FR1_H					
		NR_FDD_FR1_A					
		NR_TDD_FR1_A		-57.83		-90.09	
		NOTE 6					
		NR_FDD_FR1_B				-89.59	
		NR_TDD_FR1_C	dBm/			-89.09	
	Config 1,2	NR_FDD_FR1_D	9.36MHz		-60.5	-88.59	
		NR_TDD_FR1_D	3.30ivii 12			00.00	
		NR_FDD_FR1_E				-88.09	
		NR_TDD_FR1_E				07.00	
		NR_FDD_FR1_G NR_FDD_FR1_H				-87.09 -86.59	
Io ^{Note3}		NR_FDD_FR1_A				-00.59	
		NR_TDD_FR1_A				-84	
		NOTE 6				01	
		NR_FDD_FR1_B				-83.5	
		NR_TDD_FR1_C	al Direc /			-83	
	Config 3	NR_FDD_FR1_D	dBm/ 38.16MHz	-51.73	-54.41	-82.5	
		NR_TDD_FR1_D	30. 10IVII 12			-02.5	
		NR_FDD_FR1_E				-82	
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-81	
Dropogetic	n condition	NR_FDD_FR1_H			AVA/CNI	-80.5	
	on condition		-		AWGN 1x2		
	onfiguration	a used such that hoth		llocated and a con-		d nowar anastral	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.4 L1-RSRP measurement for beam reporting

A.6.7.4.1 SSB based L1-RSRP measurement

A.6.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.6.7.4.1.1-1.

Table A.6.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1

Table A.6.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
	1		FDD	FDD
Duplex mode	2	1	TDD	TDD
	3	1	TDD	TDD
	1		N/A	N/A
TDD Configuration	2	-		·
TDD Configuration		1	TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
	1	_	10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3		SR.2.1 TDD	SR.2.1 TDD
DMOLOODEOFT D (1		CR.1.1 FDD	CR.1.1 FDD
RMSI CORESET Reference	2		CR.1.1 TDD	CR.1.1 TDD
Channel	3	1	CR.2.1 TDD	CR.2.1 TDD
	1	1	CCR.1.1 FDD	CCR.1.1 FDD
Dedicated CORESET				
Reference Channel	2	4	CCR.1.1 TDD	CCR.1.1 TDD
	3		CCR.2.1 TDD	CCR.2.1 TDD
	1]	SSB.3 FR1	SSB.3 FR1
SSB configuration	2		SSB.3 FR1	SSB.3 FR1
_	3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~3		OP.1	OP.1
	- ' -		DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~3			
-	4		ULBWP.0.1	ULBWP.0.1
	1	_	TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicated DWD configuration	4.0		DLBWP.1.1	DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3			slot80
	1~3		slot80	SIOIOU
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH DWRS to SSS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0	0
EPRE ratio of PDSCH to PDSCH	11:3			
DMRS				
EPRE ratio of OCNG DMRS to				
SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				
NR_FDD_FR1_A,				
NR_TDD_FR1_A NOTE 5				-117
NR FDD FR1 B				-116.5
	}			
NR_TDD_FR1_C	4.6	-ID.: /45111	24.05	-116
NR_FDD_FR1_D, NR_TDD_FR1_D	1~3	dBm/15kHz	-94.65	-115.5
NR_FDD_FR1_E,				-115
NR_TDD_FR1_E				
NR_FDD_FR1_G				-114
NR_FDD_FR1_H				-113.5
NR_FDD_FR1_A,		dBm/SSB		
Note2 NR_TDD_FR1_A	1,2	dBm/SSB SCS	-94.65	-117
NR_FDD_FR1_B				-116.5

				T	T
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,				1155
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-114
	NOTE 5				1
	ND EDD ED4 D				440.5
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,	3		-91.65	440.5
	NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-112
					444
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
f:/r		4.0	j	40	
$\hat{E}_{_{\!s}}/I_{_{\!ot}}$		1~3	dB	10	-3
	ND EDD ED4 V		1		
	NR_FDD_FR1_A,				400
	NR_TDD_FR1_A		1		-120
			1		
	NR_FDD_FR1_B		1		-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,	1,2		-84.65	110
		1,2		-64.03	-118.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E				110
	NR_FDD_FR1_G				-117
SSB	NR_FDD_FR1_H		dBm/SSB		-116.5
RSRP					-110.5
Note3	NR_FDD_FR1_A,		SCS		4.47
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3		-81.65	110
		3		-61.05	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				110
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				1 10.0
			1		07.00
	NR_TDD_FR1_A		1		-87.28
	NOTE 5				
	NR_FDD_FR1_B		1		-86.78
	NR_TDD_FR1_C		dBm/9.36		-86.28
	NR_FDD_FR1_D,	1,2	MHz	-56.28	
	NR_TDD_FR1_D	1,2	'\'' '2	00.20	-85.78
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				
	NR_FDD_FR1_G		1		-84.28
I Notes	NR_FDD_FR1_H				-83.78
lo Note3	NR_FDD_FR1_A,		1		
					91 10
	NR_TDD_FR1_A				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dD/00.40		-80.19
	NR_FDD_FR1_D,	3	dBm/38.16	-50.19	
	NR_TDD_FR1_D		MHz	33.10	-79.69
	NR_FDD_FR1_E,		1		-79.19
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
L	<u> </u>		1	l	

\hat{E}_s/N_{oc}		1~3	dB	10	-3
Propagat	ion condition	1~3		AWGN	AWGN
Antenna	configuration	1~3		1x2	1x2
Note 1: Note 2:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.				s assumed to be
Note 3:					ation purposes.
Note 4: RSRP minimum requirements are specified assuming independent interference and n at each receiver antenna port.				ference and noise	
Note 5:	•		pport for band n	51 and it is not require	ed to run this test

A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

on band n51 in this release of the specification.

A.6.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

	Parameter	Config	Unit	Test 1	Test 2
SSB GS0	CN	1~3		freq1	freq1
		1		FDD	FDD
Duplex m	node	2		TDD	TDD
		3		TDD	TDD
		1		N/A	N/A
TDD Cor	nfiguration	2	1	TDDConf.1.1	TDDConf.1.1
		3		TDDConf.2.1	TDDConf.2.1
		1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}		2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
		3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH	Reference	1		SR.1.1 FDD	SR.1.1 FDD
	ment channel	2		SR.1.1 TDD	SR.1.1 TDD
		3		SR.2.1 TDD	SR.2.1 TDD
RMSI CC	ORESET Reference	1		CR.1.1 FDD	CR.1.1 FDD
Channel	DIVEOUT Reference	2		CR.1.1 TDD	CR.1.1 TDD
Chamer		3		CR.2.1 TDD	CR.2.1 TDD
Dodinata	d CORESET	1		CCR.1.1 FDD	CCR.1.1 FDD
	ce Channel	2		CCR.1.1 TDD	CCR.1.1 TDD
Kelelelic	e Chamei	3		CCR.2.1 TDD	CCR.2.1 TDD
		1		SSB.3 FR1	SSB.3 FR1
SSB con	figuration	2	1	SSB.3 FR1	SSB.3 FR1
	3	3		SSB.4 FR1	SSB.4 FR1
OCNG P	atterns	1~3		OP.1	OP.1
33.13.		1		TRS.1.1 FDD	TRS.1.1 FDD
TRS con	figuration	2		TRS.1.1 TDD	TRS.1.1 TDD
1110 0011	ngaration	3		TRS.1.2 TDD	TRS.1.2 TDD
				DLBWP.0.1	DLBWP.0.1
Initial BW	/P Configuration	1~3		ULBWP.0.1	ULBWP.0.1
				DLBWP.1.1	DLBWP.1.1
Dedicate	d BWP configuration	1~3		ULBWP.1.1	ULBWP.1.1
SMTC cc	onfiguration	1~3		SMTC.1	SMTC.1
OWITO CC	7 mgaration	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS		2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
COI-ICO		3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
roportCo	nfiaTypo	1~3		periodic	
reportCo		1~3			periodic
reportQu				cri-RSRP	cri-RSRP
	of reported RS	1~3		2	2
	reporting period	1~3		slot80	slot80
EPRE fallo	o of PSS to SSS o of PBCH DMRS to SSS				
	o of PBCH to PBCH DMRS				
	o of PDCCH DMRS to SSS				
EPRE ratio	o of PDCCH to PDCCH				
DMRS					
	of PDSCH DMRS to SSS	1~3	dB	0	0
DMRS	of PDSCH to PDSCH				
	o of OCNG DMRS to				
SSSNote 1					
EPRE ration DMRS Note	o of OCNG to OCNG				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~3	dBm/15kHz	-94.65	11E F
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				-110
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	· – –			•	•

	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2		-94.65	-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G		dBm/CSI-RS		-114
N_{oc}	NR_FDD_FR1_H		SCS		-113.5
Note2	NR_FDD_FR1_A,		000		
	NR_TDD_FR1_A NOTE 5				-114
	NR_FDD_FR1_B				-113.5
	NR TDD FR1 C				-114
	NR_FDD_FR1_D,	3		-91.65	
	NR_TDD_FR1_D	Ü		01.00	-112.5
	NR_FDD_FR1_E,				
	NR TDD FR1 E				-112
	NR FDD FR1 G				-111
	NR_FDD_FR1_H				-110.5
- Ĉ /r	וואוי_וטט וואו_וו	4.0	i.	40	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	ND EDD ED4 A	1~3	dB	10	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-120
	NR_FDD_FR1_B		dBm/CSI-RS SCS		-119.5
	NR_TDD_FR1_C				-119
	NR FDD FR1 D,	1,2		-84.65	440.5
	NR_TDD_FR1_D	-,-			-118.5
	NR_FDD_FR1_E,				
	NR TDD FR1 E				-118
	NR FDD FR1 G				-117
CSI-RS	NR FDD FR1 H				-116.5
RSRP					-110.3
Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3		-81.65	
	NR_TDD_FR1_D,	3		201.00	-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E,				-115
					444
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H		1		-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-87.28
	NR FDD FR1 B				-86.78
	NR_TDD_FR1_C		dDm/0.00		
		4.0	dBm/9.36	EC 00	-86.28
	NR_FDD_FR1_D,	1,2	MHz	-56.28	-85.78
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				
La Noto?	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A,				04.40
	NR_TDD_FR1_A NOTE 5				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dBm/38.16		-80.19
	NR_FDD_FR1_D,	3	MHz	-50.19	
	NR_TDD_FR1_D				-79.69
	NR_FDD_FR1_E,				70.40
	NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19

	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}		1~3	dB	10	-3
Propagat	ion condition	1~3		AWGN	AWGN
Antenna	configuration	1~3		1x2	1x2
Note 1:	OCNG shall be used s	such that bot	h cells are fully a	allocated and a consta	nt total
	transmitted power spe				
Note 2:	Interference from other				
	constant over subcarri	ers and time	and shall be me	odelled as AWGN of a	ppropriate power
	for N_{oc} to be fulfilled				
Note 3:	RSRP and lo levels ha	ave been de	rived from other	parameters for informa	ation purposes.
They are not settable parameters themselves.					
Note 4: RSRP minimum requirements are specified assuming independent interference and				erence and noise	
at each receiver antenna port.					
Note 5: The test configuration excludes support for band n51 and it is not required to run this			d to run this test		

A.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.19.2.

A.6.7.5 E-UTRAN RSRP

A.6.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell

on band n51 in this release of the specification.

A.6.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.2 for SA inter-RAT E-UTRAN RSRP measurements.

A.6.7.5.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.5.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRP are tested by using the parameters in A.6.7.5.1.2-2 and A.6.7.5.1.2-3.

Table A.6.7.5.1.2-1: Inter-RAT E-UTRAN RSRP supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.5.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Duplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
	Config 1, 4		10: N _{RB,c} = 52 (FDD)	
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)	
	Config 3, 6		40: N _{RB,c} = 106 (TDD)	
Gap pattern Id	<u> </u>		0	
	Config 1, 4		SR.1.1 FDD	
PDSCH reference measurement	Config 2, 5	1	SR.1.1 TDD	
channel	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5	1	CR.1.1 TDD	
CONCET TOTOTOTION OF ANIMAL	Config 3, 6	†	CR.2.1 TDD	
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD	
COLING for tracking	Config 2, 5	-	TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
	Initial DL BWP		DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP		ULBWP.0.1	
	Dedicated UL BWP		ULBWP.1.1	
OONO " Note1	Dedicated OL BWP			
OCNG pattern ^{Note1}			OP.1	
SMTC configuration			SMTC.1	
SSB configuration	Config 1, 2, 4, 5 Config 3, 6	 	SSB.1 FR1 SSB.2 FR1	
EDDE ratio of DCC to CCC	Coning 3, 6		33D.2 FK1	
EPRE ratio of PSS to SSS	`			
EPRE ratio of PBCH_DMRS to SSS		dB	٠	
EPRE ratio of PBCH to PBCH_DMF				
EPRE ratio of PDCCH_DMRS to S				
EPRE ratio of PDCCH to PDCCH_I			0	
EPRE ratio of PDSCH_DMRS to SS				
EPRE ratio of PDSCH to PDSCH_E				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DM	RS			
N _{oc} Note2	T =	dBm/15 kHz	-104	
Noc Note2	Config 1, 2, 4, 5	dBm/SCS	-104	
	Config 3, 6		-101	
Ê _s /N _{oc}		dB	17	
Ê _s /I _{ot} Note3		dB	17	
SS-RSRP ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87	
	Config 3, 6	UDITI/OCO	-84	
SSB_RP ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87	
	Config 3, 6	ubili/303	-84	
Io ^{Note3}	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
10	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition			AWGN	
Antenna Configuration and Correlat	ion Matrix		1x2	
		Illy allocated and a co	onstant total transmitted power	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

E-UTRA RF channel number	Parar	neter	Unit	Се	II 2
Duplex mode			Test 1		Test 2
TDD special subframe		per		•	1
TDD special subtries	Duplex mode	Config 1, 2, 3			
Config 4, 5, 6 6					
TDD uplink-downlink					
Description Description					
BW-thereoid BMHz S.MHz: Neac = 25 10 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: Neac = 50 20 MHz: R.11 FDD				N/	/A
10 MHz: Nasc = 50		Config 4, 5, 6			1
PDSCH parameters: DL Reference Measurement ChannelNovaz	BWchannel		MHz		
PDSCH parameters:					
D. Reference Measurement Channell-Nove FOFCICH/PDCDCH/PHICH Parameters: Config 1, 2, 3 1.0 MHz: R.6 FDD 20 MHz: R.10 FDD 10 MHz: R.6 FDD 20 MHz: R.10 TDD 10 MHz: R.6 FDD 20 MHz: R.10 TDD 20 MHz: CP.14 FDD 20 MHz: CP.14 FDD 20 MHz: CP.10 TDD 20 MHz: CP.2 TDD 20 MHz: CP				20 MHz: N	I _{RB,c} = 100
PGFICH/PDCCH/PHICH parameters		nt ChannalNote2		•	=
Darameters: 10 MHz: R6 FDD 20 MHz: R10 FDD				Г МI I Г) 44 EDD
DL Reference Config 4, 5, 6 S MHz: R.10 FDD		Config 1, 2, 3			
Measurement Channel/Note2	•				
ChannelNote2		Config 4 F 6	-		
Config 1, 2, 3 S MHz: R 10 TDD		Config 4, 5, 6			
Config 1, 2, 3	Onarinei				
10 MHz: OP.6 FDD 20 MHz: OP.14 FDD 20 MHz: OP.14 FDD 20 MHz: OP.10 TDD 10 MHz: OP.2 TDD 10 MHz: OP.2 TDD 10 MHz: OP.2 TDD 20 MHz: OP.8 TDD 20 MHz:	OCNG Patterns Note2	Config 1 2 3			
Config 4, 5, 6 Conf	CONOT attorns	Joining 1, 2, 3			
Config 4, 5, 6 S MHz: OP.10 TDD 10 MHz: OP.2 TDD 20 MHz: OP.2 TDD 20 MHz: OP.2 TDD 20 MHz: OP.8 TDD					
PBCH_RA PBCH_RB PSS RA SSS_RA PCFICH_RB PHICH_RA PHICH_RB PDCCH_RA PDCCH_RA PDCCH_RB PDSCH_RA PDSCH_RA PDSCH_RA PDSCH_RB OCNG_RA ^{Notos} OCNG_RB ^{Notos} Bands FDD_B, Note 10 Bands FDD_C, TDD_C Bands FDD_E, FDD_F, Note 7, TDD_E Bands FDD_B, DG Note 8 Bands FDD_H Bands FDD_H Bands FDD_H Bands FDD_H Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B Bands FDD_B, Note 9, TDD_B, Note 9, Note 9, TDD_B, Note 9, Not		Config 4 5 6	}		
BBCH_RA BBCH_RB PSS_RA SSS_RA PCFICH_RB		301111g 1, 0, 0			
PBCH_RB					
PBCH_RB PSS_RA SSS_RA PCFICH_RB PHICH_RA PHICH_RB PDCCH_RA PDCCH_RA PDSCH_RA PDSCH_RA PDSCH_RB PDSCH_R	PBCH RA	1		-	-
SSS RA PCFICH RB PCFICH RB					
SSS RA PCFICH RB PCFICH RB					
FCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA			dB	0	
PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3					
PDSCH_RA PDSCH_RB OCNG_RANote3 OCNG_RBNote3	PDCCH_RB				
DCNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote3 CNG_RBNote5 CNG_RBNote5 CNG_RBNOTE5	PDSCH_RA				
Bands FDD_A Note 9					
Bands FDD_A Note 9, TDD_A	OCNG_RA ^{Note3}				
TDD_A Bands FDD_B1, FDD_B2 Note 10 -116.5 Roc_Note4 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_B1, FDD_B Bands FDD_A Note 9, TDD_A Bands FDD_D Bands FDD_D Bands FDD_B -120.5 RSRPNote5 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_B FDD_B Bands FDD_B -119.5 Bands FDD_B Bands FDD_	OCNG_RB ^{Note3}				
NocNote4 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C		Bands FDD_A Note 9,			-117
FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_B1 Bands FDD_B1					-117
Noc Note4 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E					-116.5
Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_H Bands FDD_H Bands FDD_A Note 9 TDD_A Bands FDD_D Bands FDD_D Bands FDD_D Bands FDD_D Bands FDD_E FDD_F Note 7, TDD_E Bands FDD_D Bands FDD_B -120.5 Bands FDD_D Bands FDD_E -119.5 Bands FDD_G Note 8 Bands FDD_H Bands FDD_H Bands FDD_A Note 9 -118 Bands FDD_A Note 9 -117.5 Bands FDD_A Note 9 -121 Bands FDD_A Note 9 -118 Bands FDD_A Note 9 -121 Ba				-91.65	
Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Es/Noc Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_D Bands FDD_C, TDD_C Bands FDD_E Bands FDD_E Bands FDD_B1, FDD_B2 Note 10 Bands FDD_B Bands FDD_B Bands FDD_C, TDD_C Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H SCH PPNote5 Bands FDD_A Note 9, CBM PPNote5 Bands FDD_A Note 9, CBM PPNote5 Bands FDD_A Note 9, CBM PPNote5 Bands FDD_A Note 9, CBM PPNote5 Bands FDD_A Note 9, CBM PPNote5	Noce4		dBm/15kHz		
Note 7, TDD_E Bands FDD_G Note 8 -114 Bands FDD_H -113.5 Es/Noc dB 10 -4 Es/Iot Note5 dB 10 -4 Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_D Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_A Note 9 Bands FDD_H -117.5 Bands FDD_A Note 9 Bands FDD_A No	1 100		G.Z, 101		-115.5
Bands FDD_G Note 8 -114 Bands FDD_H					-115
Bands FDD_H		Devide FDD O Moto 9			
Bands FDD_A Note 9					
Bands FDD_A Note 9	Ê /N	Bands FDD_H	4ID	40	
RSRPNote5 Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9, CB Band					
TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9	⊏s/Iot ¹¹⁰⁰⁰	Panda EDD A Note 9	aB	10	-4
RSRPNote5 Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9, Bands FDD_A No					-121
RSRPNote5 RSRPNote5 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_B Note 9 Bands FDD_					
RSRPNote5 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_B Bands FDD_F, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9, Bands FDD_A					-120.5
Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H Bands FDD_A Note 9, Bands FDD_A					-120
Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H SCH_PDNote5 Bands FDD_A Note 9, CREATER A STATE OF THE PROOF STATE OF THE PRO	RSRP ^{Note5}		dBm/15kHz	-81.65	
Note 7, TDD_E					
Bands FDD_G Note 8 Bands FDD_H -118 -117.5 SCH_RDNote5 Bands FDD_A Note 9, dBm/15kHz -81.65 -121					-119
Bands FDD_H -117.5 SCH_PDNote5 Bands FDD_A Note 9, dBm/15kHz -81.65 -121					-118
SCH_PDNote5 Bands FDD_A Note 9, dBm/15kHz -81.65 -121					
	Note 5				
1 100 //	SCH_RP ^{Note5}	TDD_A	dBm/15kHz	-81.65	-121

	Bands FDD_B1, FDD_B2 Note 10			-120.5
	Bands FDD_C, TDD_C			-120
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F			-119
	Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9,			-87.76 +
	TDD_A			10log(N _{RB,c} /50)
	Bands FDD_B1,			-87.26 +
	FDD_B2 Note 10			10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C			-86.76 +
	Bands FDD_C, TDD_C			10log(N _{RB,c} /50)
IoNote5	Bands FDD D	dBm/Ch BW	-53.45 +	-86.26 +
10		abili/Oli bvv	10log(N _{RB,c} /50)	10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F			-85.76 +
	Note 7, TDD_E			10log(N _{RB,c} /50)
	Bands FDD_G Note 8			-84.76 +
	Darids i DD_G			10log(N _{RB,c} /50)
	Bands FDD H			-84.26 +
	Danas i DD_II			10log(N _{RB,c} /50)
Propagation Condition	Propagation Condition		AWGN	
Antenna Configuration and	Correlation Matrix		1)	(2

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.5.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRP measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.2.

A.6.7.6 E-UTRAN RSRQ

A.6.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.3 for SA inter-RAT E-UTRAN RSRQ measurements.

A.6.7.6.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.6.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRQ are tested by using the parameters in A.6.7.6.1.2-2 and A.6.7.6.1.2-3.

Table A.6.7.6.1.2-1: Inter-RAT E-UTRAN RSRQ supported test configurations with FR1 serving cell

Configuration	Description		
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD		
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD		
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD		
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD		
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD		
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD		
Note: The UE is	only required to be tested in one of the supported test configurations		

Table A.6.7.6.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Duplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
· ·	Config 3, 6		TDDConf.1.2	
	Config 1, 4		10: N _{RB,c} = 52 (FDD)	
BWchannel	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)	
	Config 3, 6	1	40: N _{RB,c} = 106 (TDD)	
Gap pattern Id	J - , -		0	
• •	Config 1, 4		SR.1.1 FDD	
PDSCH reference measurement	Config 2, 5	†	SR.1.1 TDD	
channel	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5	1	CR.1.1 TDD	
CONCET TOTOTOTICS CHAINIC	Config 3, 6	 	CR.2.1 TDD	
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD	
CSI-ICS for tracking	Config 1, 4	-	TRS.1.1 TDD	
	Config 3, 6	 		
	Initial DL BWP		TRS.1.2 TDD DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	
BWP configurations				
•	Initial UL BWP		ULBWP.0.1	
O O N I O W Noted	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern ^{Note1}			OP.1	
SMTC configuration	T		SMTC.1	
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
EPRE ratio of PSS to SSS		<u> </u>		
EPRE ratio of PBCH_DMRS to SS		_		
EPRE ratio of PBCH to PBCH_DMI		dB		
EPRE ratio of PDCCH_DMRS to S			0	
EPRE ratio of PDCCH to PDCCH_I				
EPRE ratio of PDSCH_DMRS to S	SS			
EPRE ratio of PDSCH to PDSCH_[DMRS			
EPRE ratio of OCNG DMRS to SS	3			
EPRE ratio of OCNG to OCNG DM	RS			
Noc ^{Note2}		dBm/15 kHz	-104	
N _{oc} Note2	Config 1, 2, 4, 5	dDm/CCC	-104	
Nocholez	Config 3, 6	dBm/SCS —	-101	
Ês/Noc	, ,	dB	17	
Ê _s /l _{ot} ^{Note3}		dB	17	
SS-RSRQ ^{Note3}	Config 1, 2, 4, 5		-87	
	Config 3, 6	dBm/SCS —	-84	
OOD DENGES	Config 1, 2, 4, 5	J. 10.00	-87	
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS	-84	
	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
Io ^{Note3}	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition		GDITI/OU. TO IVILIZ	AWGN	
Antenna Configuration and Correla	ion Matrix		1x2	
Note 1: OCNG shall be used suc				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: \hat{E}_s/I_{ot} , SS-RSRQ, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled

Table A.6.7.6.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parar	neter	Unit		Cell 2	
			Test 1	Test 2	Test 3
E-UTRA RF channel number				1	
Duplex mode	Config 1, 2, 3			FDD	
	Config 4, 5, 6			TDD	
TDD special subframe	Config 1, 2, 3]		N/A	
configuration ^{Note1}	Config 4, 5, 6			6	
TDD uplink-downlink	Config 1, 2, 3			N/A	
configuration ^{Note1}	Config 4, 5, 6			1	
BW _{channel}		MHz		5 MHz: $N_{RB,c} = 25$	5
				$0 \text{ MHz: } N_{RB,c} = 50$	
			2	0 MHz : $N_{RB,c} = 10$	00
PDSCH parameters:				-	
DL Reference Measureme PCFICH/PDCCH/PHICH				- MII D 44 EDD	.
	Config 1, 2, 3			5 MHz: R.11 FDD	
parameters: DL Reference				10 MHz: R.6 FDD 20 MHz: R.10 FD[
Measurement	Config 4, 5, 6	1		5 MHz: R.11 TDD	
Channel ^{Note2}	Coning 4, 5, 6			5 MHz. R. 11 TDD 10 MHz: R.6 TDD	
Charine				20 MHz: R.10 TD[
OCNG Patterns ^{Note2}	Config 1, 2, 3			MHz: OP.19 FDI	
CONC I allems	Joining 1, 2, 3			0 MHz: OP.6 FDI	
				0 MHz: OP.14 FD	
	Config 4, 5, 6	1		MHz: OP.10 TDI	
	Coming 1, c, c			0 MHz: OP.2 TDI	
				0 MHz: OP.8 TDI	
PBCH_RA					
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA			dB 0		
PHICH_RB		dB			
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
	Bands FDD_A Note 9,				-119.5
	TDD_A]			-119.5
	Bands FDD_B1,				-119
	FDD_B2 Note 10]			
N _{oc} Note4	Bands FDD_C, TDD_C	dBm/15kHz	-83	-104.70	-118.5
INC	Bands FDD_D	GDIII/ IJKI IZ	-03	-104.70	-118
	Bands FDD_E, FDD_F				-117.5
	Note 7, TDD_E]			
	Bands FDD_G Note 8]			-116.5
<u> </u>	Bands FDD_H				-116
Ê _s /N _{oc}		dB	-1.75	-4.0	-4.0
Ês/Iot ^{Note5}	T	dB	-1.75	-4.0	-4.0
	Bands FDD_A Note 9,				-123.5
	TDD_A	-			
	Bands FDD_B1,			-108.70	-123
	FDD_B2 Note 10	4			
RSRP ^{Note5}	Bands FDD_C, TDD_C	dBm/15kHz	-84.75		-122.5
	Bands FDD_D		_		-122
	Bands FDD_E, FDD_F				-121.5
	Note 7, TDD_E	-			
	Bands FDD_G Note 8	-			-120.5
	Bands FDD_H	-			-120
RSRQ ^{Note5}	Bands FDD_A Note 9,	dB	-14.76	-16.25	-16.25
	TDD_A				

	Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H				-90.26 +
	Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10				10log(N _{RB,c} /50) -89.76 + 10log(N _{RB,c}
	Bands FDD_C, TDD_C		50.	75.40	/50) -89.26 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53 + 10log(N _{RB,c} /50)	-75.46 + 10log(N _{RB,c} /50)	-88.76 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-88.26 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-87.26 + 10log(N _{RB,c} /50)
	Bands FDD_H				-86.76 + 10log(N _{RB,c} /50)
Propagation Condition				AWGN	
Antenna Configuration and	Correlation Matrix			1x2	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: Ê_s/l_{ot}, RSRP, RSRQ and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.6.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRQ measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.3.

A.6.7.7 E-UTRAN RS-SINR

A.6.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.4 for SA inter-RAT E-UTRAN RS-SINR measurements.

A.6.7.7.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.7.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RS-SINR are tested by using the parameters in A.6.7.7.1.2-2 and A.6.7.7.1.2-3.

Table A.6.7.7.1.2-1: Inter-RAT E-UTRAN RS-SINR supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1	
NR RF channel number			1	
Duplex mode	Config 1, 4		FDD	
Duplex mode	Config 2, 3, 5, 6		TDD	
	Config 1, 4		N/A	
TDD Configuration	Config 2, 5		TDDConf.1.1	
· ·	Config 3, 6		TDDConf.2.1	
	Config 1, 4		10: N _{RB,c} = 52 (FDD)	
BWchannel	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)	
	Config 3, 6		40: N _{RB,c} = 106 (TDD)	
Gap pattern Id	J - , -		0	
	Config 1, 4		SR.1.1 FDD	
PDSCH reference measurement	Config 2, 5	1	SR.1.1 TDD	
channel	Config 3, 6		SR.2.1 TDD	
	Config 1, 4		CR.1.1 FDD	
CORSET reference channel	Config 2, 5	 	CR.1.1 TDD	
OCHOET Telefelies sharifiel	Config 3, 6		CR.2.1 TDD	
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD	
CSI-ICS for tracking	Config 2, 5	-	TRS.1.1 TDD	
		 	TRS.1.2 TDD	
	Config 3, 6 Initial DL BWP		DLBWP.0.1	
	Dedicated DL BWP		DLBWP.1.1	
BWP configurations	Initial UL BWP			
•			ULBWP.0.1	
O O N O Noted	Dedicated UL BWP		ULBWP.1.1	
OCNG pattern ^{Note1}			OP.1	
SMTC configuration	T =		SMTC.1	
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
EPRE ratio of PSS to SSS		-		
EPRE ratio of PBCH_DMRS to SS				
EPRE ratio of PBCH to PBCH_DMI		dB		
EPRE ratio of PDCCH_DMRS to S			0	
EPRE ratio of PDCCH to PDCCH_I				
EPRE ratio of PDSCH_DMRS to S	SS			
EPRE ratio of PDSCH to PDSCH_[DMRS			
EPRE ratio of OCNG DMRS to SS	3			
EPRE ratio of OCNG to OCNG DM	RS			
Noc ^{Note2}		dBm/15 kHz	-104	
N _{oc} Note2	Config 1, 2, 4, 5		-104	
Nocholez	Config 3, 6	dBm/SCS —	-101	
Ês/Noc	, <u>,</u>	dB	17	
Ê _s /I _{ot} Note3		dB	17	
SS-RS-SINR ^{Note3}	Config 1, 2, 4, 5		-87	
	Config 3, 6	dBm/SCS —	-84	
OOD DENGES	Config 1, 2, 4, 5	ID (6.5.5	-87	
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS —	-84	
	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96	
Io ^{Note3}	Config 3, 6	dBm/38.16 MHz	-52.87	
Propagation condition		GDITI/OU. TO IVILIZ	AWGN	
Antenna Configuration and Correlate	ion Matrix		1x2	
Note 1: OCNG shall be used suc		<u>. </u>		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled

Note 3: Ê_s/I_{ot}, SS-RS-SINR, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parar	neter	Unit		Cell 2		
			Test 1	Test 2	Test 3	
E-UTRA RF channel number				1		
Duplex mode	Config 1, 2, 3			FDD		
	Config 4, 5, 6			TDD		
TDD special subframe	Config 1, 2, 3]		N/A		
configuration ^{Note1}	Config 4, 5, 6			6		
TDD uplink-downlink	Config 1, 2, 3			N/A		
configuration ^{Note1}	Config 4, 5, 6			1		
BW _{channel}		MHz		5 MHz: N _{RB,c} = 25	5	
				0 MHz: $N_{RB,c} = 5$		
			2	$0 \text{ MHz: } N_{RB,c} = 10$	00	
PDSCH parameters:	- 1 Ol INote?			-		
DL Reference Measureme				C MILE: D 44 EDE	`	
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDD		
parameters:				10 MHz: R.6 FDD		
DL Reference Measurement	Config 4 F 6	-		20 MHz: R.10 FDI 5 MHz: R.11 TDD		
Channel ^{Note2}	Config 4, 5, 6			5 MHz. R. 11 TDL 10 MHz: R.6 TDD		
Chamilei				20 MHz: R.10 TDI		
OCNG Patterns ^{Note2}	Config 1, 2, 3			MHz: OP.19 FD		
CONG I allellis	Coming 1, 2, 3			0 MHz: OP.19 FD		
				0 MHz: OP.14 FD		
	Config 4, 5, 6	-		MHz: OP.10 TD		
	001111g 4, 5, 0			0 MHz: OP.2 TD		
				0 MHz: OP.8 TD		
PBCH_RA						
PBCH_RB		†				
PSS_RA		1				
SSS_RA		1				
PCFICH_RB		1				
PHICH_RA		1				
PHICH_RB		dB		0		
PDCCH_RA		1				
PDCCH_RB		1				
PDSCH_RA		1				
PDSCH_RB						
OCNG_RA ^{Note3}						
OCNG_RB ^{Note3}		1				
	Bands FDD_A Note 9,				110 5	
	TDD_A				-119.5	
	Bands FDD_B1,				110	
	FDD_B2 Note 10]			-119	
N _{oc} Note4	Bands FDD_C, TDD_C	dBm/15kHz	-88	-108.50	-118.5	
INOC	Bands FDD_D	UDIII/ IOKEZ	-00	-100.00	-118	
	Bands FDD_E, FDD_F				-117.5	
	Note 7, TDD_E]				
	Bands FDD_G Note 8]			-116.5	
A	Bands FDD_H				-116	
CRS Ê _s /N _{oc1}		dB	-1.75	20.0	-4.0	
CRS Ê _s /I _{ot} Note5		dB	-1.75	20.0	-4.0	
	Bands FDD_A Note 9,				-123.5	
	TDD_A]			120.0	
	Bands FDD_B1,				-123	
	FDD_B2 Note 10					
RSRP ^{Note5}	Bands FDD_C, TDD_C	dBm/15kHz	-89 75	-88.50	-122.5	
		dBm/15kHz	-89.75	00.00	-122	
	Bands FDD_D	-{				
	Bands FDD_E, FDD_F	-			-121.5	
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5	
	Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8				-120.5	
	Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H					
RS-SINR ^{Note5}	Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8	dB	-1.75	20	-120.5	

	Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H					
	Bands FDD_A Note 9, TDD_A				-93.48 + 10log(N _{RB,c} /50) -92.98 +	
	Bands FDD_B1, FDD_B2 Note 10				10log(N _{RB,c} /50)	
	Bands FDD_C, TDD_C				-92.48 + 10log(N _{RB,c} /50)	
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53.79 + 10log(N _{RB,c} /50)	-60.56 + 10log(N _{RB,c} /50)	-91.98 + 10log(N _{RB,c} /50)	
	Bands FDD_E, FDD_F Note 7, TDD_E				-91.48 + 10log(N _{RB,c} /50)	
	Bands FDD_G Note 8				-90.48 + 10log(N _{RB,c} /50)	
	Bands FDD_H				-89.98 + 10log(N _{RB,c} /50)	
Propagation Condition				AWGN		
Antenna Configuration and	Correlation Matrix			1x2		

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc1 to be fulfilled.
- Note 4a: Void
- Note 5: CRS Ê_s/I_{ot}, RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

A.7 NR standalone tests with one or more NR cells in FR2

A.7.1 SA: RRC_IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

A.7.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.7.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2-1: Supported test configurations

C	onfiguration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	
T2 end	Active cell		1, 2	Cell2	
condition	Neighbour cells		1, 2	Cell1	
Final	Active cell		1, 2	Cell1	
condition	Neighbour cell		1, 2	Cell2	
RF Channe	el Number		1, 2	1	
Time offset	between cells		1, 2	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC conf	figuration		1, 2	SMTC.1	
DRX cycle	length	S	1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	stCell		1, 2	Not configured	
T1		S	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2		S	1, 2	135	T2 needs to be defined so that cell reselection reaction time is taken into account.
T3		S	1, 2	35	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.7.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test		Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1, 2	TDDConf.3.1			TDDConf.3.1			
PDSCH RMC		1	Ş	SR.3.1 TDD)	SR.3.1 TDD			
configuration		2	9	SR.3.1 TDD)		R.3.1 TDI		
RMSI CORESET		1		CR.3.1 TDD		C	R.3.1 TDI)	
RMC configuration		2		CR.3.1 TDD			R.3.1 TDI		
Dedicated CORESET		1		CR.3.1 TDI			CR.3.1 TD		
RMC configuration		2		CR.3.1 TDI			CR.3.1 TD		
SSB configuration		1		SSB.3 FR2			SSB.7 FR2		
3		2		SSB.4 FR2			SSB.8 FR2		
OCNG Pattern		1, 2		OP.4			OP.4		
BW _{channel}	MHz	1, 2	10	00: N _{RB,c} = 6	66	10	0: N _{RB,c} =	66	
Data RBs allocated		1, 2		66		1	66	-	
Initial DL BWP		1, 2		DLBWP.0.1			DLBWP.0.	1	
configuration		., _				_			
Initial UL BWP		1, 2		JLBWP.0.1		l	JLBWP.0.	1	
configuration		., _							
RLM-RS		1, 2		SSB			SSB		
Qrxlevmin	dBm/SCS	1		-138			-138		
		2		-135		-135			
Pcompensation	dB	1, 2		0		0			
Qhyst _s	dB	1, 2		0		0			
Qoffset _{s, n}	dB	1, 2		0		0			
Cell_selection_and_	4.2	1, 2	SS-RSRP			SS-RSRP			
reselection_quality_m		., _							
easurement									
AoA setup		1, 2	Setup 1	defined in A	A.3.15.1	Setup 1 defined in A.3.15.1			
·		,	•			'			
Beam assumption ^{Note}		1,2		Rough		1	Rough		
4		1,2		Rough			Kougii		
Ê , /I ot	dB	1	8	-3	1.5	-infinity	1.5	-3	
E _s /1 _{ot}	QD		0	-3	1.5	-ii iii ii ii ii y	1.5	-5	
	dBm/SCS	2			<u> </u> -93	1			
$N_{\!oc}^{}$ Note2	dBm/SCS	1			-93	3			
		2			-90)			
A.I. Noto?	dBm/15 kHz	1			-10				
$N_{oc}^{}$ Note2	dBill/10 Ki12	'			10.	_			
		2							
\hat{E}_{s}/N_{oc}	dB	1	8	-3	1.5	-infinity	1.5	-3	
3 , 02		2							
SS-RSRP Note3	dBm/SCS	1	-85	-96	-91.5	-infinity	-91.5	-96	
··•···	,000	2	-82	-93	-88.5	-infinity	-88.5	-93	
lo on SSB symbols of	dBm/95.04 MHz	1	-59.37	-63.40	-62.47	-64.01	-62.47	-63.40	
each cell	2511, 00.0 1 WII IZ	2	-57.18	-62.86	-61.67	-64.01	-61.67	-62.86	
Treselection	S	1, 2	0	0	0	0	0	0	
SintrasearchP	dB	1, 2		50			50		
Propagation	QD	1, 2			AWG	N N			
Condition		1, 2			/ 1000	e. 1			
	he used such that h	ath a lla ana fullur		d = =======		:		-1	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{\text{evaluate, NR_intra}} + T_{\text{SI-NR}}$,

Where:

$$\begin{split} T_{\text{detect, NR_Intra}} & \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\ T_{\text{evaluate, NR_intra}} & \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \end{split}$$

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

A.7.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.7.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

Configuration Description for serving cell		Description for target cell				
1	120 kHz SSB SCS, 100 MHz bandwidth,	120 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode	duplex mode				
2	240 kHz SSB SCS, 100 MHz bandwidth,	240 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

	Parameter		Test configuration	Value	Comment
Initial	Active cell		1, 2	Cell2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2	Cell1	phase and during T1 period the UE reselects to cell 1
T1 end	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2	Cell2	during T1
T3 end	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2	Cell1	with higher priority during T3
RF Channe	el Number		1, 2	1, 2	
Time offset	t between cells		1, 2	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC conf	SMTC configuration		1, 2	SMTC.1	
DRX cycle	length	S	1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	35	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		S	1, 2	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2	95	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	T3	T1	T2	T3
TDD configuration		1, 2	T	DConf.3.1		Т	DDConf.3.	1
PDSCH RMC		1, 2	S	R.3.1 TDD		S	R.3.1 TDD)
configuration								
RMSI CORESET		1, 2	С	R.3.1 TDD		C	R.3.1 TDD)
parameters								
RMSI CORESET		1, 2	CC	CR.3.1 TDE)	C	CR.3.1 TDI)
RMC configuration								
OCNG Pattern		1, 2	OP.1 d	efined in A	.3.2.1	OP.1 c	lefined in A	.3.2.1
Initial DL BWP		1, 2	D	LBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1, 2	U	LBWP.0.1		L	JLBWP.0.1	
configuration								
RLM-RS		1, 2		SSB			SSB	
Qrxlevmin	dBm/SCS	1		-140			-140	
		2		-137			-137	
Pcompensation	dB	1, 2		0			0	
Qhysts	dB	1, 2		0		0		
Qoffsets, n	dB	1, 2	0			0		
Cell_selection_and_		1, 2						
reselection_quality_			SS-RSRP		SS-RSRP			
measurement								
AoA setup		1, 2	Setup 1 defined in A.3.15.1			Setup 1 defined in A.3.15.1		
Beam assumption ^{Note}		1,2	Rough		Rough			
Ê s /I ot	dB	1	10.5	10.5	8	-10.5	-infinity	8.5
		2						
N_{oc} Note2	dBm/SCS	1		-93		-93		
		2		-90		-90		
N_{oc} Note2	dBm/15 kHz	1		-102			-102	
		2						
\hat{E}_{s}/N_{oc}	dB	1	10.5	10.5	8	-10.5	-infinity	8.5
		2						
SS-RSRP Note3	dBm/SCS	1	-83.5-	-83.5	-85	-103.5	-infinity	-84.5
		2	-80.5	-80.5	-82	-100.5	-infinity	-80.5
lo	dBm/95.04 MHz	1, 2	-54.05	-54.05	-55.37	-63.64	-54.01	-54.94
Treselection	S	1, 2	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2		50			50	
Thresh _{x, highP}	dB	1, 2		48			48	
Thresh _{serving, lowP}	dB	1, 2		44			44	
Thresh _{x, lowP}	dB	1, 2		50			50	
Propagation Condition		1, 2	AWGN			AWGN		

Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers Note 2: and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system Note 4: implementation

A.7.1.1.2.3 **Test Requirements**

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the RRCSetupRequest message to perform a Registration procedure for mobility and periodic registration update on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

 $T_{higher_priority_search}$ See clause 4.2.2.7

T_{evaluate, NR_ inter} See Table 4.2.2.4-1 in clause 4.2.2.4

 T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to

camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell reselection delay to a lower priority cell in the test case, which we allow 27 s.

A.7.2 SA: RRC_INACTIVE state mobility

A.7.3 RRC_CONNECTED state mobility

A.7.3.1 Handover

A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

	Config	Description				
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring In	formation	-	Not Sent	No additional delays in random
				access procedure.
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter	Unit	Ce	ell 1	Cell 2		
Parameter	Unit	T1	T2	T1	T2	
Assumption for UE beams ^{Note 6}		N	N/A		Rough	
AoA setup		NA		Setup 1		
AuA setup		11	INA		as defined in A.3.15	
NR RF Channel Number		1		2		

Dupley mode	Config 1		FDD	TDD
Duplex mode	Config 2,3		TDD	TDD
	Config 1		Not Applicable	TDDConf.3.1
TDD configuration	Config 2		TDDConf.1.1	TDDConf.3.1
	Config 3		TDDConf.2.1	TDDConf.3.1
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66
	Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66
BWP BW	Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66
	Config 3		40: $N_{RB,c} = 106$	100: N _{RB,c} = 66
	Config 1		52	66
Data RBs allocated	Config 2		52	66
	Config 3		106	66
DRx Cycle		ms	Not Ap	plicable
	Config 1		SR.1.1 FDD	SR.3.1 TDD
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	SR.3.1 TDD
	Config 3		SR2.1 TDD	SR.3.1 TDD
	Config 1		CR.1.1 FDD	CR.3.1 TDD
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	CR.3.1 TDD
	Config 3		CR2.1 TDD	CR.3.1 TDD
Control Channel RMC	Config 1		CCR.1.1 FDD	CCR.3.1 TDD
	Config 2		CCR.1.1 TDD	CCR.3.1 TDD
	Config 3		CCR.2.1 TDD	CCR.3.1 TDD
OCNG Patterns			OF	P.1
SSB configuration	Config 1,2		SSB.1 FR1	SSB.3 FR2
33B corniguration	Config 3		SSB.2 FR1	SSB.3 FR2
SSB configuration	Config 1,2		SSB.1 FR1	SSB.3 FR2
33B corniguration	Config 3		SSB.2 FR1	SSB.3 FR2
SMTC configuration	Config 1,2		SMTC.1	SMTC.1
Swite configuration	Config 3		SMTC.2	SMTC.1
PDSCH/PDCCH	Config 1,2	kHz	15 kHz	120 kHz
subcarrier spacing	Config 3	NI IZ	30 kHz	120 kHz
PUCCH/PUSCH	Config 1,2	kHz	15 kHz	120 kHz
subcarrier spacing	Config 3	NI IZ	30 kHz	120 kHz
PRACH configuration			FR1 PRACH configuration	FR2 PRACH configuration
TRS configuration	Config 1		TRS.1.1 FDD	TRS.2.1 TDD
-	Config 2		TRS.1.1 TDD	TRS.2.1 TDD
PDSCH/PDCCH TCI sta	Config 3		TRS.1.2 TDD N/A	TRS.2.1 TDD TCI.State.2
BWP configuration	Initial DL BWP		DLBWP.0.1	DLBWP.0.1
DVVI Comiguration	Dedicated DL		DLBWP.0.1	DLBWP.0.1
	BWP		DLDVVF.I.I	DLDVVF.I.I

	Initial UL BWP			ULBWP.0.1	ULBW	P.0.1	
		Dedicated UL BWP		ULBWP.1.1	ULBWP.1.1		
EPRE ratio	EPRE ratio of PSS to SSS						
EPRE ratio	o of PBCH DM	RS to SSS					
	o of PBCH to F						
	o of PDCCH D						
		PDCCH DMRS	dB	0	C)	
	o of PDSCH D		ub.	o			
	o of PDSCH to						
		IRS to SSS(Note 1)					
	o of OCNG to	OCNG DMRS (Note					
	1)		15 (45)		1017		
N_{oc} Note2	Note2		dBm/15kH		-104.7		
	T		Z		-95.7		
Note2	Config 1,2 Config 3		- dBm/SCS		-90.1		
IV oc					-95.7		
Ê s /I ot			dB	Link only, see clause A.3.7A	-Infinity	10	
\hat{E}_{s}/N_{oc}			dB		-Infinity	10	
L - Note3	Config 1,2		dBm/ BW		-66.7	-56.3	
Io ^{Note3}			dBm/ BW		-66.7 -56.3		
Propagation condition		-		AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over							

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 562$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Pa	rameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dBm	-120	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 µs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

D	1114	Ce	II 1	Cell 2			
Para	meter	Unit	T1	T2	T1	T2	
Assumption for UE be	ams ^{Note 6}			Rough Roug			
AoA setup				Setup 1 as de	fined in A.3.15		
NR RF Channel Numb	per		1		1		
Duplex mode					DD		
TDD configuration				TDDC			
BW _{channel}		MHz			RB,c = 66		
BWP BW		MHz		100: N _F	RB,c = 66		
Data RBs allocated				6	6		
DRx Cycle		ms		Not Ap	plicable		
PDSCH Reference me	easurement channel			SR.3.	1 TDD		
RMSI CORESET Refe	erence Channel			CR.3.	1 TDD		
Control Channel RMC	;		CCR.3.1 TDD				
OCNG Patterns			OP.1				
SMTC Configuration				SMTC pattern 1			
SSB Configuration			SSB.3 FR2				
PDSCH/PDCCH subc		kHz	120 kHz				
PUCCH/PUSCH subc		kHz	120 kHz				
PRACH configuration			FR2 PRACH configuration 1				
TRS configuration				TRS.2			
PDSCH/PDCCH TCI :					tate.2		
BWP configuration	Initial DL BWP			DLBWP.0.1			
	Dedicated DL BWP			DLBW			
	Initial UL BWP			ULBW			
Dedicated UL BWP				ULBW	/P.1.1		
EPRE ratio of PSS to	 						
EPRE ratio of PBCH [
EPRE ratio of PBCH to PBCH DMRS		dB		0 0			
EPRE ratio of PDCCH					O O		
EPRE ratio of PDCCH							
EPRE ratio of PDSCH	I DMRS to SSS						

EPRE rat	io of PDSCH to PDSCH							
	io of OCNG DMRS to SSS(Note 1)							
EPRE rat	io of OCNG to OCNG DMRS (Note							
1)								
, Note2		dBm/15kH		-10	4.7			
N oc		Z						
Note2		dBm/SCS	-95.7					
Ê s /I ot		dB	6	-1.8	-Infinity	0		
\hat{E}_{s}/N_{oc}		dB	6	6	-Infinity	7		
Io ^{Note3}	Io ^{Note3}		-59.7	-56.7	-59.7	-56.7		
Propagati	ion condition	_	AWGN AW			GN		
Note 1:		colle are fully						
 Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N to be fulfilled. 								
Note 3:	3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							
Note 4:	Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone							
Note 5:	As observed with 0 dBi gain antenna							
Note 6:								

A.7.3.1.2.3 Test Requirements

system implementation

The UE shall start to transmit the PRACH to Cell 2 less than 232 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 222$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 232 ms.

A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

Par	ameter	Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A4-Offset		dB	-120	
Hysteresis		dB	0	
Time To Trigger		S	0	
Filter coefficient			0	L3 filtering is not used
Access Barring Inf	formation	-	Not Sent	No additional delays in random
				access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

Dana	11	Ce	II 1	Cell 2				
Para	meter	Unit	T1	T2	T1	T2		
Assumption for UE be	ams ^{Note 6}		Rot	ugh				
AoA setup				Setup 1 as defined in A.3.15				
NR RF Channel Numb	oer		1			2		
Duplex mode				TE	-			
TDD configuration				TDDC				
BW _{channel}		MHz			RB,c = 66			
BWP BW		MHz		100: N _F	RB,c = 66			
Data RBs allocated				6	6			
DRx Cycle		ms		Not Ap	plicable			
PDSCH Reference me	easurement channel			SR.3.				
RMSI CORESET Refe	erence Channel			CR.3.	1 TDD			
Control Channel RMC				CCR.3	.1 TDD			
OCNG Patterns				OF	P.1			
SMTC Configuration				SMTC pattern 1				
SSB Configuration			SSB.3 FR2					
PDSCH/PDCCH subc	arrier spacing	kHz	120 kHz					
PUCCH/PUSCH subc	arrier spacing	kHz	120 kHz					
PRACH configuration				FR2 PRACH configuration 1				
TRS configuration			TRS.2.1 TDD					
PDSCH/PDCCH TCI s			TCI.State.2					
BWP configuration	Initial DL BWP			DLBW				
	Dedicated DL BWP			DLBW				
	Initial UL BWP			ULBW				
	Dedicated UL BWP			ULBW	/P.1.1			
EPRE ratio of PSS to								
EPRE ratio of PBCH [
EPRE ratio of PBCH to								
EPRE ratio of PDCCH								
EPRE ratio of PDCCH		dB	C)		0		
EPRE ratio of PDSCH					-			
EPRE ratio of PDSCH								
EPRE ratio of OCNG								
	to OCNG DMRS (Note							
1)		dBm/15kH						
Note2			-10-	4.7	-10)4.7		
		Z						

N oc Note2	dBm/SCS	-95.7		-95.7				
Ê _s /I _{ot}	dB	5 5		-Infinity	5			
\hat{E}_s / N_{oc}	dB	5	5	-Infinity	5			
Io ^{Note3}	dBm/ BW	-60.5	-60.5	-66.7	-60.5			
Propagation condition	-	AW	GN	AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral								

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 542 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.4.2.$

This gives a total of 552 ms.

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Chann	el Number		1	1	
Time offse	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	·
SMTC con			1	SMTC pattern 1	
DRX cycle	length	s	1	OFF	
	PRACH configuration		1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1		S	1	5	
T2		S	1	5	Time for the UE to detect RLF
T3		s	1	5	

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
Assumption for UE beams ^{Note 4}			Rough		Rough				
TDD configuration		1	Т	DDConf.3.	1	Т	DDConf.3.	1	
PDSCH RMC		1		R.3.1 TDD			N/A	•	
configuration		·					14// (
RMSI CORESET		1	C	R.3.1 TDD)	(CR.3.1 TDI)	
RMC configuration									
Dedicated CORESET		1	С	CR.3.1 TDI)	С	CR.3.1 TD	D	
RMC configuration									
TRS configuration		1	T	RS.2.1 TDI)		N/A		
PDSCH/PDCCH TCI		1		TCI.State.2			N/A		
state									
OCNG Pattern		1	OP.1 defined in A.3.2.1		OP.1 defined in A.3.2.1				
Initial DL BWP		1	DLBWP.0.1		DLBWP.0.1				
configuration									
Initial UL BWP		1	ULBWP.0.1		Į į	ULBWP.0.	1		
configuration									
RLM-RS		1	SSB		SSB				
AoA setup		1	Setup 1 defined in A.3.15.1		Setup 1 defined in A.3.15.1		A.3.15.1		
Ê _s /I _{ot}	dB	1	-0.12	-infinity	-infinity	-3.46	2	2	
N_{oc} Note2	dBm/15 kHz	1			-104.	.7			
N_{oc} Note2	dBm/SCS	1			-95.7	7			
\hat{E}_{s}/N_{oc}	dB	1	4	-infinity	-infinity	2	2	2	
SS-RSRP Note3	dBm/SCS	1	-91.7	-infinity	-infinity	-93.7	-93.7	-93.7	
lo	dBm/95.04 MHz	1	-59.64 -62.59 -62.59		-59.94	-62.59	-62.59		
Propagation Condition		1	AWGN						
	or all OFDM symbols.		oatou ana c	i Jonatant t	otal transin	illou powe	- opcoliai (acrioity	

and time and shall be modelled as AWGN of appropriate power for $^{N_{oc}}$ to be fulfilled.

SS-RSRP levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system Note 4: implementation

A.7.3.2.1.1.2 **Test Requirements**

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the RRCReestablishmentRequest message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

T_{UL} grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; \text{ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 3250 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

Config	Description			
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.3.2.1.2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1, 2	
Time offset	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR2	
SMTC conf	figuration		1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co			1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1	·	S	1	5	
T2		S	1	5	Time for the UE to detect RLF
T3		S	1	6	

Cell 2

T2

T3

Parameter

Unit

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

T1

Cell 1

T2

T3

Test

configuration

		configuration		12	13	11	12	13	
Assumption for UE beams ^{Note 4}				Rough			Rough		
AoA setup		1		Setup 3 as specified i			in clause A.3.15		
			AoA1			AoA2			
TDD configuration		1	Т	DDConf.3.	1	Т	DDConf.3	.1	
BW _{channel}	MHz	1		$N_{RB,c} = 6$			$N_{RB,c} = 0$		
Data RBs allocated		1		24			24		
PDSCH RMC		1	9	SR.3.2 TDD)		N/A		
configuration		'	·	511.0.2 100			14// (
RMSI CORESET		1		CR.3.1 TDD)	(CR.3.1 TDI	n .	
RMC configuration		'	·	011.0.1 100	•	`	J11.0.1 1D1		
Dedicated CORESET		1	0	CR.3.1 TDI	n	С	CR.3.1 TD)D	
RMC configuration		'	· ·	O11.0.1 1D1	_		011.0.1 12	, ,	
TRS configuration		1	т	RS.2.1 TDI)		N/A		
PDSCH/PDCCH TCI		1		TCI.State.2			N/A		
state				101.01010.2			14// (
OCNG Pattern		1	OP 3	defined in A	321	OP 3.0	defined in	Δ 3 2 1	
Initial DL BWP		1		DLBWP.0.1		OP.3 defined in A.3.2.1 DLBWP.0.1			
configuration		'	'	DEDVVI .0.1		DEDVVI .U. I			
Initial UL BWP		1	ULBWP.0.1		ULBWP.0.1				
configuration		'		OLDVVI .O. I		OLDWI .O. I			
RLM-RS		1		SSB		SSB			
	dBm/15 kHz	1		-92.1			-92.1		
N_{oc} Note2	UDIII/13 KHZ	'		-92.1			-92.1		
N_{oc} Note2	dBm/SCS	1		-83.1			-83.1		
\hat{E}_{s}/N_{oc}	dB	1	0	-infinity	-infinity		-infinity	0	
E _s / IV _{oc}	uБ	!	U	-iiiiiiity	-iiiiiiiity	infinity	-iiiiiiiity	U	
<i>△ /-</i>	dB	1	-1.01	-infinity	-infinity		-infinity	-1.01	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}{_{_{BB}}}_{Note\mathtt{5}}$	-	1		-iiiiiiity	-ii iii iity	infinity	-iiiiiiiity		
SSB_RP Note3	dBm/SCS	1	-83.1	-infinity	-infinity	-	-infinity	-83.1	
						infinity			
lo	dBm/95.04 MHz	1	-55.46	-infinity	-infinity	-	-infinity	-55.46	
						infinity			
Propagation Condition		1		AWGN			AWGN		
	be used such that a c	constant total transr	nitted powe	r is achieve	d for all OF	DM symbo	ols.		
	from other cells and r							carriers	
11010 2. 111011010100	outor oono ana i	15.55 5541555 1161 5			carriod to b	o Jonotan	. Svoi sabi	Jan 1010	
				N_{oc}					

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

 $T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$

Where:

 T_{UL_grant} = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; \text{ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify\ intra\ NR} = 1600\ ms$

 $T_{identify inter NR} = 2080 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1	
Time offset	t between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311		ms	1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR2	
SMTC con	figuration		1	SMTC pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co	nfiguration		1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1		S	1	5	
T2		S	1	11	Time for the UE to detect RLF
T3		S	1	5	

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1 Cell 2					
		configuration	T1	T2	Т3	T1	T2	T3
Assumption for UE beams ^{Note 4}			Rough			Rough		
TDD configuration		1	т	DDConf.3.	1	т	DDConf.3.	1
PDSCH RMC		1		R.3.1 TDD		I	N/A	ı
configuration		l	3	K.3.1 100	,		IN/A	
RMSI CORESET		1		R.3.1 FDD	`		CR.3.1 FDE	`
RMC configuration		' '		ית.ט.ו רטט	,		, K.J. I FUL	,
Dedicated CORESET		1		CR.3.1 FDI			CR.3.1 FD	<u> </u>
RMC configuration		' '	C	UK.3.1 FDI)		CK.S.T FD	D
TRS configuration		1	Т	RS.2.1 TDE	<u> </u>		N/A	
PDSCH/PDCCH TCI		1		CI.State.2			N/A	
state		'		CI.State.2			IN/A	
OCNG Pattern		1	OP 1 c	lefined in A	321	OP.1 defined in A.3.2.1		321
Initial DL BWP		1		DLBWP.0.1		DLBWP.0.1		
configuration		'	DLBWF.0.1			DEBWY .O. 1		
Initial UL BWP		1	l	JLBWP.0.1		Į	JLBWP.0.1	
configuration								
RLM-RS		1		SSB			SSB	
AoA setup		1	Setup 1	defined in A	A.3.15.1	Setup 1	defined in	A.3.15.1
Ê s /I ot	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
N_{oc} Note2	dBm/15kHz	1			-104.	7		
N_{oc} Note2	dBm/SCS	1			-95.7	7		
\hat{E}_{s}/N_{oc}	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
SS-RSRP Note3	dBm/SCS	1	-90.7	-infinity	-infinity	-infinity	-infinity	-90.7
lo	dBm/95.04 MHz	1	-60.52	-66.71	-60.52	-60.52	-66.71	-60.52
Propagation Condition		1	AWGN					
Note 1: OCNG shall is achieved f	be used such that bot for all OFDM symbols. from other cells and r	-				•	•	-

and time and shall be modelled as AWGN of appropriate power for $^{N_{oc}}$ to be fulfilled.

SS-RSRP levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system Note 4: implementation

A.7.3.2.1.3.2 **Test Requirements**

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the RRCReestablishmentRequest message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 5

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

T_{UL} grant = It is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re_establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify\ intra\ NR} = 3520\ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 $T_{PRACH} = 15$ ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.2 Random Access

A.7.3.2.2.1 Contention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	
Duplex Mode for Cell 1 Config 1			TDD	
TDD Configuration	Config 1		TDDConf.3.1	As defined in A.3.1.4
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66	
Data RBs allocated	Config 1		24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference	Config 1		SR.3.1 TDD	As defined in A.3.1.1.
Channel Note 2				
RMSI CORESET	Config 1		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
NR RF Channel Number			1	
EPRE ratio of PSS to SS		dB		
EPRE ratio of PBCH_DM		dB		
EPRE ratio of PBCH to P		dB		
EPRE ratio of PDCCH_D		dB	0	
EPRE ratio of PDCCH to		dB		
EPRE ratio of PDSCH_D		dB		
EPRE ratio of PDSCH to	PDSCH_DMRS	dB		
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δul	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process Note 3
Configured UE transmitte	ed power (dBm	maximum value configurable	As defined in clause
$P_{\text{CMAX}, f, c}$			for certain power class	6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below
rsrp-ThresholdSSB		dBm	RSRP_69 +Δ _{DL}	RSRP_69 corresponds to -88dBm. Δ _{DL} is derived from the downlink calibration process Note 4
preambleReceivedTarge	tPower	dBm	-100	As defined in TS 38.331 [2]

- Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
- Note 3: The Δ_{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, *preambleReceivedTargetPower* = -100dBm and *ss-PBCH-BlockPower* = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The Δ_{DL} value is calculated as (RSRP_REP RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

	Parameter	Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	
	Es Note1	dBm/SCS	-80.6	Power of SSB with index
SSB with	SSB_RP	dBm/SCS	-80.6	0 is set to be above configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	
	lo	dBm/95.04 MHz	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
SSB with	SSB_RP	dBm/SCS	-95.0	1 is set to be below configured rsrp- ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	
	lo	dBm/95.04 MHz	-70.41	lo in symbols containing SSB index 1
Propagation	Condition	-	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: Void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.7.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	TRS.2.1 TDD	
CSI-RS Configuration Config 1			N/A	CSI-RS.3.1 TDD	As defined in A.3.1.4
Duplex Mode for Cell 1	Config 1		TDD	TDD	
TDD Configuration	Config 1		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} =66	
Data RBs allocated	Config 1		24	24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
RMSI CORESET Refere	ence Channel	Config 1		CR.3.1 TDD	CR.3.1 TDD
NR RF Channel Number	r		1	1	
EPRE ratio of PSS to S	SS	dB			
EPRE ratio of PBCH_D	MRS to SSS	dB			
EPRE ratio of PBCH to PBCH_DMRS		dB			
EPRE ratio of PDCCH_ SSS	DMRS to	dB	0	0	
EPRE ratio of PDCCH t	0	dB			
EPRE ratio of PDSCH_	DMRS to SSS	dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
ss-PBCH-BlockPower		dBm/ SCS	+20 +ΔUL	+20 +ΔUL	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process Note 3
Configured UE transmit	ted power (dBm	maximum value	maximum value	As defined in clause
P _{CMAX, f, c})			configurable for certain power class	configurable for certain power class	6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH	FR2 PRACH	As defined in A.3.8.3,
			configuration 2	configuration 3	with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +∆DL	RSRP_69 +ADL	RSRP_69 corresponds to -88dBm. Δ _{DL} is derived from the downlink calibration process Note 4
preambleReceivedTarg	etPower	dBm	-100	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3:	The Δ _{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH
	power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower
	= 20dBm. These values are used during the uplink calibration process carried out before the test case is
	run, with the UE configured to send PRACH.

Note 4: The Δ_{DL} value is calculated as (RSRP_REP - RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone

Pa	rameter	Unit	Test-1	Test-2	Comments
AoA setup			Setup 1	Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with index 0	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/Iot _{BB}	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	Io in symbols containing SSB index 0
	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below
SSB with	SSB_RP	dBm/SC S	-95.0	-95.0	configured rsrp- ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	Io in symbols containing SSB index 1
Propagation	Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated

with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	3.2	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

D		Unit		Cell 1	Ce	ell 2
Para	Parameter		T1	T2	T1	T2
Assumption for UE be	eams ^{Note 6}		F	Rough Rough		
AoA setup				Setup 1 as de	fined in A.3.15	
NR RF Channel Numl	oer			1		2
Duplex mode					DD	
TDD configuration					onf.3.1	
BW _{channel}		MHz			RB,c = 66	
BWP BW		MHz		100: N	RB,c = 66	
Data RBs allocated				6	66	
DRx Cycle		ms			plicable	
PDSCH Reference me	easurement channel				1 TDD	
RMSI CORESET Refe	erence Channel			CR.3.	.1 TDD	
Control Channel RMC	;			CCR.3	3.1 TDD	
OCNG Patterns				O	P.1	
SMTC configuration	SMTC configuration		SMTC.1 FR2			
SSB Configuration				SSB.3 FR2		
PDSCH/PDCCH subc	arrier spacing	kHz	120 kHz			
PUCCH/PUSCH subo	arrier spacing	kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI				TCI.State.2		
BWP configuration	Initial DL BWP			DLBWP.0.1		
	Dedicated DL BWP				VP.1.1	
	Initial UL BWP			ULBWP.0.1		
	Dedicated UL BWP			ULBV	VP.1.1	
EPRE ratio of PSS to						
	EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		dB		0		0
EPRE ratio of PDSCH DMRS to SSS		QD.				O
EPRE ratio of PDSCH to PDSCH						
	DMRS to SSS(Note 1)					
	to OCNG DMRS (Note					
1)						

N_{oc} Note2	dBm/15kH z	-10	4.7	-10	4.7
$N_{oc}^{}$ Note2	dBm/SCS	-9	5.7	-94	5.7
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	5	5	-Infinity	5
\hat{E}_s/N_{oc}	dB	5	5	-Infinity	5
Io ^{Note3}	dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation condition	-	AW	GN	AW	GN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zonee
- Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test

system implementation

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

The redirection delay can be expressed as:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH}$$

where:

 $T_{RRC_procedure_delay} = 110 \text{ ms in the test.}$

 $T_{identify-NR} = 1760$ ms in the test.

T_{SI-NR} = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 10$ ms in the test.

This gives a total of 3160 ms.

A.7.4 Timing

A.7.4.1 UE transmit timing

A.7.4.1.1 NR UE Transmit Timing Test for FR2

A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1	Freq1	Freq1
TDD configuration		1	TDDConf.3.1	
BWchannel	MHz	1	100: N _{RB,c} = 66	
Data RBs allocated		1	66	
Initial BWP Configuration		1		BWP.0.1 BWP.0.1
Dedicated BWP Configuration		1		3WP.1.1 3WP.1.1
TRS Configuration		1	TRS	2.1 TDD
PDSCH/PDCCH TCI state		1	TCI	.State.2
DRx Cycle	ms	1	N/A	DRX.8 ^{Note5}
PDSCH Reference measurement channel		1	SR.:	3.3 TDD
RMSI CORESET Reference Channel		1	CR.	3.2 TDD
Dedicated CORESET Reference Channel		1	CCR.3.7 TDD	
OCNG Patterns		1	(OP.1
SSB Configuration		1	SSB.4 FR2	
SMTC Configuration		1	SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	1		120
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	dB	1	0	0

EPRE ra	tio of OCNG				
DMRS to	SSS(Note 1)				
EPRE ra	tio of OCNG to]			
OCNG D	MRS (Note 1)				
Propaga	tion condition		1	A۱	VGN
SRS Cor	nfig		1	SRSConf.1 ^{Note6} SRSConf.2 ^{Note6}	
Note 1:	OCNG shall be	used such that bo	th cells are fully al	located and a cons	stant total
	transmitted pow	er spectral density	y is achieved for a	II OFDM symbols.	
Note 2:	Void				
Note 3:	Void				
Note 4:	Void				
Note 5:	ote 5: DRx related parameters are given in Table A.3.3.8-1				

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		Setup 1 according	to clause A.3.15.1
Assumption for UE beams ^{Note}	E beams ^{Note} Fine		ne
N_{oc} Note1	dBm/15kHz ^{Note4}	-1	12
N_{oc} Note1	dBm/SCS ^{Note3}	-10	00
\hat{E}_s/N_{oc}	dB	4	1
SSB_RP ^{Note2}	dBm/SCS Note4	-9	96
Ê s /I ot	dB	4	1
Io ^{Note2}	dBm/95.04 MHz Note4	-68	3.5
	ner cells and noise sources n rriers and time and shall be r		

- SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- As observed with 0dBi gain antenna at the centre of the quiet zone Note 5:
- Information about types of UE beam is given in B.2.1.3, and does not limit UE Note 6:
 - implementation or test system implementation

Note 6: SRS configs are given in Table A.7.4.1.1.1-3

Table A.7.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	fregDomainPosition	0	0	
	fregDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches N _{RB,c}
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl2560, 4	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.7.4.1.1.4: Void

A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test:

- 1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within ($N_{TA} + N_{TA \text{ offset}}$) $\times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
240	+8*64T _c	+4*64T _c

4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c \pm T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX confiured.

5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.7.4.2 UE timer accuracy

A.7.4.3 Timing advance

A.7.4.3.1 SA FR2 timing advance adjustment accuracy

A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new} = N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS $N_{TA_new} = N_{TA_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Tes	Test1				
Parameter	Unit	T1	T2				
Duplex mode		TD	DD				
TDD configuration		TDDCc	onf.3.1				
BW _{channel}	MHz	100: N _R	,-				
BWP BW	MHz	100: N _R					
DRx Cycle	ms	Not App					
PDSCH Reference measurement channel		SR.3.1					
CORESET Reference Channel		CR.3.1					
OCNG Patterns		OCNG p					
TRS configuration		TRS.2.					
PDSCH/PDCCH TCI state		TCI.St	tate.2				
SMTC configuration		SMTC.	1 FR2				
SSB Configuration		SSB.3	FR2				
PDSCH/PDCCH subcarrier spacing	kHz	120	kHz				
PUCCH/PUSCH subcarrier spacing	kHz	120	kHz				
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS	dB	0	1				
EPRE ratio of PDSCH DMRS to SSS	QD.	Ĭ					
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note							
1)							
Propagation condition	-	AW					
Note 1: OCNG shall be used such that the r			ated and a constant total				
transmitted power spectral density is							
Note 2: Interference from other cells and no		=	ned to be constant over				

- subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 4:
- As observed with 0 dBi gain antenna at the centre of the quiet zone Note 5:

Table A.7.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	T	est 1			
			T1	T2			
Angle of a	arrival configuration		Setup 1 according	g to clause A.3.15.1			
Assumpti	on for UE beams ^{Note}		Fine				
$N_{oc}^{ m Note1}$		dBm/15kHz ^{Note4}	-112				
N _{oc} Note1		dBm/SCS ^{Note3}	-103				
\hat{E}_s/N_{oc}		dB	4				
SS-RSRF	Note2	dBm/SCS Note4		-99			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB		4			
Io ^{Note2}		dBm/95.04 MHz Note4	-68.5				
Note 1:		er cells and noise sources no riers and time and shall be m					
	for N_{oc} to be fulfilled	l.					
Note 2:							
Note 3:							
Note 4:							
Note 5:	te 5: As observed with 0dBi gain antenna at the centre of the quiet zone						
Note 6:		pes of UE beam is given in Bast system implementation	.2.1.3, and does not	limit UE			

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment				
c-SRS	16					
b-SRS	0	Frequency hopping is disabled				
b-hop	0					
freqDomainPosition	0	Frequency domain position of SRS				
freqDomainShift	0					
groupOrSequenceHopping	neither	No group or sequence hopping				
SRS-PeriodicityAndOffset	sl5=0	Once every 5 slots				
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation				
usage	Codebook	Codebook based UL transmission				
startPosition	0	resourceMapping setting. SRS on last				
nrofSymbols	n1	symbol of slot, and 1symbols for SRS				
repetitionFactor	n1	without repetition.				
combOffset-n2	0	transmission Comb patting				
cyclicShift-n2	0	transmissionComb setting				
nrofSRS-Ports	Number of antenna ports used for SRS transmission					
Note: For further information see clause 6.3.2 in TS 38.331 [2].						

A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k = 11.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.7.5 Signaling characteristics

A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Value		
Test 1		
Cell 1		
1		
TDD		
100: N _{RB,c} = 66		
24		
DLBWP.0.1		
DLBWP.1.1		
ULBWP.0.1		
ULBWP.1.1		
TDDConf.3.1		
CR.3.1 TDD		
CIX.3.1 1DD		
CCR.3.4 TDD		
OCK.0.1 122		
SSB.1 FR2		
SMTC.1		
120 KHz		
120 1012		
Table A.3.8.3.4		
0,1		
OP.5		
Normal		
1-0		
2		
8		
4		
-		
4		
-		
REG bundle size		
6		
OFF		
gp0		
Enabled		
0		
1000		
1		
1		
CSI-RS.3.1 TDD		
TCI.State.2		
TRS.2.1 TDD		
0.2		
9.68		
9.68		
9.64		

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter			Test 1					
		T1	T2	T3	T1	T2	Т3	
AoA setup			Set	up 3 defi	ned in A.3	3.15		
·				AoA1		AoA2		
Assumption for UE bea	ams ^{Note 5}			Rough			Rough	
EPRE ratio of PDCCH	DMRS to SSS	dB		4			Not sent	
EPRE ratio of PDCCH	to PDCCH DMRS	dB		0				
EPRE ratio of PBCH D	MRS to SSS	dB						
EPRE ratio of PBCH to	PBCH DMRS	dB						
EPRE ratio of PSS to \$	SSS	dB						
EPRE ratio of PDSCH	DMRS to SSS	dB						
EPRE ratio of PDSCH	to PDSCH DMRS	dB						
EPRE ratio of OCNG [OMRS to SSS	dB						
EPRE ratio of OCNG t	o OCNG DMRS	dB						
ssb-Index 0 SNR	Config 1	dB	2 ^{Note 6}	-6 ^{Note 6}	-15			
ssb-Index 1 SNR	Config 1		Not sent		2 ^{Note 6}	-15	-15	
N_{oc}	Config 1	dBm/	-92.1			-92.1		
		15kHz						
Time multiplexing of th				Define	ed in Figu	re A.7.5.1	1.1.1-2	
transmissions from each	ch AoA							
Propagation condition				-A 30ns 7			-A 30ns 7	
	be used such that a c	constant to	otal trans	mitted pov	ver spect	ral density	y is achie	ved for
all OFDM sy							20110	
Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.								
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For								
							ie band. I	-01
	UE which supports 4R						lomont-t	
	about types of UE beautimplementation.	in is give	II III B.Z.1	.5 and do	es not im	III OE IM	nementat	IOH OF
-	illows up to 1dB degra	dation fro	m annlied	SNR to I	IF hasah	and		

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0

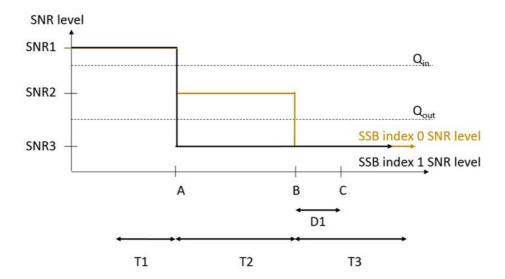


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

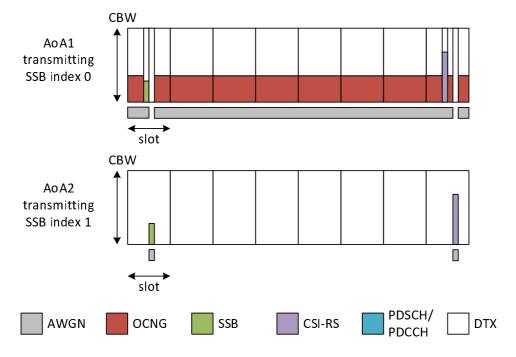


Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.2.1-1. The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

	Paramete	ſ	Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Nu	mber			1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
Data RBs alloca		Config 1		24
DL initial BWP		Config 1		DLBWP.0.1
DL dedicated B	WP	Config 1		DLBWP.1.1
configuration UL initial BWP	anfiguration	Config 1		ULBWP.0.1
UL dedicated B		Config 1		ULBWP.1.1
configuration	VVI	Coming		OLDWI .I.I
TDD Configuration	ion	Config 1		TDDConf.3.1
RMSI CORESE		Config 1		CR.3.1 TDD
Channel				
Dedicated COR	ESET	Config 1		CCR.3.1 TDD
Reference Cha				
SSB Configurat		Config 1		SSB.1 FR2
SMTC Configur		Config 1		SMTC.3
PDSCH/PDCCI	1 subcarrier	Config 1		120 KHz
spacing	.matia.a	Confin 4		Table A 2 0 2 4
PRACH Configu SSB index assi		Config 1 Config 1		Table A.3.8.3.4
RS Index assi	yılcu as KLIVI	Coming I		0,1
OCNG paramet	ers			OP.5
CP length	.010			Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
		etical PDCCH RE	dB	0
	energy to avera	age SSS RE energy		
		netical PDCCH DMRS	dB	0
		age SSS RE energy		5501 " :
	DMRS precode			REG bundle size
Out of sync	REG bundle si	ze		<u>6</u> 1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
p amount of the		etical PDCCH RE	dB	4
		age SSS RE energy		
	Ratio of hypoth	etical PDCCH DMRS	dB	4
	energy to avera	age SSS RE energy		
	DMRS precode	er granularity		REG bundle size
	REG bundle si	-		6
DRX	INCO buridie 3i.	26		OFF
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T210 times			ma	4000
T310 timer T311 timer			ms ms	4000 1000
N310			ms	1
N310				<u></u>
CSI-RS for CSI reporting Config 1				CSI-RS.3.1 TDD
TCI states for PDCCH/PDSCH				TCI.State.2
CSI-RS for tracking Config 1				TRS.2.1 TDD
T1			S	0.2
T2			S	0.2
T3			S	1.88
T4			S	0.2
T5			S	3.84
D1	onfigurations see	agging and to the LIF and	S start of	3.8
		assigned to the UE prides not transmitted after 1		шне репос 11.
INULE Z. UE-S	Perilic EDCCU I	s not transmitted after 1	ו אמונא.	

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit					Te	st 1				
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
oA setup						Se	tup 3 defi	ned in A.3	.15			
·					AoA1					AoA2		
ssumption for UE b	eams Note 5				Rough					Rough		,
PRE ratio of PDCC	H DMRS to SSS	dB			0					Not sent		
PRE ratio of PDCC	H to PDCCH DMRS	dB			0							
PRE ratio of PBCH	DMRS to SSS	dB										
PRE ratio of PBCH	to PBCH DMRS	dB										
PRE ratio of PSS to	SSS	dB										
PRE ratio of PDSCI	H DMRS to SSS	dB										
PRE ratio of PDSCI	H to PDSCH DMRS	dB										
PRE ratio of OCNG	DMRS to SSS	dB										
PRE ratio of OCNG	to OCNG DMRS	dB										
sb-Index 0 SNR	Config 1	dB	2 ^{Note 6}	-6 ^{Note 6}	-15	-4.5	2 ^{Note 6}					
sb-Index 1 SNR	Config 1				Not sent			2 ^{Note 6}	-15	-15	-15	-15
J Config 1		dBm/			-92.1					-92.1		
\sqrt{oc}		15kHz										
me multiplexing of	the downlink		Defined in Figure A.7.5.1.2.1-2									
ansmissions from e	ach AoA											
ropagation condition	n		TDL-A 30ns 75Hz TDL-A 30ns			L-A 30ns 7	75Hz					

- ote 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.
- ote 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- ote 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- ote 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on a bands, the SNR during T3 is A.3.6.
- ote 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- ote 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.1.2.1-4: Void

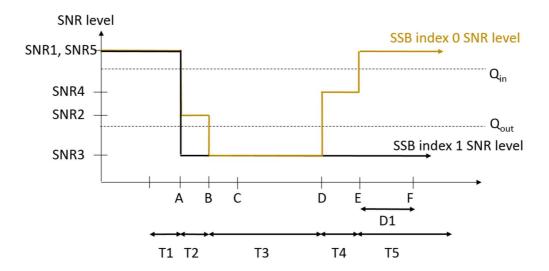


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

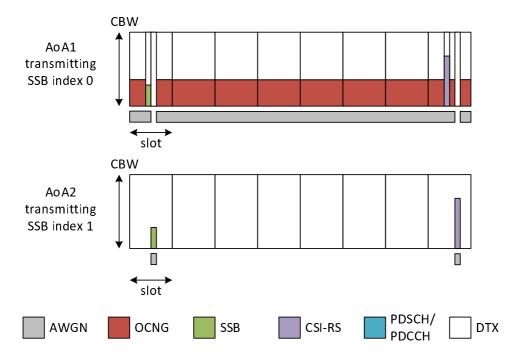


Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Parameter			Unit	Value		
				Test 1		
A (; DO !!	Antino DO all			0.114		
Active PCell	RF Channel Number			Cell 1		
				1 TDD		
Duplex mode BW _{channel}		Config 1 Config 1		100: N _{RB,c} = 66		
Data RBs alloca	nto d	Config 1		100. NRB,c = 66		
DL initial BWP (Config 1		DLBWP.0.1		
DL initial BWP 0		Config 1		DLBWP.0.1 DLBWP.1.1		
configuration	VVF	Coming i		DLBWF.1.1		
UL initial BWP of	configuration	Config 1		ULBWP.0.1		
UL dedicated B		Config 1		ULBWP.1.1		
configuration	VVI	Corning 1		OLDWI .I.I		
TDD Configurat	ion	Config 1		TDDConf.3.1		
RMSI CORESE		Config 1		CR.3.1 TDD		
Channel	T ROIGIGIOG	Coming 1		GIX.6.1 1BB		
Dedicated COR	ESET	Config 1		CCR.3.4 TDD		
Reference Char		Jonny 1]	0011.0.1 100		
SSB Configurat		Config 1		SSB.1 FR2		
SMTC Configur		Config 1	1	SMTC.1		
PDSCH/PDCCH		Config 1		120 KHz		
spacing	- Cabbarrior	Coming 1		120 1412		
PRACH Configu	uration	Config 1		Table A.3.8.3.4		
SSB index assignment		Config 1		0,1		
RS	ga. a.a . t. <u>=</u>	John J.		σ, .		
OCNG paramet	ers			OP.1		
CP length				Normal		
Out of sync	DCI format			1-0		
transmission		ntrol OFDM symbols		2		
parameters	Aggregation le		CCE	8		
		netical PDCCH RE	dB	4		
		age SSS RE energy				
		netical PDCCH	dB	4		
		to average SSS RE				
	energy	· ·				
	DMRS precod	er granularity		REG bundle size		
	REG bundle s	ze		6		
DRX Configurat	tion			DRX.3		
Gap pattern ID				N.A.		
Layer 3 filtering				Enabled		
T310 timer			ms	0		
T311 timer			ms	1000		
N310				1		
N311				1		
CSI-RS for CSI reporting Config 1			CSI-RS.3.1 TDD			
TCI states for PDCCH/PDSCH			TCI.State.2			
CSI-RS for tracking Config 1			TRS.2.1 TDD			
T1		S	0.2			
T2			S	14.48		
T3			S	14.48		
D1			S	14.44		
		assigned to the UE pr		of time period T1.		
Note 2: UE-s	pecific PDCCH	is not transmitted after	T1 starts.			
1						

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parame	Unit		Test 1	t 1			
			T1	T2	Т3		
AoA setup			Setu	p 1 defined in A.	3.15		
Assumption for UE beams		Rough					
EPRE ratio of PDCCH DN	MRS to SSS	dB	4				
EPRE ratio of PDCCH to	PDCCH DMRS	dB		0			
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DN	IRS to SSS	dB	0				
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	dB						
ssb-Index 0 SNR	Config 1	dB	2 ^{Note 6}	-6 ^{Note 6}	-15		
ssb-Index 1 SNR	Config 1		2 ^{Note 6}	-15	-15		
N_{oc}	Config 1	dBm/15K		-104.7dBm			
Dropogation condition		Hz	-	FDL A 2000 75U:	-		
Propagation condition	1 1 1 4 4 4			TDL-A 30ns 75H:			
	used such that the				instant total		
	ver spectral density tains PDCCH for U				CNC		
	respond to the sign				CNG.		
	es are specified for				o band For		
	which supports 4R				le ballu. Ful		
	out types of UE bea				nlementation		
	mplementation.	iiio is giveii iii	D.Z. 1.3 and 006	S HOLIMING OF IIII	piementation		
	vs up to 1dB deara	dation from an	nlind CND to LIE				

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

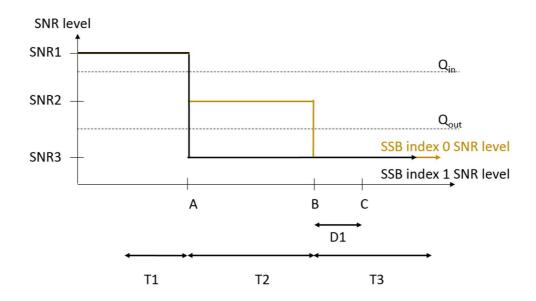


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

	Parameter	ſ	Unit	Value
				Test 1
Active PCell				Cell 1
RF Channel Nu	ımber			1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
Data RBs alloc	ated	Config 1		66
DL initial BWP		Config 1		DLBWP.0.1
DL dedicated B		Config 1		DLBWP.1.1
configuration		Jos.i.i.g		22
	UL initial BWP configuration Config 1			ULBWP.0.1
UL dedicated B		Config 1		ULBWP.1.1
configuration	,,,,,	Coming 1		OLDWI IIII
TDD Configura	tion	Config 1		TDDConf.3.1
RMSI CORESE		Config 1		CR.3.1 TDD
Channel	- i ittorororoc	Coming 1		OK.5.1 100
Dedicated COF	PESET	Config 1		CCR.3.1 TDD
Reference Cha		Comig		CCN.S.1 1DD
SSB Configuration		Config 1		SSB.1 FR2
			+	
SMTC Configur		Config 1		SMTC.3
PDSCH/PDCCI	H subcarrier	Config 1		120 KHz
spacing	•	0 " 1		T.I. A.G.G.C.
PRACH Config	uration	Config 1		Table A.3.8.3.4
SSB index assi	gned as RLM	Config 1		0,1
	RS			
	OCNG parameters			OP.1
CP length				Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
	Ratio of hypoth	etical PDCCH RE	dB	0
	energy to average SSS RE			
	Ratio of hypoth	etical PDCCH DMRS	dB	0
	energy to avera	age SSS RE energy		
	DMRS precode	er granularity		REG bundle size
	REG bundle si	ze		6
Out of sync	DCI format			1-0
transmission	Number of Cor	ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		etical PDCCH RE	dB	4
		age SSS RE energy		
		etical PDCCH DMRS	dB	4
		age SSS RE energy		
	DMRS precode			REG bundle size
	REG bundle si			6
DRX Configura				DRX.11
Gap pattern ID				N.A.
Layer 3 filtering	1			Enabled
T310 timer	•		ms	4000
T311 timer			ms	1000
N310			1110	1
N311			+	1
	reporting	Config 1		CSI-RS.3.1 TDD
TCI etates for F	CSI-RS for CSI reporting Config 1			TCI.State.2
	TCI states for PDCCH/PDSCH			TRS.2.1 TDD
	CSI-RS for tracking Config 1			
T1			S	0.2
T2			S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88
D1			S	3.84
Note 1: All co	onfigurations are	assigned to the UE pri	or to the start	of time period T1.
Note 2: UE-s	specific PDCCH i	s not transmitted after	I 1 starts.	

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

	Param	neter	Unit	Test 1					
				T1	T2	Т3	T4	T5	
AoA setup				;	Setup 1	defined	in A.3.1	15	
	on for UE beam			Rough					
EPRE rati	io of PDCCH D	MRS to SSS	dB	0					
EPRE rati	io of PDCCH to	PDCCH DMRS	dB			0			
	io of PBCH DM		dB						
EPRE rati	io of PBCH to F	PBCH DMRS	dB						
EPRE rati	io of PSS to SS	SS	dB						
	io of PDSCH D		dB			0			
		PDSCH DMRS	dB						
EPRE rati	io of OCNG DM	IRS to SSS	dB						
	io of OCNG to (dB		1	1		1	
ssb-Index	0 SNR	Config 1	dB	2 ^{Note}	- - N-4-	-15	-4.5	2 ^{Note 6}	
				6 6 ^{Note}					
	4.0015	0 " 1		6				4-	
ssb-Index	1 SNR	Config 1		2 ^{Note}	-15 -15 -15 -		-15		
		Config 1	dBm/1						
N_{oc}		Coning 1	5KHz		-	104.7dE	3m		
Propagati	ion condition		JINIIZ		TDI	-A 30ns	75Hz		
Note 1:		e used such that the res	ources in						
14010 11		transmitted power speci							
Note 2:		ntains PDCCH for UEs of							
	OCNG.3								
Note 3:	SNR levels co	rrespond to the signal to	noise rat	io over t	he SSS	REs.			
Note 4:	The SNR values are specified for testing a UE which supports 2RX on at least one								
	band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is						is		
	A.3.6.								
Note 5:		oout types of UE beam is		B.2.1.3	and doe	s not lim	nit UE		
1	•	n or test system implem							
Note 6:	This value allo	ows up to 1dB degradati	on from ap	plied SI	NR to U	E baseb	and		

Table A.7.5.1.4.1-4: Void Table A.7.5.1.4.1-5: Void

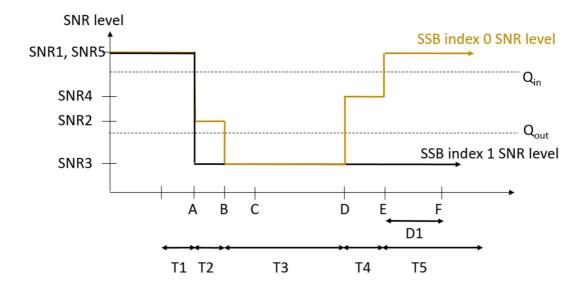


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.5.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration	_		
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated CORESET	Config 1		CCR.3.4 TDD
Reference Channel			CCR.3.6 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
	_		Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for P	DCCH#1/PDSCH		TCI.State.2
TCI configuration for P	DCCH#2		TCI.State.3
OCNG parameters			OP.2
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
T1		S	0.2
T2		S	0.35
T3		s	0.35
D1		s	0.31
Note 1: UE-specific	PDCCH is not transmitted after T1 star	ts.	

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter			Unit	Test 1						
				T1	T2	Т3	T1	T2	T3	
AoA setu	ρ				Set	up 3 defir	ned in A.	3.15		
				AoA1			AoA2			
Assumpti	on for UE bea	ams Note 10			Rough			Rough		
EPRE rat	EPRE ratio of PDCCH DMRS to SSS				4					
EPRE rat	io of PDCCH	to PDCCH DMRS	dB							
	io of PBCH D		dB							
		PBCH DMRS	dB							
	io of PSS to S		dB							
EPRE rat	io of PDSCH	DMRS to SSS	dB		0			Not sent		
EPRE rat	io of PDSCH	to PDSCH DMRS	dB							
EPRE rat	io of OCNG D	MRS to SSS	dB							
		OCNG DMRS	dB							
SNR on F	RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note}	-15				
					11			1		
SNR on F	RLM-RS2	Config 1			Not sent		2 ^{Note 11}	-14	-15	
N_{oc}		Config 1	dBm/		-92.1			-92.1		
	11.0		15kHz	TDI (0011			0011	
	ion condition	1 1 1 1 1 1			TDL-C 300ns 100Hz TDL-C 300ns 100Hz s in Cell 1 are fully allocated and a constant total					
Note 1:							and a c	onstant to	tal	
Note 2:		power spectral density					o otort o	f tima nari	ad T1	
Note 3:		esources for CSI repor S resource set configur								
Note 3.	of time perio		allon ioi	CSI Tepoi	ung are a	issigned t	o the ob	prior to ti	ie start	
Note 4:		nt gap configuration is	assigned	to the UI	E prior to	the start o	of time pe	eriod T1.		
Note 5:		and layer 3 filtering rela							period	
	T1.	,	•		•	•		•		
Note 6:		contains PDCCH for UE					part of 0	DCNG.		
Note 7:		correspond to the sign								
Note 8:		time periods T1, T2 ar	nd T3 is d	lenoted as	s SNR1, S	SNR2 and	SNR3 r	espectivel	y in	
	figure A.7.5.									
Note 9:										
	testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or									
Note 10:			ms is give	en in B.2.	1.3 and d	oes not lii	mit UE in	npiementa	tion or	
Note 44	test system implementation.									
Note 11:	Note 11: This value allows up to 1dB degradation				SNK to U	J⊏ baseb	and.			

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field					
	rieiu					
	gapOffset	0				
Note 1:	Note 1: RLM RS is partially overlapped wi					
	measurement gap					

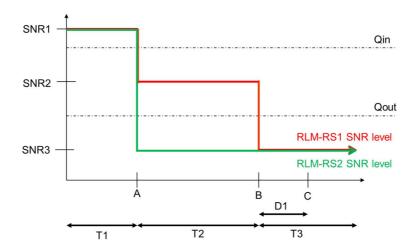


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1 which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration	One fire 4		LILDWD 4.4
UL dedicated BWP	Config 1		ULBWP.1.1
configuration RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel	Config 1		CR.3.1 1DD
Dedicated CORESET	Config 1		CCR.3.1 TDD
Reference Channel	Coming 1		CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing	Coming		120 KHZ
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
	····· y ·		Resource #4 in TRS.2.2 TDD
TRS configuration	1		TRS.2.1 TDD
J			TRS.2.2 TDD
TCI configuration for PI	DCCH#1/PDSCH		TCI.State.2
TCI configuration for PI	DCCH#2		TCI.State.3
OCNG parameters			OP.2
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols	005	2
	Aggregation level Ratio of hypothetical PDCCH RE	CCE	4
	energy to average CSI-RS RE	dB	0
	energy to average CSI-KS KE		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS	d D	ů .
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88

D1		S	0.84
Note 1:	UE-specific PDCCH is not transmitted after T1 start	ts.	_

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Param	eter	Unit					Te	st 1		
			T1	T2	T3	T4	T5	T1	T2	T3
AoA setup						Se	tup 3 defi	ned in A.3	.15	
					AoA1			AoA2		
Assumption for UE be	eams Note 10				Rough					Rough
EPRE ratio of PDCCI	H DMRS to SSS	dB			0					
EPRE ratio of PDCCI	to PDCCH DMRS	dB								
EPRE ratio of PBCH	DMRS to SSS	dB								
EPRE ratio of PBCH	to PBCH DMRS	dB								
EPRE ratio of PSS to	SSS	dB								
EPRE ratio of PDSCH	I DMRS to SSS	dB			0					Not sent
EPRE ratio of PDSCH	to PDSCH DMRS	dB								
EPRE ratio of OCNG	DMRS to SSS	dB								
EPRE ratio of OCNG	to OCNG DMRS	dB								
SNR on RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note}	-15	-4.5	2 ^{Note 11}			
				11						
SNR on RLM-RS2	Config 1				Not sent			2 ^{Note 11}	-14	-15
N_{oc}	Config 1	dBm/ 15KHz			-92.1					-92.1
Propagation condition)			TDL-	C 300ns 1	100Hz	•		TDL	-C 300ns 1

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectra achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in fig 1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supbands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

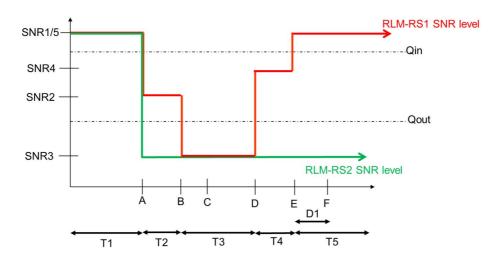


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and insync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter	Unit	Value	
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	
DL initial BWP	Config 1		DLBWP.0.1	
configuration	_			
DL dedicated BWP	Config 1		DLBWP.1.1	
configuration				
UL initial BWP	Config 1		ULBWP.0.1	
configuration				
UL dedicated BWP	Config 1		ULBWP.1.1	
configuration				
RMSI CORESET	Config 1		CR.3.1 TDD	
Reference Channel				
Dedicated CORESET	Config 1		CCR.3.4 TDD	
Reference Channel			CCR.3.6 TDD	
SSB Configuration	Config 1		SSB.1 FR2	
SMTC Configuration	Config 1		SMTC.1	
PDSCH/PDCCH	Config 1		120 KHz	
subcarrier spacing				
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD	
			Resource #4 in TRS.2.2 TDD	
TRS configuration			TRS.2.1 TDD	
			TRS.2.2 TDD	
TCI configuration for PDCCH#1/PDSCH			TCI.State.2	
TCI configuration for Pl	DCCH#2		TCI.State.3	
OCNG parameters			OP.1	
CP length	Lagran		Normal	
Out of sync	DCI format		1-0	
transmission	Number of Control OFDM symbols		2	
parameters	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE	dB	4	
	energy to average CSI-RS RE			
	energy	-ID	4	
	Ratio of hypothetical PDCCH	dB	4	
	DMRS energy to average CSI-RS RE energy			
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	NEG bullule Size		DRX.3	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer		ms	Епаріей 0	
T311 timer			1000	
N310		ms	1	
N311			1	
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD	
reporting			001-100.0.1 1DD	
T1	1	S	0.2	
T2		s S	1.28	
T3		S	1.28	
D1		S	1.24	
	PDCCH is not transmitted after T1 star		1.24	
140to 1. OL-Specific	Door is not transmitted after 11 star	ω.		

Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter		Unit		Test 1	
			T1 T2 T3		
AoA setup dB			Setup 1 defined in A.3.15		
Assumption for	r UE beams Note 10			Rough	
EPRE ratio of SSS	PDCCH DMRS to	dB		4	
EPRE ratio of DMRS	PDCCH to PDCCH	dB			
EPRE ratio of SSS	PBCH DMRS to	dB			
EPRE ratio of DMRS	PBCH to PBCH	dB	_		
EPRE ratio of	PSS to SSS	dB			
EPRE ratio of SSS	PDSCH DMRS to	dB	0		
EPRE ratio of DMRS	PDSCH to PDSCH	dB			
EPRE ratio of SSS	OCNG DMRS to	dB	_		
EPRE ratio of DMRS	OCNG to OCNG	dB	_		
SNR on RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note 11}	-15
SNR on RLM-RS2	Config 1	dB	2 ^{Note 11}	-14	-15
N_{oc}	Config 1	dBm/15KHz	-104.7		
Propagation c	ondition			TDL-C 300ns 100Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

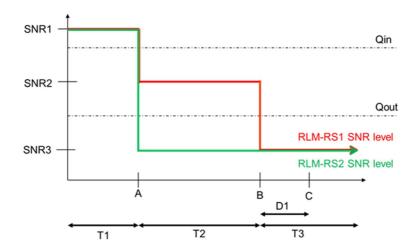


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During time durations T1, T2 and T3, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on PCell.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Insync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1 which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration UL initial BWP	Config 1		ULBWP.0.1
configuration	Config 1		ULBWP.U.1
UL dedicated BWP	Config 1		ULBWP.1.1
configuration	Comig		OLDWI .I.I
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			5
Dedicated CORESET	Config 1		CCR.3.1 TDD
Reference Channel			CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
TD0 (' ('			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
TCI configuration for PI	DCCLI#4/DDCCLI		TRS.2.2 TDD
TCI configuration for PI			TCI.State.2 TCI.State.3
OCNG parameters	JCCH#2		OP.1
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		DEC houndle size
	DMRS precoder granularity REG bundle size		REG bundle size
In sync transmission	DCI format		6 1-0
In sync transmission parameters	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE		Ç
	energy		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
DDV	REG bundle size		6
DRX Gap pattern ID			DRX.3
Gap pattern ID Layer 3 filtering			*gp0 Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310		0	1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
T1		S	0.2
T2		S	0.2
T3		S	1.64
T4		S	0.2
T5		S	1.88

D1		S	1.84	
Note 1:	Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
AoA setup dB				Setup	1 defined in	A.3.15	
	or UE beams Note 10			•	Rough		
EPRE ratio of PDCCH DMRS to SSS		dB			0		
EPRE ratio of DMRS	PDCCH to PDCCH	dB					
EPRE ratio of SSS	PBCH DMRS to	dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB			0		
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note 11}	-15	-4.5	2 ^{Note 11}
SNR on Config 1 C		dB	2 ^{Note 11}	-14	-15	-15	-14
N_{oc}	Config 1	dBm/15KHz	-104.7				
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field			
Fleid		Value		
	gapOffset	0		
Note 1:	Note 1: RLM RS is partially overlapped with			
	measurement gap			

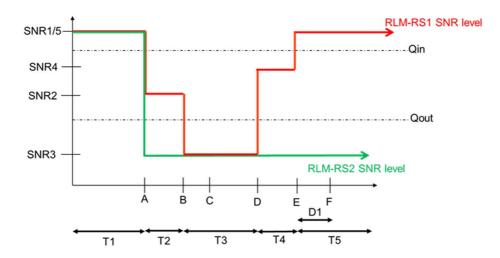


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description		
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	
T1	S	1	5	During T1 the UE is required to correctly
				transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Cell 1		
A o A lootus		configuration	Setup 3 defined in A.3.15.3		
AoA setup		1	AoA1 AoA2		
Assumption for UE			Rough	Rough	
beams Note 1			Rough	Rougii	
TDD configuration		1	TDDC	onf 3 1	
BW _{channel}	MHz	1		RB,c = 66	
Data RBs allocated	IVII IZ	1		14.	
PDSCH Reference		1	SR.3.2 TDD	Not sent	
measurement		'	OIX.3.2 1DD	NOT Sent	
channel					
RMSI CORESET		1	CR.3.1 TDD	Not sent	
RMC configuration		'	O14.0.1 122	THOU GOIN	
Dedicated CORESET		1	CCR.3.2 TDD	Not sent	
RMC configuration			00111012112		
TRS configuration		1	TRS.2.1 TDD	TRS.2.2 TDD	
PDCCH/PDSCH TCI		1	TCI.State.2	N/A	
state				·	
OCNG Pattern		1	OP.5 defined in	Not sent	
			A.3.2.1		
Initial DL BWP		1	DLBWP.0.1		
configuration					
Initial UL BWP		1	ULBWP.0.1		
configuration					
RLM-RS		1	SSB with index 0	SSB with index 1	
N_{oc}	dBm/15kHz	1	-92.1	-92.1	
N_{oc} Note2	dBm/SCS	1	-83.1	-83.1	
\hat{E}_s/N_{oc}	dB	1	2	2	
$\hat{E}_{s}/I_{\text{ot}}$ BB Note 4	dB	1	1	1	
SSB_RP Note3	dBm/SCS	1	-81.1	-81.1	
lo	dBm/95.04 MHz	1	-54.35	-54.35	
Time multiplexing	Time multiplexing of the downlink		Defined in Figure A.7.5.1.9.1-1		
	transmissions from each AoA		Defined in Figu	re A.7.5.1.9.1-1	
Propagation		1	AWGN	AWGN	
Condition					
-				-	

Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for
$$N_{oc}$$
 to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MBs from TS 38.101-2 [19] Table 6.2.1.3-4.

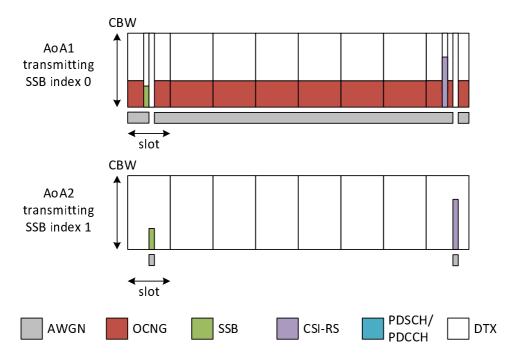


Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.7.5.2 Interruption

A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode		

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated		Cell2	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell1	Cell2	
Frequency Range			R2		
Duplex mode		TDD		DD	
TDD configuration			TDDConf.3.1		
BW _{channel}			100 MHz: N _{RB,c} = 66		
Data RBs allocated				66	
Initial DL BWP			DLBWF	P.0.2 ^{Note4}	
Configuration					
Initial UL BWP			ULBWF	2.0.2 Note6	
Configuration					
Downlink dedicated			DLBV	VP.1.1	
BWP Configuration					
Uplink dedicated			ULBV	VP.1.1	
BWP configuration					
PDSCH Reference			SR.3.	1 TDD	
measurement					
channel					
RMSI CORESET	RMSI CORESET		CR.3.	1 TDD	
parameters					
Dedicated			CCR.3.1 TDD		
CORESET					
parameters					
OCNG Patterns			OP.1		
				TC.1	
SSB Configuration			SSB.1 FR2		
TCI State				State.0	
TRS Configuration				.1 TDD	
	rrelation Matrix and Antenna 1x2 Low		Low		
Configuration					
EPRE ratio of PSS to					
EPRE ratio of PBCH I					
EPRE ratio of PBCH t					
EPRE ratio of PDCCH					
EPRE ratio of PDCCH to PDCCH		_ dB 0		0	
DMRS			0		
EPRE ratio of PDSCH DMRS to SSS				-	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to					
SSS(Note 1)					
EPRE ratio of OCNG to OCNG					
DMRS (Note 1)		แร			
	Time offset to Cell1 Note 3		-	3	
Propagation Condition			AWGN		
Note 1: OCNG sha	II be used such that	at both cells	are fully allocated and a constan	t total transmitted power	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.

Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2 defined in clause 12 of of TS 38.213 [3].

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell 1	Cell 2
Angle of arrival configuration			Setup1 according to table A.3.15.1	Setup 1according to table A.3.15.1
Assumption for UE beams Note 6			Rough	Rough
$N_{oc}^{ m Note1}$ NR_TDD_FR2_A NR_TDD_FR2_B		dBm/15kHz	-104.7	-104.7
	NR_TDD_FR2_F NR_TDD_FR2_G	UDIII/13KHZ	-104.7	- 104.7

	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A		-95.7		
	NR_TDD_FR2_B			-95.7	
$N_{oc}^{ m Note1}$	NR_TDD_FR2_F	dBm/SCS			
	NR_TDD_FR2_G	ubili/000		-33.1	
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B		-88.7	-88.7	
SS-RSRPNote2	NR_TDD_FR2_F	dBm/120KH			
OO RORI	NR_TDD_FR2_G	z ^{Note3}			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
$\frac{\hat{E}_s/N_{oc}}{\hat{E}_s/I_{ot}}$		dB	7	7	
\hat{E}_{s}/I_{ot}		dB	7	7	
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-58.92	-58.92	
10	NR_TDD_FR2_G	MHz Note4			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be					
constant over subcarriers and time and shall be modelled as AWGN of appropriate pow				f appropriate power	
for N_{oc} to be fulfilled.					
Note 2: SS-RSI	SS-RSRP and to levels have been derived from other parameters for information				

Note 2: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 6: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. The interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channels are used for this test, cell 1 and cell2 use RF channel 1 and
			2, respectively.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}	Unit		Cell 1			Cell 2		
Parameter	Unit	T1	T2	Т3	T1	T2	T3	
SSB ARFCN			freq1			freq2		
Duplex mode		TDD						
TDD configuration				TDDC	onf.3.1			
Downlink initial BWP Configuration				DLBV	VP.0.1			
Downlink dedicated BWP Configuration				DLBV	VP.1.1			
Uplink initial BWP configuration				ULBV	VP.0.1			
Uplink dedicated BWP configuration				ULBV	VP.1.1			
TRS configuration				TRS.2	.1 TDD			
TCI state				TCI.S	State.0			
BW _{channel}	MHz			100: N	RB,c = 66			
Data RBs allocated			66			66		
PDSCH Reference measurement channel			SR.3.1 TD	D		-		
RMSI CORESET Parameters			CR.3.1 TD	D		-		
Dedicated CORESET Parameters			CR.3.1 TE	DD		-		
OCNG Patterns				0	P.1			
SSB Configuration		SSB.1 FR2						
SMTC Configuration				SM	TC.1			
CSI-RS configuration for CSI reporting				CSI-RS	.3.1 TDD			
reportConfigType			periodic			N/A		
reportQuantity			cri-RI-CQ	l		N/A		
CSI reporting periodicity	slot		40			N/A		
CSI reporting offset	slot		4			N/A		
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of PDCCH_DMRS to SSS								
EPRE ratio of PDCCH to PDCCH_DMRS	dB				0			
EPRE ratio of PDSCH_DMRS to SSS	uБ				U			
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSS ^{Note 1}								
EPRE ratio of OCNG to OCNG DMRS Note								
Propagation conditions				AW	/GN			
Note 1: OCNG shall be used such that both	n cells are full	v allocated	and a con	stant total t	transmitted	nower spe	ectral	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

Darameter	Unit		Cell 1			Cell 2	
Parameter	Unit	T1	T2	T3	T1	T2	Т3

Angle of arrival configuration		Setup 1 according to table	Setup 1 according to table
•		A.3.15.1	A.3.15.1
Assumption for UE beams Note 7		Rough	Rough
N oc Note1	dBm/15kHz ^N	-104.7	-104.7
N oc Note1	dBm/SCS ^{Note}	-95.7	-95.7
\hat{E}_s/N_{oc}	dB	7	7
SSB_RPNote2	dBm/SCS Note4	-88.7	-88.7
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	7	7
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-58.92	-58.92

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for ___ to be fulfilled.
- Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: Void
- Note 6: Void
- Note 7: Implementation about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB} + 5$ ms as defined in clause 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot $m+T_{L1-RSRP}$. In the next DL slot after slot $m+T_{L1-RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE is onl	y required to pass in one of the supported test configurations

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}		Unit		Cell 1			Cell 2	
CCD ADECN			T1	T2	T3	T1	T2	T3
SSB ARFCN	Config 1			Freq1 FDD			Freq2 TDD	
Duplex mode	Config 1			רטט	TDD)	טטו	
	Config 1			Not Applicab				
TDD configuration	Config 2	1		TDDConf.1.		-	TDDConf.3	.1
1 DD corniguration	Config 3	+		TDDConf.2.		_	10000111.5	. !
Downlink initial				TDDC0III.2.				
BWP Configuration	Config 1,2,3				DLBWF	P.0.1		
Downlink dedicated BWP Configuration	Config 1,2,3				DLBWF	P.1.1		
Uplink initial BWP configuration	Config 1,2,3				ULBWF	P.0.1		
Uplink dedicated BWP configuration	Config 1,2,3				ULBWF			
TRS configuration	Config 1,2,3			N/A			TRS.2.1 TD	D
TCI state	Config 1,2,3				TCI.Sta	ite.0		
BW _{channel}	Config 1,2	MHz		10: $N_{RB,c} = 5$		1	00: N _{RB,c} =	66
	Config 3	1911 12		40: $N_{RB,c} = 1$				
Data RBs allocated	Config 1,2]	52	66	52	66	52	66
	Config 3		106		106		106	
PDSCH Reference	Config 1			SR.1.1 FDI		_		
measurement	Config 2]		SR.1.1 TDI			-	
channel	Config 3			SR.2.1 TDI				
RMSI CORESET	Config 1	1		CR.1.1 FDI				
Parameters	Config 2	1		CR.1.1 TDI			-	
	Config 3			CR.2.1 TDI				
Dedicated	Config 1	1		CCR.1.1 FD		_		
CORESET	Config 2	1		CCR.1.1 TD		_	-	
Parameters	Config 3			CCR.2.1 TD				
OCNG Patterns		-		000 4 504	OP.	1		
SSB configuration	Config 1,2 Config 3	-	SSB.1 FR1 SSB.3 FR2			2		
CSI-RS configuration for CSI reporting	Config 1~3			N/A		N/A	CSI- RS.3.1 TDD Note 6	CSI- RS.3.1 TDD
reportConfigType for CSI reporting				periodic			N/A	
reportConfigType for L1-RSRP				periodic			N/A	
reportQuantity for CSI reporting				cri-RI-CQI			N/A	
reportQuantity for L1-RSRP			S	sb-Index-RS	RP		N/A	
CSI reporting periodicity	Config 1,2 Config 3	slot		5 10			N/A	
L1-RSRP reporting	Config 1,2	slot		5			N/A	
periodicity Note 7	Config 3	1		10				
CSI reporting offset	Config 1,2 Config 3	slot	2 N/A					
L1-RSRP reporting	Config 1,2	slot		2		1	N/A	
offset	Config 3	0.01		4			,	
SMTC configuration	200				SMTC	J.1		
EPRE ratio of PSS to		4						
EPRE ratio of PBCH		-						
EPRE ratio of PBCH		4						
EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS		4						
		dB			0			
EPRE ratio of PDSCI		4			-			
EPRE ratio of PDSCI		-						
EPRE ratio of OCNG		1						
EPRE ratio of OCNG	IO OCING DINIKS "							

Propagation conditions			N/A Link only, see clause A.3.7A	AWGN			
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total density is achieved for all OFDM symbols.				al transmitted power spectral			
Note 2:	Void						
Note 3:	Void						
Note 4:	Void						
Note 5:	All parameters apply for configura	ation 1 and	2.				
Note 6:	6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T _{L1-RSRP} during T2.						
Note 7:	L1-RSRP measurement and repo	rting are co	onfigured to the the UE prior to the	start of time period T1.			

Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

Parameter		Unit	Cell 1		Cell 2			
		Onit	T1	T2	T3	T1	T2	T3
Angle of arrival configuration			N/A		According to clause A.3.15.1			
Assumption for UE b	eams ^{Note 7}			N/A			Rough	
$N_{oc}^{}$ Note 1	Config 1,2,3	dBm/15kHz			-104.7			
N_{oc} Note 1	Config 1,2,3	dBm/SCS				-95.7		
\hat{E}_s/N_{oc}	Config 1,2,3	dB	Link only, see clause A.3.7A		-∞	7	7	
Ê , /I "	Config 1,2,3	dB			-∞	7	7	
SSB_RPNote 2, Note 4	Config 1,2,3	dBm/SCS				-∞	-88.7	-88.7
Io ^{Note 2, Note 4}	Config 1,2,3	dBm/95.04 MHz				-66.68	-58.92	-58.92

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void

Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation.

A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot $(m+T_{L1-RSRP})$, where $T_{L1-RSRP}$ is no larger than

 $3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}}$

as defined in clause 8.3.2. For this test case, $T_{FirstSSB_MAX} = T_{SMTC_MAX} = T_{rs} = 20ms$; $T_{L1-RSRP, measure} = 160ms$ and $T_{L1-RSRP, measure}$

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \ slot \ length}$, where

- T_{HARO} is defined in Table A.5.5.3.1.1-2

 $-T_{activation_time} = 3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + max \left\{ (T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty_RRC} + T_{RRC_delay}) \right\}, \\ which allows 710 ms$

- $T_{CSI_Reporting} = 10 ms$
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot $n + \frac{T_{HARQ} + 3 ms}{NR \, slot \, length}$, as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $m+1+\frac{T_{\text{HARQ}+3\,\text{ms}+T_{\text{X}}}}{\text{NR slot length}}$, as defined in clause 8.3, where T_{X} =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $n+1+\frac{T_{HARQ}+3ms}{NR\,slot\,\,length}$ to $n+1+\frac{T_{HARQ}+3ms}{NR\,slot\,\,length}$, as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

A.7.5.4 Void

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform interfrequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Cor	nfiguration	Description					
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth					
Note:	<u> </u>						

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value	Comment
		Test 1	

Active PCell RF Channel Number 1 1 1 1 1 1 1 1 1	A ative DC		1		0-11.4	
Duplex mode			h		Cell 1	
BWchannel					·	
Data RRS Config 1, 2 Config 1, 2 DLBWP.0.1		de				
Allocated DL initial BWP Config 1, 2 DLBWP.0.1						
DL Initial BWP Config 1, 2			Contig 1, 2		66	
Configuration		A/D	0 " 1 -		DI BIAID O	
DL dedicated BWP Config 1, 2 DLBWP.1.1			Config 1, 2		DLBWP.0.1	
SWP			0		DI BIAID 4 4	
Description Config 1, 2		ed	Config 1, 2		DLBWP.1.1	
UL Initial BWP Config 1, 2						
Lil dedicated Config 1, 2 BWP Configuration Config 1, 2 TDDConf.3.1	configuration	וו	Confir 4 0		LIL D\\\D 0 4	
UL dedicated BWP			Config 1, 2		ULBWP.U.1	
BWP Configuration TDD Configuration Config 1, 2 TDDConf.3.1	LII dodicati	ווע	Config 1 2		LILDWD 4.4	
Configuration Config 1, 2		c u	Coming 1, 2		ULDVVF.I.I	
TDD		nn				
Configuration		<i>/</i> 11	Config 1 2		TDDConf 3 1	
CORESET Reference Channel Config 1, 2 CR. 3.1 TDD		on	Joining 1, 2		10000111.3.1	
Reference Channel SSB	CORFSET	J11	Config 1 2		CR 31 TDD	
Channel SSB			551mg 1, 2		510. 5.1 155	
SSB						
Configuration			Config 1		SSB.1 FR2	
SMTC		on				
Configuration PDSCH/PDCC Config 1, 2 H subcarrier spacing PRACH Config 1, 2 Configuration SSB index assigned as BFD RS (q ₀) SSB index assigned as CBD RS (q ₁) CCNG parameters CP length Normal Beam indiure detection transmiss ion parameter Ratio of hypothetical PDCCH RE energy to average SSS RE energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID gapOffset TimlnSyncOutOfSyncThreshold PDCS Config 1 Res (Config 1 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Conf						
PDSCH/PDCC		on	Joining 1, 2		3.0.1.0.0	
H subcarrier spacing PRACH	PDSCH/PF	CC	Config 1 2		120 KHz	
Spacing			Joining 1, 2		1201012	
PRACH		•				
Configuration SSB index assigned as BFD RS (qs)			Confia 1. 2		FR2 PRACH configuration 2	A.3.8.3
SSB index assigned as BFD RS (q)		on	· · · · · · · · · · · · · · · · · ·			
Gap DCH promote CCE			ned as BFD RS		0	
SSB index assigned as CBD RS						
Qq1		assiar	ned as CBD RS		1	
OCNG parameters		3.	-			
DCI format		amete	rs		OP.1	
DCI format						
Salure detection transmiss Aggregation level CCE		DCI	format			
Description Description	failure					
transmiss ion paramete rs Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX OFF Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 1 Config 2 CCE 8 0 REG bundle SI REG bundle size 6 DFF Gap pattern ID gp0 absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). Trestp- ThresholdSSB Config 2 SCS -91.5 Threshold used for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-	detection					
ion paramete rs Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rsrp- Config 1 dBm/SSB Config 2 SCS DATE Config 2 SCS REG bundle size REG bundle size GBB O ThresholdSSB Config 2 SCS GBB O O ThresholdSSB Config 2 SCS GBB O O ThresholdSSB Config 2 SCS GBB O O ThresholdSSB Config 2 SCS GBB O O ThresholdSSB Config 2 SCS GBB O O ThresholdSSB Config 2 SCS GBB O Used for deriving rsrp- rsrp- rsrp- ThresholdSSB Config 1 SCS Config 1 SCS Config 2 SCS GBB O Used for deriving rsrp-	transmiss			CCE	8	
Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy to average SSS RE energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX OFF Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rimInSyncOutOfSyncThreshold Config 1 DRX Series Abendal Size Abendal Siz	_					
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PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size BRX OFF Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold riminSyncOutOfSyncThreshold Figh Config 1 dBm/SSB ThresholdSSB DRX Config 2 SCS DRX OFF Threshold used for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-	rs					
to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 1 Config 2 Config 2 Config 1 Config 2 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 4 Config 4 Config 5 Config 5 Config 6 Config 6 Config 7 Config 7 Config 7 Config 8 Config 8 Config 8 Config 8 Config 8 Config 9				dB	0	
energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size BRX OFF Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 1 Config 2 Config 2 Config 2 Config 1 Config 2 Config 1 Config 2 Config 2 Config 2 Config 2 Config 3 Config 2 Config 3 Config 4 Config 4 Config 6 Config 6 Config 7 Config 7 Config 7 Config 7 Config 8 Config 9 Conf						
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size BRX Gap pattern ID gapOffset rlmInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 1 Config 2 Config 2 Config 2 Config 1 Config 1 Config 2 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 4 Config 4 Config 4 Config 5 Config 6 Config 6 Config 7 Config 7 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 9 Config 9 Config 9 Config 9 Config 9 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 3 Config 2 Config 3 Config 3 Config 4 Config 6 Config 7 Config 8 Config 8 Config 8 Config 8 Config 8 Config 9 Config 9 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 3 Config 4 Config 6 Config 7 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 3 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config			-			
PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size BRX OFF Gap pattern ID gp0 gapOffset rImInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 2 Config 2 Config 2 Config 2 Config 1 Config 1 Config 2 Config 3 Config 4 Co			0,			
energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX OFF Gap pattern ID gapOffset rImInSyncOutOfSyncThreshold rsrp- Config 1 dBm/SSB ThresholdSSB DRX Config 2 SCS DRX OFF Gap pattern ID GapOffset O ThresholdSSB Description ThresholdSSB Description ThresholdSSB Description REG bundle size REG bundle size REG bundle size 6 DRX OFF Gap pattern ID GapO GapOffset O Threshold is absent Abs				dB	0	
SSS RE energy		_	-			
DMRS precoder granularity REG bundle size DRX OFF Gap pattern ID gp0 gapOffset rImInSyncOutOfSyncThreshold rsrp- ThresholdSSB Config 2 Config 2 Config 1 Config 2 Config 2 Config 2 Config 3 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 Config 4 C						
granularity REG bundle size 6			•••			
REG bundle size 6					REG bundle size	
DRX OFF Gap pattern ID gp0 gapOffset 0 rlmInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp- Config 1 dBm/SSB -94.5 Threshold used for Qin_LR_SSB ThresholdSSB Config 2 SCS -91.5 for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-						
Gap pattern ID gp0 gapOffset 0 rImInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp- Config 1 dBm/SSB -94.5 Threshold used for Qin_LR_SSB ThresholdSSB Config 2 SCS -91.5 for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-		REG	bundle size			
gapOffset rlmInSyncOutOfSyncThreshold absent when the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp- ThresholdSSB Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 4 Config 5 Config 6 Config 7 Config 7 Config 8 Config 8 Config 8 Config 8 Config 8 Config 9 Config 9 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 3 Config 3 Config 4 Config 6 Config 7 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 3 Config 3 Config 3 Config 4 Config 4 Config 5 Config 6 Config 7 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 3 Config 3 Config 3 Config 4 Config 4 Config 5 Config 6 Config 7 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 3 Config 4 Config 4 Config 4 Config 4 Config 4 Config 5 Config 5 Config 6 Config 6 Config 7 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config 2 Config 2 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 1 Config 2 Config						
rlmInSyncOutOfSyncThreshold absent When the field is absent, the UE applies the value 0. (Table 8.1.1-1). rsrp- ThresholdSSB Config 1 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 2 Config 3 Config 3 Config 4 Config 5 Config 6 Config 7 Config 8 Config 7 Config 8 Config 8 Config 8 Config 8 Config 8 Config 8 Config 9 Config 9 Config 1 Config 2 Config		n ID			gp0	
absent, the UE applies the value 0. (Table 8.1.1-1). rsrp-	gapOffset			0		
rsrp- Config 1 dBm/SSB -94.5 Threshold used ThresholdSSB Config 2 SCS -91.5 for Q _{in_LR_SSB} powerControlOffsetSS db0 Used for deriving rsrp-	rlmInSyncOutOfSyncThreshold			absent		
0. (Table 8.1.1-1). rsrp-	· · · · · · · · · · · · · · · · · · ·					
rsrp- Config 1 dBm/SSB -94.5 Threshold used ThresholdSSB Config 2 SCS -91.5 for Q _{in_LR_SSB} powerControlOffsetSS db0 Used for deriving rsrp-						
ThresholdSSB Config 2 SCS -91.5 for Qin_LR_SSB powerControlOffsetSS db0 Used for deriving rsrp-						
powerControlOffsetSS db0 Used for deriving rsrp-						4
rsrp-				SCS		for Q _{in_LR_SSB}
	powerCont	rolOffs	setSS		db0	
ThresholdCSI-RS						
						ThresholdCSI-RS

beamFailureInstanceM	laxCount		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetection	Γimer		pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration	Config		CSI-RS.3.1 TDD	
for CSI reporting	1, 2			
TCI states			TCI.State.0	TCI.State.0
CSI-RS for tracking	Config 1, 2		TRS.2.1 TDD	
SSB index assigned as	RLM RS		0, 1	
T310 Timer	T310 Timer		1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	2.61	
T3		S	1.64	
T4		S	0	
T5		S	1.01	
D1		S	0.97	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Editor's note: An additional RS for RLM, different from BFD-RS at constant high SNR shall be configured as part of the test configuration.

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parame	ter	Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup	1 defined in	A.3.15	•	
Assumption for UE bear	ns ^{Note 10}				Rough		
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DN	/IRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DI	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
	Config 2		5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
	Config 2		0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/SS	-104.5	-104.5	-84.5	-84.5	-84.5
		В					
	Config 2	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
N _{oc} Config 1		dBm/120			-104.7		
		KHz					
	Config 2				-104.7		
Propagation condition				TD	L-A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.1.1-4: Void

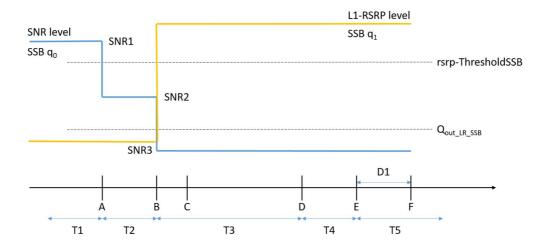


Figure A.7.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

Con	figuration	Description
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth
Note:	The UE is only r	equired to pass in one of the supported test configurations in FR2

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Р	aramete	r	Unit	Value	Comment
				Test 1	
Active PCell				Cell 1	
RF Channel Nu	mber			1	
Duplex mode		Config 1, 2		TDD	
BW _{channel}		Config 1, 2		100: N _{RB,c} = 66	
Data RBs alloca	ated	Config 1, 2		66	
DL initial BWP		Config 1, 2		DLBWP.0.1	
configuration		001111g 1, 2		525	
DL dedicated B	WP	Config 1, 2		DLBWP.1.1	
configuration					
UL initial BWP		Config 1, 2		ULBWP.0.1	
configuration					
UL dedicated B	WP	Config 1, 2		ULBWP.1.1	
configuration		, , _			
TDD Configurat	ion	Config 1, 2		TDDConf.3.1	
RMSI CORESE		Config 1		CR.3.1 TDD	
Reference Cha		Config 2		CR.3.2 TDD	†
SSB Configurat		Config 1		SSB.1 FR2	
SSB Cornigurat	.1011	Coning i		33B.1 FK2	
		Config 2		SSB.2 FR2	
		Oorning 2		00B.2 T 102	
SMTC Configuration		Config 1, 2		SMTC.3	
PDSCH/PDCCI		Config 1, 2		120 KHz	
subcarrier spacing		Cornig 1, 2		120 KHZ	
-	_				
PRACH Configuration		Config 1, 2		FR2 PRACH configuration 2	A.3.8.3
SSB index assi	gned as E	BFD RS (q ₀)		0	
SSB index assi	nned as (CBD RS (g ₄)		1	
COB III GOX GOO!	griod do C	355 NO (41)		•	
OCNG paramet	ers			OP.1	
CP length				Normal	
Beam	DCI fo	rmat		1-0	
failure	Numbe	er of Control		2	
detection		symbols			
transmission	Aggre	gation level	CCE	8	
parameters					
	Ratio	of hypothetical	dB	0	
	PDCC	H RE energy			
	to ave	rage SSS RE			
	energy				
	Ratio	Ratio of hypothetical PDCCH DMRS		0	
		_			
		to average E energy			
		precoder		REG bundle size	
				REG buildle size	
	granul	undle size		6	+
DDV	I KEG D	uriule size		-	A 2 2 2
DRX Con nottorn ID				DRX.3	A.3.3.3
Gap pattern ID				N.A.	

rlmInSyncOutOfSyncThreshold				absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB	Config		dBm/SSB	-94.5	Threshold used
	Config	2	SCS	-91.5	for Q _{in_LR_SSB}
powerControlOffsetSS	3			db0	Used for deriving rsrp- ThresholdCSI- RS
beamFailureInstanceN	/laxCoun	t		n1	see clause 5.17 of TS 38.321 [7]
beamFailureDetection	Timer			pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration reporting	for CSI	Config 1, 2		CSI-RS.3.1 TDD	A.3.14.2
TCI states				TCI.State.0	TCI.State.0
CSI-RS for tracking		Config 1, 2		TRS.2.1 TDD	
SSB index assigned a	s RLM R	.S		0, 1	
T310 Timer			ms	1000	
N310				2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1	
T2			S	3.37	
T3		S	2.8		
T4			S	0	
T5			S	0.61	
D1			S	0.57	

All configurations are assigned to the UE prior to the start of time period T1. UE-specific PDCCH is not transmitted after T1 starts. Note 1: Note 2:

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parame	Unit			Test 1				
			T1	T2	Т3	T4	T5	
AoA setup			Setup 1 defined in A.3.15					
Assumption for UE bear			•	Rough				
EPRE ratio of PDCCH D	OMRS to SSS	dB			0			
EPRE ratio of PDCCH to	o PDCCH DMRS	dB						
EPRE ratio of PBCH DN	MRS to SSS	dB	Ī					
EPRE ratio of PBCH to	PBCH DMRS	dB	Ī					
EPRE ratio of PSS to S	SS	dB	Ī					
EPRE ratio of PDSCH D	MRS to SSS	dB	Ī					
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note} 11	-3 ^{Note 11}	-12	-12	-12	
	Config 2	_	5 ^{Note}	-3 ^{Note 11}	-12	-12	-12	
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2	
·	Config 2		0.2	0.2	20.2	20.2	20.2	
SSB_RP of set q ₁	Config 1	dBm/SSB	- 104. 5	-104.5	-84.5	-84.5	-84.5	
	Config 2	SCS	- 101. 5	-101.5	-81.5	-81.5	-81.5	
N_{oc}	Config 1	dBm/120 KHz			-104.7	•	1	
	Config 2				-104.7			
Propagation condition				TE	DL-A 30ns	75Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.2.1-4: Void

Table A.7.5.5.2.1-5: Void

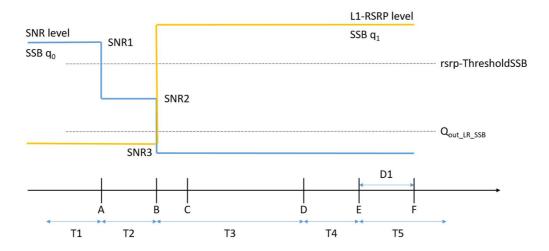


Figure A.7.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description				
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Paramet	or	Unit	Value	Comment
Faraniei	.ei	Offic	Test 1	Comment
			16211	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
BW _{channel}	Config 1	MHz	100: $N_{RB,c} = 66$	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference	Config 1		CR.3.1 TDD	A.3.1.2
Channel				
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH	Config 1		120KHz	
subcarrier spacing	0 " 1		EDO DD AOU	4 0 0 0
PRACH Configuration	Config 1		FR2 PRACH	A.3.8.3
ani DC Inday anaimand	as bases failure		configuration 4	
csi-RS-Index assigned	as beam failure		0	
detection RS in set q ₀ TRS configuration		+	TRS.2.1 TDD	+
PDSCH/PDCCH TCI st	ate		TCI.State.2	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	A.J.Z.1
Beam failure	DCI format	+	1-0	+
detection	Number of	+	2	+
transmission	Control OFDM		2	
parameters	symbols			
	Aggregation	CCE	8	
	level		-	
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical PDCCH			
	DMRS energy			
	to average			
	CSI-RS RE			
	energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			OFF	
Gap pattern ID			N.A.	1
csi-RS-Index assigned			1	
beam detection RS in s	set q ₁		1 .	140 0 0 111
rlmInSyncOutOfSyncTh	nresnoid		absent	When the field is
				absent, the UE
				applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm/SC	-94.5	Threshold used
101P THIOSHOROOD		S kHz	UT.U	for Q _{in_LR_SSB}
powerControlOffsetSS		U 10.12	db0	Used for deriving
			420	rsrp-
				ThresholdCSI-RS
beamFailureInstanceM	axCount		n1	see clause 5.17 of
				TS 38.321 [7]
beamFailureDetectionT	imer		pbfd4	see clause 5.17 of
	T.			TS 38.321 [7]
CSI-RS configuration	Config 1		CSI-RS.3.2 TDD	A.3.14.2
for q ₀ and q ₁				

CSI-RS configuration	Config 1		CSI-RS.3.1 TDD	A.3.14.2
for CSI reporting				
csi-RS-Index assigned	as RLM RS		0, 1	A.3.14.2
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	1.17	
T3		S	0.9	
T4		S	0	
T5		S	0.31	
D1		S	0.27	
Note 1: UE-specific I	PDCCH is not tran	smitted afte	r T1 starts.	

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Paramet	Unit	Test 1					
			T1	T2	Т3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beam	S Note 10				Rough		
EPRE ratio of PDCCH DI	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMI	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB					
EPRE ratio of PDSCH DI	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to C	OCNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q ₁	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS kHz					
N_{oc}	Config 1	dBm/15			-104.7		
·oc		KHz					
Propagation condition				TDI	L-A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.3.1-4: Void Table A.7.5.5.3.1-5: Void

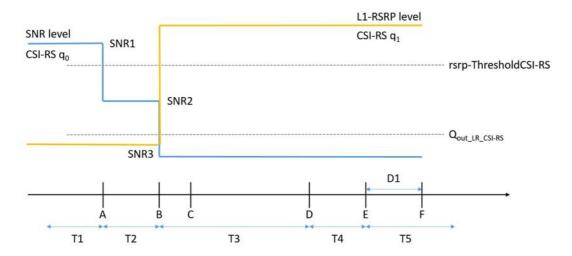


Figure A.7.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration

timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Paramete	7	Unit	Value	Comment
i di dilicio	•	O.III	Test 1	Comment
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		TDD	
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66	
Data RBs allocated	Config 1		66	
TDD Configuration	Config 1		TDDConf.3.1	
CORESET Reference Channel	Config 1		CR.3.1 TDD	A.3.1.2
SSB Configuration	Config 1		SSB.1 FR2	A.3.10
SMTC Configuration	Config 1		SMTC.3	A.3.11
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz	
PRACH Configuration	Config 1		FR2 PRACH configuration 4	A.3.8.3
csi-RS-Index assigned as	beam failure		0	
detection RS in set q ₀			-	
TRS configuration			TRS.2.1 TDD	
PDSCH/PDCCH TCI state			TCI.State.2	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	, , , , , , , , , , , , , , , , , , ,
Beam failure detection	DCI format		1-0	
transmission parameters	Number of Control OFDM symbols		2	
	Aggregation level	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average CSI- RS RE energy	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0	
	DMRS precoder granularity		REG bundle size	
	REG bundle size		6	
DRX	•		DRX.3	A.3.3.3
Gap pattern ID			N.A.	
csi-RS-Index assigned as detection RS in set q ₁	candidate beam		1	
rlmInSyncOutOfSyncThres	shold		absent	When the field is absent, the UE applies the value 0. (Table 8.1.1-1).
rsrp-ThresholdSSB		dBm/SC S kHz	-94.5	Threshold used for Q _{in_LR_SSB}
powerControlOffsetSS		O IXI IZ	db0	Used for deriving rsrp-
beamFailureInstanceMaxC	Count		n1	ThresholdCSI-RS see clause 5.17 of TS 38.321 [7]
beamFailureDetectionTime	er		pbfd4	see clause 5.17 of TS 38.321 [7]
CSI-RS configuration for q ₀ and q ₁	Config 1		CSI-RS.3.2 TDD	A.3.14.2

CSI-RS configuration for	Config 1		CSI-RS.3.1 TDD	A.3.14.2
CSI reporting				
csi-RS-Index assigned as	Config 1		CSI-RS.3.2 TDD	A.3.14.2
RLM RS				
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	5.43	
T3		S	5.16	
T4		S	0	
T5	·	S	0.31	
D1	·	S	0.27	
Note 1: UE-specific PDC	CH is not transm	itted after T1	starts.	·

Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit					
			T1	T2	Т3	T4	Т5
AoA setup				Setup ²	l defined in	A.3.15	l .
Assumption for UE beams	Note 10			•	Rough		
EPRE ratio of PDCCH DN	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DN	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q ₁	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS kHz					
N_{oc}	Config 1	dBm/12			-104.7		
OC		0 KHz					
Propagation condition				TDI	L-A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.4.1-4: Void Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void

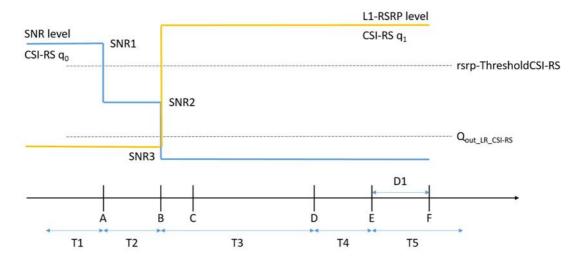


Figure A.7.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In

the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

Configuration Description					
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment	
	O i iii	Test 1	Comment		
Active PCell		Cell 1			
RF Channel Number			1		
Duplex mode	Config 1		TDD		
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66		
Data RBs allocated	Config 1		66		
TDD Configuration	Config 1		TDDConf.3.1		
DL initial BWP	Config 1		DLBWP.0.1		
configuration	0-75-4		DLBWP.1.1		
DL dedicated BWP configuration	Config 1				
UL initial BWP configuration	Config 1		ULBWP.0.1		
UL dedicated BWP configuration	Config 1		ULBWP.1.1		
CORESET Reference Channel	Config 1		CR. 3.1 TDD		
SSB Configuration	Config 1		SSB.1 FR2		
SMTC Configuration	Config 1		SMTC.1		
PDSCH/PDCCH	Config 1		120 KHz		
subcarrier spacing			0 1 11 12		
PRACH	Config 1		FR2 PRACH	A.3.8.3	
Configuration			configuration 2		
SSB index assigned as B	FD RS (q ₀)		0		
SSB index assigned as C	BD RS (q ₁)		1		
TRS configuration		TRS.2.1 TDD			
TCI configuration		TCI.State.0 OP.1			
	OCNG parameters				
CP length			Normal		
Beam failure detection	DCI format		1-0		
transmission parameters	Number of Control OFDM symbols		2		
	Aggregation level	CCE	8		
	Ratio of hypothetical	dB	0		
	PDCCH RE energy to				
	average SSS RE energy				
	Ratio of hypothetical	dB	0		
	PDCCH DMRS energy to				
	average SSS RE energy		REG bundle size		
	DMRS precoder granularity				
DRX	REG bundle size		6 OFF	DRX is not in use	
Gap pattern ID			N.A.	No measurement gap	
Sap pattern iD			IN./A.	pattern is configured	
ssb-Index			2	Number of SSB indexes	
COD MIGOX			_	used for beam failure	
				detection	
rlmInSyncOutOfSyncThreshold			absent	When the field is	
				absent, the UE applies the 10%	
rsrp-ThresholdSSB		dBm/S	-94.5	Threshold used for	
		CS kHz		Q _{in_LR_} SSB	
powerControlOffsetSS		73174	db0	Used for deriving rsrp-	
<u> </u>				ThresholdCSI-RS	
beamFailureInstanceMaxCount			n1	see TS 38.321 [7], clause 5.17	
beamFailureDetectionTimer			pbfd4	see TS 38.321 [7], clause 5.17	
CSI Configuration for reporting	Config 1		CSI-RS.3.1 TDD	A.3.14.2	
	l	ms	1000		
N310 Timer	T310 Timer				
14310	ı	2	<u>l</u>		

T1		S	1	During this time the the	
				UE shall be fully synchronized to cell 1	
				Synchronized to cell 1	
T2		S	2.6		
T3 s 1.64					
T4		S	0		
T5 s 1.01					
D1 s 0.97					
Note 1: All configurations are assigned to the UE prior to the start of time period T1.					
Note 2: UF-specific PDCCH is not transmitted after T1 starts.					

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
AoA Setup				Setup1 defined in A.3.15.1			
Assumption for UE bear	ms Note 10				Rough		
EPRE ratio of PDCCH I	DMRS to SSS	dB			0		
EPRE ratio of PDCCH t	o PDCCH DMRS	dB					
EPRE ratio of PBCH DI	MRS to SSS	dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/S CS kHz	-104.5	-104.5	-84.5	-84.5	-84.5
N_{oc} Config 1		dBm/15 KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam given in B.2.1.3 and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

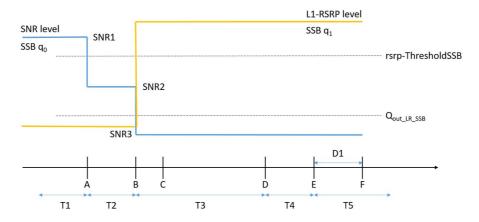


Figure A.7.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.7.5.6 Active BWP switch

A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after bwp-InactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($j+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot ($j+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSR SCS 100 MHz bandwidth TDD -TDD dupley mode

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

FR2	Parameter	Unit	Cell 1	Cell2	
TDD configuration TDDConf.3.1 BWchannel Active BWP ID O Downlink initial BWP Configuration DUBWP.0.2 Uplink initial BWP Configuration Downlink active BWP-0 Configuration Downlink active BWP-0 Configuration Downlink active BWP-1 Configuration Downlink active BWP-2 Configuration Downlink active BWP-2 Configuration ULBWP.0.2 Downlink active BWP-2 Configuration ULBWP.0.2 Uplink active BWP-2 Configuration ULBWP.0.2 Uplink active BWP-2 Configuration ULBWP.0.2 Ulbury.0.2 Ulbury.0.3 Ulbury.0.1 Ulbury.0.1 Ulbury.0.2 Ulbury.0.2 Ulbury.0.3 Ulbury.0.3 Ulbury.0.3 Ulbury.0.3 Ulbury.0.4 Ulbury.0.5 CR.3.1 TDD TRS configuration TRS configuration TRS configuration TRS.2.1 TDD TCI state TCI.State.0 RMSI CORESET parameters CR.3.1 TDD Dedicated CORESET parameters CR.3.1 TDD OCNG Patterns SBB Configuration SBB Configuration SBB Configuration SBB Configuration SBB SBB O OP.1 SSB Configuration SWTC.1 Correlation Matrix and Antenna Configuration Correlation Matrix and Antenna Configuration Correlation FDC DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS			FR2	FR2	
BW-channel	Duplex mode		TDD		
Active BWP ID Downlink initial BWP Configuration Uplink initial BWP Configuration Uplink initial BWP Configuration Downlink active BWP-0 Configuration Downlink active BWP-1 Configuration Downlink active BWP-1 Configuration Downlink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-1 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-3 Configuration Uplink active BWP-4 Configuration Uplink active BWP-5 Configuration Uplink active BWP-6 Configuration Uplink active BWP-8 Configuration Uplink active BWP-9 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-2 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-1 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-2 Configuration Uplink active BWP-	TDD configuration		TDDConf.3.1		
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Dedicated CORESET parameters OCR.3.1 TDD OCNG Patterns OP.1 SSB Configuration SMTC.1 Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS	TCI state		TCI.	State.0	
OCNG Patterns SSB Configuration SSB.1 FR2 SMTC Configuration SMTC.1 Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS	RMSI CORESET parameters	CR.3.1 TDD		3.1 TDD	
SSB Configuration SSB.1 FR2 SMTC Configuration SMTC.1 Correlation Matrix and Antenna 1x2 Low Configuration 0 EPRE ratio of PSS to SSS dB EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS	Dedicated CORESET parameters		CCR.3.1 TDD		
SMTC Configuration Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH DMRS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS	OCNG Patterns		OP.1		
Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS	SSB Configuration				
Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS	SMTC Configuration		SMTC.1		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS			1x2	2 Low	
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note	·				
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)	1				
Propagation Condition AWGN AWGN Note 1: OCNG shall be used such that both calls are fully allocated and a constant total transmitted power spectral					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.6.1.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2		
ngle of arrival configuration Setup 1 defined in clause A.3.15.1					
Assumption for UE beams Note 6 Fine Fine					
$N_{oc}^{ m Note1}$	dBm/15kHz	-112	-112		
$N_{oc}^{}$ Note1	dBm/SCS	-103	-103		
SS-RSRP ^{Note2} dBm/SCS Note3 -85 -85					
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	$ m /I_{ot}$ dB 18 18				
O ^{Note4} dBm/95.04 MHz Note4 -56 -56					
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled. Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.					
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone. Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test					

A.7.5.6.1.1.2 Test Requirements

system implementation.

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k_1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the first UL slot that occurs after the beginning of DL slot (i+ $T_{BWPswitchDelay}$ + k_1), (j+ $T_{BWPswitchDelay}$ + k_1), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after bwp-InactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description				
1	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations					

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 2	ub	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	0	
Cell2 timing offset to cell1		3	Time alignment error as specified in TS
	μs	3	38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
	Config 2,3		TDD	
TDD configuration	Config 1		Not Applicable	TDDConf.3.1
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
BW _{channel}	Config 1,2	MHz	10 MHz: N _{RB,c} = 52	100 MHz: N _{RB,c} = 66
	Config 3		40 MHz: N _{RB,c} = 106	
Active BWP ID			0	1, 2
Downlink initial BWP	Configuration		DLBW	P.0.2
Uplink initial BWP Co	nfiguration		ULBW	P.0.2
Downlink active BWF	P-0 Configuration		DLBWP.0.2	-
Downlink active BWF	P-1 Configuration		-	DLBWP.1.1
Downlink active BWF	P-2 Configuration		-	DLBWP.1.3
Uplink active BWP-0	Configuration		ULBWP.0.2	-
Uplink active BWP-1	Configuration		-	ULBWP.1.1
Uplink active BWP-2	Configuration		-	ULBWP.1.3
PDSCH Reference	Config 1		SR.1.1 FDD	SR.3.1 TDD
measurement	Config 2	j	SR.1.1 TDD	
channel	Config 3	1	SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	CR.3.1 TDD
parameters	Config 2	1	CR.1.1 TDD	
•	Config 3	1	CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	CCR.3.1 TDD
CORESET	Config 2	1	CCR.1.1 TDD	
parameters	Config 3	1	CCR.2.1 TDD	
OCNG Patterns			OP.	.1
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2
•	Config 3	1	SSB.2 FR1	
TRS configuration	Config 1,2,3		-	TRS.2.1 TDD
TCI state	Config 1,2,3		TCI.State.0	TCI.State.0
SMTC Configuration	<u> </u>		SMT	C.1
Correlation Matrix an	d Antenna		NA	1x2 Low
Configuration			Link only, see clause A.3.7A	
EPRE ratio of PSS to		dB	0	0
EPRE ratio of PBCH	DMRS to SSS]		
EPRE ratio of PBCH	to PBCH DMRS]		
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS]		
EPRE ratio of PDSCH to PDSCH]		
EPRE ratio of OCNG DMRS to SSS(Note				
1)]		
EPRE ratio of OCNG	to OCNG DMRS			
(Note 1)				
Propagation Condition	n		NA	AWGN
Note 1: OCNG shr		<u> </u>	Link only, see clause A.3.7A	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

	Parameter	Unit	Cell 1	Cell 2	
Angle of	arrival configuration			Setup 1 defined in	
Angle of	anival configuration			clause A.3.15.1	
Assumpt	ion for UE beams Note 6			Fine	
N_{oc} Note1	N oc Note1			-112	
N oc Note1		dBm/SCS	NA Link only, see clause	-103	
SS-RSRI	PNote2	dBm/SCS Note3	A.3.7A	-85	
\hat{E}_{s}/I_{ot}		dB		18	
Io ^{Note4}		dBm/95.04 MHz ^{Note4}		-56	
Note 1:	Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.				
Note 2:			other parameters for information	n purposes. They are not	
settable parameters themselves.					
Note 3:			ssuming independent interfere	ence and noise at each	
receiver antenna port.					
	Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone				
Note 5:	Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.				

A.7.5.6.1.2.2 Test Requirements

system implementation.

Note 6:

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$.

Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

If the UE doesn't support per-FR gap,

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

Otherwise no interruption due to BWP switch on SCell is allowed.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+kI$), ($j+T_{BWPswitchDelay}+kI$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts.

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell 1's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell 1.

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after bwpInactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

	Config	Description	
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1:	Void.		
Note 2:	2: A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in A.7.5.6.1.3.		

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

	Parameter	Unit	Cell 2	
Angle of arrival configuration			Setup 1 defined in	
			clause A.3.15.1	
Assumpti	Assumption for UE beams Note 6		Fine	
Noc ^{Note 1}	N _{oc} Note 1		-112	
		kHz	-112	
N _{oc} Note 1		dBm/SCS	-103	
SS-RSRI	Note 2	dBm/120	-85	
		kHz Note3	-65	
Ês/Iot		dB	18	
	Ê _s /N _{oc} Note 5		18	
Io ^{Note2}		dBm/95.04	-56	
		MHz Note4	-30	
Note 1:	Note 1: Interference from other cells and noise sources not specified in the test is			
	assumed to be constant over subo	carriers and tim	ne and shall be modelled as	
	AWGN of appropriate power for N			
Note 2:	SS-RSRP and lo levels have beer			
	information purposes. They are no			
Note 3:	SS-RSRP minimum requirements			
	interference and noise at each receiver antenna port.			
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone			
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone.			
Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.				

A.7.5.6.1.3.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelav}+kI)$.

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k1$), ($j+T_{BWPswitchDelay}+k1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts.

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot i + $\frac{{}^{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}}{NR \, Slot \, length} \, as \, defined \, in \, clause \, 8.6.3 \, and \, starts \, to \, report \, valid \, ACK/NACK \, for the PCell from the first UL slot that occurs after the beginning of DL slot i + <math display="block">\frac{{}^{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}}{NR \, Slot \, length} + k1. \, The \, UE \, shall \, be \, continuously \, scheduled \, on \, PSCell's \, BWP-1 \, starting \, from \, the \, first \, DL \, slot \, that \, occurs \, after \, the \, beginning \, of \, DL \, slot \, i + <math display="block">\frac{{}^{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}}{NR \, Slot \, length}.$

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.7.5.6.2.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	S	0.2	

Table A.7.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter			Unit	Cell 1
Frequenc	Frequency Range			FR2
Duplex m	Duplex mode			TDD
TDD conf	iguration			TDDConf.3.1
BW _{channel}				100 MHz: N _{RB,c} = 66
Active BV	VP ID			1
Initial DL	Initial DL BWP Configuration			DLBWP.0.2
Initial UL	Initial UL BWP Configuration			ULBWP.0.2
Initial Cor		Active DL BWP-1		DLBWP.1.3
		Configuration		
		Active UL BWP-1		ULBWP.1.3
		Configuration		
Final		Active DL BWP-1		DLBWP.1.1
Condition		Configuration		525W1
		Active UL BWP-1		ULBWP.1.1
		Configuration		GEBWI IIII
PDSCH F	Peference r	measurement channel		SR.3.1 TDD
	RESET pa			CR.3.1 TDD
		T parameters		CCR.3.1 TDD
OCNG Pa		1 parameters		OP.1
SSB Con				SSB.1 FR2
	nfiguration			SMTC.1
TCI State				TCI.State.0
	TRS Configuration			TRS.2.1 TDD
Antenna Configuration			1x2	
	Propagation Condition			AWGN
FPRF ratio	of PSS to S	SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		ub	O O	
	EPRE ratio of PBCH to PBCH DMRS			
	EPRE ratio of PDCCH DMRS to SSS			
		to PDCCH DMRS		
		DMRS to SSS		
	of PDSCH			
		OMRS to SSS(Note 1)		
		O OCNG DMRS (Note 1)		
Note 1:		all be used such that the	rocources in t	Call 1 are fully allegated
Note 1.				density is achieved for all
		-	ower spectrar t	density is achieved for all
Note 2:	OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is			not enecified in the test is
assumed to be constant over subcarriers				
		I of appropriate power for		
Note 3:				
	Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 4:				an UL BWP. DLBWP.0.2
is linked with ULBWP.0.2; DLBWP.1.1 is linked with UL				
		.3 is linked with ULBWP		
	[3].			

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Parameter		Unit	Cell 2
Angle of arrival configuration			Setup 1 according to table A.3.15
Assumption for UE be	eams Note 5		Fine
	NR_TDD_FR2_A		
	NR_TDD_FR2_B]	
Note1	NR_TDD_FR2_F	dBm/15kHz	-112
	NR_TDD_FR2_G	UDIII/ IONI IZ	-112
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
	NR_TDD_FR2_A	dBm/SCS	-103
	NR_TDD_FR2_B	ubiii/SCS	

		NR_TDD_FR2_F		
N oc Note1		NR_TDD_FR2_G		
		NR_TDD_FR2_T		
		NR_TDD_FR2_Y		
		NR_TDD_FR2_A		
		NR_TDD_FR2_B		
SS-RSRI	⊃Note2	NR_TDD_FR2_F	dBm/SCS	-85
33-K3Ki		NR_TDD_FR2_G	Note3	
		NR_TDD_FR2_T		
		NR_TDD_FR2_Y		
		NR_TDD_FR2_A		
		NR_TDD_FR2_B		
Io ^{Note2}		NR_TDD_FR2_F	dBm/95.04 MHz ^{Note4}	-56
10		NR_TDD_FR2_G		
		NR_TDD_FR2_T		
		NR_TDD_FR2_Y		
Note 1:	Interference	ce from other cells and	noise sources no	ot specified in the test is
	assumed t	o be constant over sub	carriers and time	e and shall be modelled as
	AWGN of	appropriate power for	N_{ac} to be fulfilled	d.
Note 2:	SS-RSRP	and lo levels have bee	en derived from o	ther parameters for
	information purposes. They are n			•
Note 3: SS-RSRP minimum requirements		•		
interference and noise at each red				
Note 4: Equivalent power received by an antenna			antenna with 0 c	dBi gain at the centre of the
	quiet zone			-
Note 5:	Information	n about types of UE be	am is given in B.	2.1.3 and does not limit UE
implementation or test system implementation.				

A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7 PSCell addition and release delay

A.7.5.7.1 Addition and Release Delay of known NR PSCell

A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the UE shall identify Cell 2 and send an event-triggered report. When the tests system receives the report, it shall send updated measurement control information where the measurement gap pattern is released. Before the start of T3, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T3.

During T3, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T4.

During T4, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T5.

During T5, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

Config	Description		
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
Note 1: The UE is only requ	Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

Parameter		Unit	Value	Comment			
RF Cha	RF Channel Number		1, 2	Two radio channels are used for this test			
Active PCell			Cell 1	PCell on RF channel number 1 in FR1			
Neighbour cell		Cell 2		Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2			
A4	Hysteresis	dB	0	Hysteresis for event A4			
	Threshold RSRP	dBm	-118	Threshold for event A4			
	Time to Trigger	S	0	Time to trigger for event A4			
DRX			OFF	For both PCell and PSCell once activated			
Measure	Measurement gap pattern ID		rement gap pattern ID 0		0	Gaps are configured before T2 and released before T3.	
PRACH configuration in Cell 2			FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.			
	CSI reporting periodicity and offset configuration for Cell 2		2				
T1	•		5	During this time the PCell is known and Cell 2 is unknown.			
T2	T2		1	During this time the UE shall identify neighbour cell 2 and report event B1.			
T3		S		During this time the UE adds the PSCell.			
T4		S	1	During this time the UE sends CSI reports for PSCell.			
T5		S	1	During this time the UE releases the PSCell.			

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2				
				T1	T2	T3	T4	T5
Frequency Range		1,2,3	FR1			FR2		
Duplex mode		1	FDD	TDD				
		2,3	TDD	טטו				
TDD configuration		1	_					
		2	TDDConf.1.1]	TE	DConf.	3.1	
		3	TDDConf.2.1					
BW _{channel}	MHz	1,2	10: N _{RB,c} = 52		100: N _{RB,c} = 66			
	IVII IZ	3	40: N _{RB,c} = 106	100. INRB,c = 00				
Data RBs allocated		1,2	52			48		
		3	106			48		
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1		D	LBWP.0).1	
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1		U	LBWP.0).1	
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1		D	LBWP.1	1.1	
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1		U	LBWP.1	1.1	
PDSCH Reference Measurement		1	SR.1.1 FDD					
Channel		2	SR.1.1 TDD	SR.3.3 TDD				
		3	SR.2.1 TDD	ĺ				
TRS configuration		1,2,3	_	TRS.2.1 TDD				
TCI state		1,2,3	_	TCI.State.0				
RMSI CORESET parameters		1	CR.1.1 FDD	CR.3.2 TDD				
		2	CR.1.1 TDD					
		3	CR.2.1 TDD					
Dedicated CORESET parameters		1	CCR.1.1 FDD	CCR.3.7 TDD				
		2	CCR.1.1 TDD					
		3	CCR.2.1 TDD					
OCNG Patterns ^{Note1}		1,2,3	OP.1			OP.3		
SSB configuration		1,2	SSB.1 FR1		9	SB.2 FF	22	
		3	SSB.2 FR1					
SMTC configuration		1,2,3	SMTC.2	SMTC.1				
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15]		120		
		3	30					
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS de		1,2,3	0			0		
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH]							
EPRE ratio of OCNG DMRS to SSS]							
EPRE ratio of OCNG to OCNG DMRS								
Propagation Condition		1,2,3	N/A			AWGN		
Note 1. OCNC shall be used such that a	acceptant total	l transmitta	d	J = = .	: :	l f	- 11 05	-DM

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1		Cell 2				
				T1	T2	T3	T4	T5	
Angle of arrival configuration		1,2,3		Setup 2a according to clause A.3.15.2.1			use		
Assumption for UE beams Note 3				Rough					
Ês	dBm/SCS	1,2,3	Link only,	-∞ -81					
SSB_RP Note1, Note2	dBm/SCS	1,2,3	see clause	-∞ -81					
$\hat{E}_{_{ m S}}/{ m I}_{_{ m Ot\ BB}}$ Note1, Note 4	dB	1,2,3	A.3.7A	-∞ 4.88					
Io Note 1, Note2	dBm/95.04 MHz	1,2,3		N/A -56.41					

- Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
- Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

Config	Description		
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz		
Note 1: The UE is only required to be tested in one of the supported test configurations			

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

Parameter	Unit	Value	Comment		
RF Channel Number		1, 2	Two radio channels are used for this test		
Active PCell		Cell 1	PCell on RF channel number 1 in FR1		
Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2		
DRX		OFF	For both PCell and PSCell once activated		
PRACH configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.		
CSI reporting periodicity and offset configuration for Cell 2	ms	[2]			
T1	S	5	During this time the PCell is known and Cell 2 is unknown.		
T2	S	1	During this time the UE adds the PSCell.		
Т3	S	1	During this time the UE sends CSI reports for PSCell.		
T4	S	1	During this time the UE releases the PSCell.		

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit Co		Cell 1	Cell2		
				T1 T2 T3 T4		
Frequency Range		1,2,3	FR1	FR2		
Duplex mode		1	FDD	TDD		
		2,3	TDD	TDD		
TDD configuration		1	_			
-		2	TDDConf.1.1	TDDConf.3.1		
		3	TDDConf.2.1			
BW _{channel}		1,2	10: N _{RB,c} = 52	400 N		
	MHz	3	40: N _{RB,c} = 106	100: $N_{RB,c} = 66$		
Data RBs allocated		1,2	52			
		3	106	48		
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1	DLBWP.0.1		
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1	ULBWP.0.1		
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1	DLBWP.1.1		
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1	ULBWP.1.1		
PDSCH Reference Measurement		1	SR.1.1 FDD			
Channel		2	SR.1.1 TDD	SR.3.3 TDD		
		3	SR.2.1 TDD			
TRS configuration		1,2,3	_	TRS.2.1 TDD		
TCI state		1,2,3	_	TCI.State.0		
RMSI CORESET parameters		1	CR.1.1 FDD			
·		2	CR.1.1 TDD	CR.3.2 TDD		
		3	CR.2.1 TDD			
Dedicated CORESET parameters		1	CCR.1.1 FDD			
		2	CCR.1.1 TDD	CCR.3.7 TDD		
		3	CCR.2.1 TDD			
OCNG Patterns ^{Note1}		1,2,3	OP.1	OP.3		
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2		
		3	SSB.2 FR1			
SMTC configuration		1,2,3	SMTC.2	SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120		
		3	30			
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0	0		
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH		1				
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS		1				
Propagation Condition Note 1: OCNG shall be used such that are		1,2,3	AWGN	AWGN		

Note 1: OCNG shall be used such that and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1		Cell 2				
				T1	T2	T3	T4		
Angle of arrival configuration		1,2,3		Setup 2a according to clause A.3.15.2.1					
Assumption for UE beams Note 3				Rough					
Ês	dBm/SCS	1,2,3	Link only,	-∞ -81					
SSB_RP Note1, Note 2	dBm/SCS	1,2,3	see clause	-∞ -81					
$\hat{E}_{\!_{s}}/I_{\!_{ot}}$ BB Note1, Note 4	dB	1,2,3	A.3.7A	-∞ 4.88					
IO Note 1, Note 2	dBm/95.04 MHz	1,2,3		N/A -56.41					

- Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.
- Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.8 Active TCI state switch delay

A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 1 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for

both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. tci-PresentInDCI is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ T_{HARQ} +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + ($T_{first-SSB}$ + $T_{SSB-proc}$).

Table A.7.5.8.1.1.1-1: Supported test configurations

Config	Description			
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this
		Į	test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	
T2	S	0.2	

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCl state switch

Parameter	Unit	Cell 1					
Frequency Range		FR2					
Duplex mode		TDD					
TDD configuration		TDDConf.3.1					
BW _{channel}		100 MHz: N _{RB,c} = 66					
Data RBs allocated		66					
Initial DL BWP Configuration		DLBWP.0.2					
Dedicated DL BWP Configuration		DLBWP.1.1					
Initial UL BWP Configuration		ULBWP.0.2					
Dedicated UL BWP Configuration		ULBWP.1.1					
PDSCH Reference measurement channel		SR.3.2 TDD					
RMSI CORESET parameters		CR.3.1 TDD					
Dedicated CORESET parameters		CCR.3.1 TDD					
OCNG Patterns		OP.5					
SSB Configuration		SSB.1 FR2					
SMTC Configuration		SMTC.1					
TCI State 0		TC. State.0					
TCI State 1		TCI.State.1					
TRS Configuration		TRS.2.1 TDD					
Correlation Matrix and Antenna		1x2 Low					
Configuration							
EPRE ratio of PSS to SSS	dB	0					
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note							
1)							
Propagation Condition		AWGN					
Note 1: OCNG shall be used such that a constant total transmitted power spectral							

density is achieved for all OFDM symbols.

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Paran	neter	Unit	Cell 1				
			SS	B0	SS	SB1	
			T1	T2	T1	T2	
Angle of arrival			Setup	3 Accordin	g to clause	A.3.15.3	
configuration			-				
			Ao	A1	A	oA2	
Assumpti	on for		Ro	ugh	Ro	ough	
UE beam	S Note 6			1			
Ês		dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
SSB-RP1		dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Not	e 7	dB	8.3	8.3	-Infinity	8.3	
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0	
Note 1:	Void						
Note 2:		and lo levels have been		•		information	
		s. They are not settable բ	parameters	themselves	S.		
Note 3:	Void						
Note 4:	Equivale	ent power received by an	antenna wit	th 0 dBi gai	n at the cen	tre of the	
Note 5:	As obse	rved with 0dBi gain anter	nna at the ce	enter of the	quiet zone.		
Note 6:	· · · · · · · · · · · · · · · · · · ·						
	implementation or test system implementation.						
Note 7:							
	assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-						
		nd an allowance of 1dB f		band relax	ation factor	ΔMB_P from	
	TS 38.1	01-2 [19] Table 6.2.1.3-4.					

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARQ}+3 ms$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $T_{first\text{-}SSB}$

A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic

L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing}$ + $T_{first\text{-SSB}}$ + 2ms.

Table A.7.5.8.2.1.1-1: Supported test configurations

Config	Description			
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this
		ı	test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	
T2	S	0.2	

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Data RBs allocated		66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.0
TCI State 1		TCI.State.1
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic
Number of reported RS		2
L1-RSRP reporting period	slot	640
timeRestrictionForChannelMeasurements		configured
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN
N. CONO. I. III.		0 11.4 (11 11 1 1 1 1

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit		C	ell 1		
		SS	B0	SSB1		
		T1	T2	T1	T2	

Angle of	arrival		to clause	A.3.15.3			
configura	ition		Ao	A1	A	AoA2	
Assumpti	ion for		Roi	ugh	Ro	ough	
UE beam	IS Note 6						
Ês		dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
SSB-RP1		dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Not	te 7	dB	8.3	8.3	-Infinity	8.3	
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0	
Note 1:	Void						
Note 2:	SSB-RF	and lo levels have been	derived from	m other par	ameters for	information	
	purpose	s. They are not settable p	parameters t	themselves			
Note 3:	Void						
Note 4:	Equivale	ent power received by an	antenna wit	h 0 dBi gair	n at the cen	tre of the	
	quiet zo	ne					
Note 5:	As obse	rved with 0dBi gain anter	na at the ce	enter of the	quiet zone.		
Note 6:		ion about types of UE be	•		and does no	t limit UE	
	implementation or test system implementation.						
Note 7:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value						
	assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-						
	2 [19], a	nd an allowance of 1dB f	or UE multi-	band relaxa	ation factor	∆MB _P from	
	TS 38.1	01-2 [19] Table 6.2.1.3-4.					

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + $T_{first-SSB}$ + 2ms.

A.7.6 Measurement procedure

A.7.6.1 Intra-frequency Measurements

A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

Conf	figuration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
offsetMO	dB	1, 2	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1 TDDConf.3.1	
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1	24	24
allocated		2	48	48
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	
RMSI CORESET		1	CR.3.1 TDD	CR.3.1 TDD
RMC configuration		2	CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET RMC		1	CCR.3.1 TDD	CCR.3.1 TDD
configuration		2	CCR.3.7 TDD	CCR.3.7 TDD
TRS configuration		1, 2 1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.2	N/A
PDSCH/PDCCH subcarrier	kHz	1, 2	120	120
spacing				
OCNG Patterns		1, 2	OP.5	N/A
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Ce	Cell 1		ell 2
			T1	T2	T1	T2
AoA setup		1, 2	Se	etup 3 defir	ned in A.3.1	5.3
			Ao	A1	Ad	oA2
Beam assumptionNote 4		1,2	Rough		Rough	
Es	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		<u>2</u>	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64	.41	See Cell 1 columns	
		2	-61.41			
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defi	ned in Figi	ure A.7.6.1.	1.1-1

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

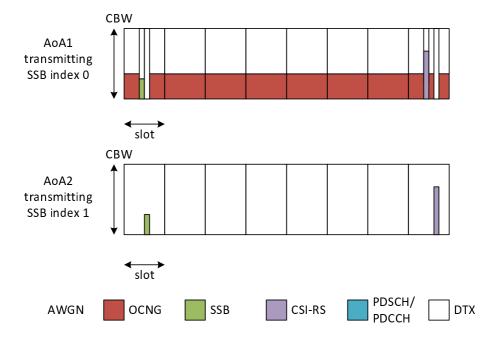


Figure A.7.6.1.1.1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,

- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.2 SA event triggered reporting test without gap under DRX

A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

	Configuration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 \sim 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	
Active cell		1, 2	PCell (Ce	ll 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 a	and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	s	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1, 2	66	66
allocated				
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	-
RMSI CORESET RMC		1	CR.3.1 TDD	CR.3.1 TDD
configuration		2	CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET RMC		1	CCR.3.1 TDD	CCR.3.1 TDD
configuration		2	CCR.3.7 TDD	CCR.3.7 TDD
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.2	N/A
PDSCH/PDCCH	kHz	1, 2	120	120
subcarrier				
spacing				
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.3 FR2	SSB.3 FR2
		2	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	Cell 1		Cell 2	
			T1	T2	T1	T2	
AoA setup		1, 2	S	Setup 1 defined in A.3.15.1			
Beam assumptionNote 4		1,2		Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52	
N_{oc} Note 2	dBm/15 KHz	1, 2	-98				
N_{oc} Note 2	dBm/SCS	1	-89 -86				
1 voc		2					
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	

\hat{E}_s/N_{oc}	,	dB	1, 2	4	4	-Infinity	4	
Io		dBm/95.04MHz	1, 2	-54.53	-52.18	See Cell	1 columns	
Note 1:	The reso	ources for uplink transi	mission are assigned	to the UE p	orior to the	start of time	e period	
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for							
	N_{oc} to be fulfilled.							
Note 3:	Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.							
Note 4:								
Note 5:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from TS 38.101-2 [19] Table 6.2.1.3-4.							

Table A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

Co	onfiguration	Description						
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode						
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode						
Note:	Note: The UE is only required to be tested in one of the supported test configurations.							

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2 \sim 4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		4 0	1: Cell 1 and	One TDD carrier frequency is used for the
		1, 2	Cell 2	NR cells.
Gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SMTC configuration		1, 2	SMTC.1	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD	
offsetMO	dB	1, 2	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2

TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1	24	24
allocated		2	48	48
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.2	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.2	ULBWP.1.1
configuration				
RLM-RS		1, 2	CSI-RS	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	
RMSI CORESET RMC		1	CR.3.1 TDD	CR.3.1 TDD
configuration		2	CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET RMC		1	CCR.3.1 TDD	CCR.3.1 TDD
configuration		2	CCR.3.7 TDD	CCR.3.7 TDD
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH		1, 2	TCI.State.2	N/A
TCI states				
PDSCH/PDCCH	kHz	1, 2	120	120
subcarrier				
spacing				
OCNG Patterns		1, 2	OP.5	N/A
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2

AoA setup		1, 2	Setup 3 defined in A.3.15.3			5.3
			Α	oA1	AoA2	
Beam Assumption ^{Note 4}		1,2	R	Rough		ugh
Es	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_{_s}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		<u>2</u>	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64.41	-64.41	See Cell	2 columns
		2	-61.41	-61.41		
Time multiplexing of the downlink transmissions from each AoA		1	Defined in Figure A.7.6.1.3.1-1			3.1-1

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Void
- Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

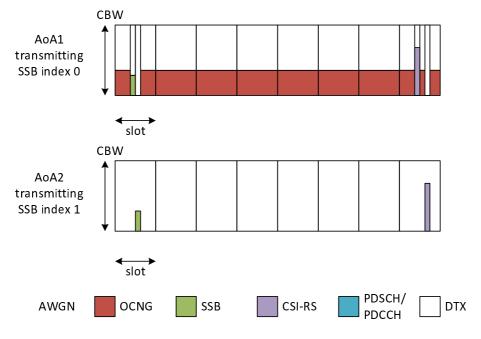


Figure A.7.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

	Configuration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell		1, 2	PCell (Cel	ll 1)	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2		One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE ga	aps	
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD		
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1	Cell 2	
			T1 T2	T1 T2	
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	100: N _{RB,c} = 66	
Data RBs		1, 2	66	66	
allocated					
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1	
configuration			ULBWP.0.1	ULBWP.0.1	
Active DL BWP		1, 2	DLBWP.1.2	DLBWP.1.1	
configuration					
Active UL BWP		1, 2	ULBWP.1.2	ULBWP.1.1	
configuration					
RLM-RS		1, 2	SCSI-RS	SSB	
PDSCH RMC		1	SR.3.2 TDD	N/A	
configuration		2	SR.3.3 TDD	1	
RMSI CORESET		1	CR.3.1 TDD	CR.3.1 TDD	
RMC					
configuration		2	CR.3.2 TDD	CR.3.2 TDD	
Dedicated		1	CCR.3.1 TDD	CCR.3.1 TDD	
CORESET RMC					
configuration		2	CCR.3.7 TDD	CCR.3.7 TDD	
TRS configuration		1, 2	TRS.2.1 TDD	N/A	
PDSCH/PDCCH		1, 2	TCI.State.2	N/A	
TCI state					
PDSCH/PDCCH	kHz	1, 2	120	120	
subcarrier					
spacing					
OCNG Patterns		1, 2	OP.1	OP.1	
SSB		1	SSB.3 FR2	SSB.3 FR2	
		2	SSB.4 FR2	SSB.4 FR2	

Propagation	1, 2	AWGN	AWGN
Condition			

Table A.7.6.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 1		Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Setup 1 defined in A.3.15.1			
Beam Assumption ^{Note 4}		1,2	Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52
$N_{oc}^{}$ Note 2	dBm/15 KHz	1, 2	-98			
N_{oc} Note 2	dBm/SCS	1	-89			
1 voc		2	-86			
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85
		2	-82	-82	-Infinity	-82
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4
Io	dBm/95.04MHz	1, 2	-54.53	-52.18	18 See Cell 2 columns	

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

Table A.7.6.1.4.1-5: Void

Table A.7.6.1.4.1-6:Void

A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2 Inter-frequency Measurements

A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description				
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1: Void.					

Table A.7.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configurati on	Value	Comment		
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.		
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.		
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.		
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1	39			
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2		
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object		
A3-Offset	dB	Config 1	-11			
Hysteresis	dB	Config 1	0			
CP length		Config 1	Normal			
TimeToTrigger	s	Config 1	0			
Filter coefficient		Config 1	0	L3 filtering is not used		
DRX		Config 1	OFF	DRX is not used		
Time offset between serving and neighbour cells		Config 1	3µs	Synchronous cells.		
T1	S	Config 1	5			
T2	S	Config 1	5.2 for PC1; 3.5 for other PC			

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Cell 1		Cell 2		
			configuratio n	T1	T2	T1	T2	
AoA setup			Config 1	Setu	p 3 as specif	ed in clause A.3.15		
				Ad	pA1	AoA2		
Beam Assump	tion ^{Note 7}		1,2	Ro	ugh	Rough		
NR RF Channe	el Number		Config 1		1		2	
Duplex mode			Config 1	TI	TDD		ΓDD	
TDD configura	tion		Config 1	TDDC	onf.3.1	TDDConf.3.1		
BW _{channel}		MHz	Config 1	100: N _{RB,c} = 66		100: N _{RB,c} = 66		
Data RBs alloc	ated	MHz	Config 1 Config 1	66		66 100: N _{RB,c} = 66		
BWP configuration	Initial DL BWP	IVII IZ	Comig		100: N _{RB,c} = 66 DLBWP.0.1		N/A	
Comiguration	Initial UL		Config 1	ULBWP.0.1		N/A		
	BWP			ULBV	VF.U. I		IN/ <i>P</i> A	
	Dedicated DL BWP			DLBWP.1.1		N/A		
20110 5	Dedicated UL BWP			ULBV	VP.1.1	N/A		
OCNG Pattern A.3.2.1.1 (OP.	1)		Config 1	OP.1		OP.1		
PDSCH Refere measurement			Config 1	SR.3.1 TDD		-		
CORESET Ref	ference		Config 1	CR.3.1 TDD		-		
SMTC configur in A.3.11.1 and			Config 1	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120		
TRS configurat			Config 1	TRS.2.1 TDD		N/A		
PDSCH/PDCC EPRE ratio of I			Config 1	TCI.State.2		N/A		
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS				0		0		
EPRE ratio of PDCCH to PDCCH DMRS			Config 1					
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
Ês		dBm/S CS	Config 1	-87	-87	-Infinity	-87	
SSB_RP Note 3		dBm/S CS Note5	Config 1	-87	-87	-Infinity	-87	
$\hat{E}_{_{ m S}}/{ m I}_{_{ m ot}}$ BB Note 8		dB	Config 1	1.89	1.89	-Infinity	1.89	
Io Note3		dBm/95 .04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01	
Propagation Co	ondition		Config 1	AWGN		AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5: Note 6:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	est Value		Comment
		configurati on	Test 1	Test 2	7
NR RF Channel Number		Config 1	1, 2		Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3µs		Synchronous cells.
T1	S	Config 1	5		
T2	S	Config 1	8 for PC1; 5 for other PC	82 for PC1; 52 for other PC	

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

Parameter		Unit	Test	Ce	Cell 1		Cell 2
			configuratio n	T1	T2	T1	T2
AoA setup			Config 1	Setu	p 1 as speci	fied in claus	e A.3.15
Beam Assump	tion ^{Note 7}		Config 1		R	ough	
NR RF Chann	el Number		Config 1		1		2
TDD configura	tion		Config 1	TDDC	onf.3.1	TDE	Conf.3.1
Duplex mode			Config 1	T!	DD		TDD
BW _{channel}		MHz	Config 1	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs alloc	cated		Config 1	66		66	
BWP BW		MHz	Config 1	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBV	VP.0.1		N/A
-	Initial UL BWP		0.555.4	ULBWP.0.1		N/A	
	Dedicated DL BWP		Config 1	DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1			N/A
OCNG Pattern A.3.2.1.1	is defined in		Config 1	OP.1 OP.1		OP.1	

PDSCH Reference			SD 3	1 TDD			
measurement channel		Config 1	SK.3.	ו וטט		-	
CORESET Reference			CR 3	1 TDD		_	
Channel		Config 1	011.0.	1 100			
SMTC configuration defined							
in A.3.11.1 and A.3.11.2		Config 1	SM	TC.1	SN	ITC.1	
PDSCH/PDCCH subcarrier	kHz	Config 1					
spacing	2	Comig i	1:	20		120	
TRS configuration		Config 1	TRS.2	.1 TDD		N/A	
PDSCH/PDCCH TCI state		Config 1		State.2		N/A	
EPRE ratio of PSS to SSS		y				•	
EPRE ratio of PBCH DMRS							
to SSS							
EPRE ratio of PBCH to PBCH							
DMRS							
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to							
PDCCH DMRS		Config 1	0			0	
EPRE ratio of PDSCH DMRS							
to SSS							
EPRE ratio of PDSCH to							
PDSCH							
EPRE ratio of OCNG DMRS							
to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)	-ID /4.5		4.0	24.7	4047		
$N_{oc}^{ m Note2}$	dBm/15		-10)4.7	-104.7		
	kHz Note5						
N. W. C	dBm/S	Config 1	0	5.7	.	95.7	
$N_{oc}^{ m Note2}$	CS	Comig	-9	5.7		95.7	
	Note4						
SSB RP Note 3	dBm/S	Config 1	-89.7	-89.7	-Infinity	-86.7	
	CS	comig .	30	00		00	
	Note5						
\hat{E}_{s}/I_{ot}	dB	Config 1	6	6	-Infinity	9	
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$					Ţ		
\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9	
Io ^{Note3}	dBm/95	Config 1	-59.7	-59.7	-66.7	-57.2	
	.04						
	MHz						
	Note5						
Propagation Condition		Config 1		/GN		WGN	
Note 1: OCNG shall be used	I such that b	oth cells are ful	ly allocated a	and a constai	nt total transi	mitted power	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.2.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description					
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1: Void.						

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configurati	Value	Comment
NR RF Channel Number		On Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	,
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	S	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3µs	Synchronous cells.
T1	S	Config 1	5	
T2	S	Config 1	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Para	Parameter		Unit Test		Cell 1		Cell 2	
			configuratio n	T1	T2	T1	T2	
AoA setup			Config 1	Setu	Setup 3 as specifi		A.3.15	
				Ac	A1	AoA2		
Beam Assump	tion ^{Note 7}		Config 1	Ro	ugh	R	ough	
NR RF Channe	el Number		Config 1		1		2	
Duplex mode			Config 1	TI	DD	-	ΓDD	
TDD configura	tion		Config 1		onf.3.1		Conf.3.1	
BW _{channel}		MHz	Config 1		RB,c = 66	100: I	$N_{RB,c} = 66$	
Data RBs alloc	ated	NAL I—	Config 1		66	400.1	66	
BWP BW BWP	Initial DL	MHz	Config 1		_{RB,c} = 66 VP.0.1		N _{RB,c} = 66 N/A	
configuration	BWP			DLDV	VI .O. I		IN/74	
ŭ	Initial UL BWP		Confin 4	ULBV	VP.0.1		N/A	
	Dedicated DL BWP		Config 1	DLBV	VP.1.1		N/A	
	Dedicated UL BWP			ULBV	VP.1.1		N/A	
OCNG Pattern A.3.2.1.1	s defined in		Config 1	0	P.1	(DP.1	
PDSCH Refere measurement			Config 1	SR.3.	1 TDD	-		
CORESET Ref Channel			Config 1	CR.3.	CR.3.1 TDD		-	
SMTC configur in A.3.11.1 and			Config 1	SM	SMTC.1		MTC.1	
spacing	PDSCH/PDCCH subcarrier spacing		Config 1	1	120		120	
TRS configurat			Config 1	TRS.2.1 TDD		N/A		
PDSCH/PDCC EPRE ratio of I	H TCI state		Config 1	TCI.S	State.2	N/A		
EPRE ratio of I								
DMRS	PBCH to PBCH							
to SSS	PDCCH DMRS							
EPRE ratio of I PDCCH DMRS	3		Config 1		0		0	
to SSS	PDSCH DMRS							
EPRE ratio of I PDSCH								
EPRE ratio of 0 to SSS(Note 1))							
EPRE ratio of 0								
Ês		dBm/S CS	Config 1	-87	-87	-Infinity	-87	
SSB_RP Note 3		dBm/S CS Note5	Config 1	-87 -87		-Infinity	-87	
\hat{E}_{s}/I_{ot} BB Note 8		dB	Config 1	1.89	1.89	-Infinity	1.89	
Io Note3		dBm/95 .04 MHz Note5	Config 1	-58.01	-58.01	-Infinity	-58.01	
Propagation Co	ondition		Config 1	Config 1 AWGN		Δ	WGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4

A.7.6.2.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

The UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati	Test 1	Test 2	
		on			
NR RF Channel		Config 1	1,	, 2	Two FR2 NR carrier frequencies is
Number					used.
Active cell		Config 1	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel
					number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel
					number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap		Config 1	39		
offset		_			
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between		Config 1	3µs		Synchronous cells.
serving and neighbour		_			
cells					
T1	S	Config 1	5		
T2	S	Config 1	11 for PC1; 108 for PC1;		
		-	6.5 for other	67 for other	
			PC	PC	

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Para	meter	Unit	Test	С	ell 1	Cell 2	
			configuratio n	T1	T2	T1	T2
AoA setup			Config 1	Set	up 1 as specit	ied in clause	A.3.15
Beam Assump	otion ^{Note 7}		Config 1		R	ough	
NR RF Chann	el Number		Config 1		1		2
Duplex mode			Config 1	Т	TDD	Т	DD
TDD configura	ition		Config 1	TDD0	Conf.3.1	TDDC	onf.3.1
BW _{channel}		MHz	Config 1	100: N	$N_{RB,c} = 66$	100: N	RB,c = 66
Data RBs alloc	cated		Config 1		66	(66
BWP BW		MHz	Config 1	100: N	$N_{RB,c} = 66$	100: N	RB,c = 66
BWP configuration	Initial DL BWP				WP.0.1	N/A	
	Initial UL BWP		Config 1	ULBWP.0.1		N/A	
	Dedicated DL BWP		Coning i	DLBWP.1.1		N/A	
	Dedicated UL BWP			ULBWP.1.1		N/A	
OCNG Patterr A.3.2.1.1	ns defined in		Config 1	C)P.1	OP.1	
PDSCH Reference measurement			Config 1	SR.3.1 TDD			-
CORESET Re Channel	ference		Config 1	CR.3.1 TDD			-
SMTC configuration defined in A.3.11.1 and A.3.11.2			Config 1	SMTC.1		SM	TC.1
PDSCH/PDCC spacing	CH subcarrier	kHz	Config 1	120		120	
TRS configura	tion		Config 1	TRS.	2.1 TDD	N/A	
PDSCH/PDCC			Config 1	TCI.	State.2	N/A	

1016

EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1		0		0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{ m Note2}$	dBm/15 kHz Note5		-104.7		-104.7	
$N_{oc}^{}$ Note2	dBm/S CS Note4	Config 1	-95.7		-95.7	
SSB_RP Note 3	dBm/S CS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1	-59.7	-59.7	-66.7	-57.2
Propagation Condition		Config 1		/GN		WGN
Note 1: OCNG shall be used				and a constar	nt total trans	mitted power
spectral density is ac					_	
Note 2: Interference from oth		d noise sources	-			

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.4.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD				
3 NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode duplex mode						
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel		Config 1,2,3	1, 2		One NR FR1 and one NR FR2
Number					carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1.1 FDD		
parameters on NR RF		Config 2	TRS.1.1 TDD		
Channel 1		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3	-105		
CP length		Config 1,2,3	Normal		
TimeToTrigger	s	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between		Config 1	3ms		Asynchronous cells.
serving and neighbour cells					The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	5.2 for PC1; 3.5 for other PC	3 for PC1; 2 for other PC	

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Parameter Unit Test Cell 1		ell 1		ell 2		
		configuratio	T1	T2	T1	T2	
		n					
AoA setup		Config 1,2,3		N/A		s specified in e A.3.15	
Beam AssumptionNote 7		Config 1,2,3		N/A	R	ough	
NR RF Channel Number		Config 1,2,3		1		2	
Duplex mode		Config 1	F	-DD	TDD		
-		Config 2,3	7	TDD		TDD	
TDD configuration		Config 1	Not A	pplicable	TDDConf.3.1		
		Config 2	TDD	Conf.1.1	TDDConf.3.1		
		Config 3	TDDConf.2.1		TDDConf.3.1		
BW _{channel}	MHz	Config 1	10: N	$I_{RB,c} = 52$	100: N _{RB,c} = 66		
		Config 2	10: N	$I_{RB,c} = 52$	100: 1	$N_{RB,c} = 66$	
		Config 3	40: N	RB,c = 106	100: N _{RB,c} = 66		
Data RBs allocated		Config 1	52			66	
		Config 2		52		66	
		Config 3		106		66	
BWP BW	MHz	Config 1	10: $N_{RB,c} = 52$		100: 1	N _{RB,c} = 66	
		Config 2	10: N	$I_{RB,c} = 52$	100: 1	$N_{RB,c} = 66$	

			Config 3	40: N _{RB,c} = 106	100: N	I _{RB,c} = 66
BWP	Initial DL			DLBWP.0.1		N/A
configuration	BWP					
	Initial UL			ULBWP.0.1		N/A
	BWP		Config 1,2,3			
	Dedicated DL			DLBWP.1.1	ı	N/A
	BWP Dedicated UL					
	BWP			ULBWP.1.1	I	N/A
OCNG Pattern			Config 1,2,3			
A.3.2.1.1 (OP.				OP.1	C	P.1
PDSCH Refere			Config 1	SR.1.1 FDD		-
measurement	channel		Config 2	SR.1.1 TDD		
			Config 3	SR2.1 TDD		
RMSI CORESI	FT Reference		Config 1	CR.1.1 FDD		-
Channel	21 11010101100		Config 2	CR.1.1 TDD		
			Config 3	CR2.1 TDD		
Dedicated COI	RESET RMC		Config 1	CCR.1.1 FDD		-
configuration						
			Config 2	CCR.1.1 TDD		
			Config 3	CCR.2.1 TDD		
SMTC configu	ration defined		Config 1	SMTC.2	QI.	ITC.2
in A.3.11.1 and	d A.3.11.2		Corning 1	OWITO.2	Oiv	110.2
			Config 2,3	SMTC.1	SMTC.1	
			-			
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15		120
	spacing EPRE ratio of PSS to SSS		Config 3	30		120
			Config 1,2,3	0		0
EPRE ratio of l	PBCH DMRS					
to SSS	DDOLL 4- DDOLL					
DMRS	PBCH to PBCH					
	PDCCH DMRS					
to SSS	DOON DIVING					
EPRE ratio of	PDCCH to					
PDCCH DMRS						
	PDSCH DMRS					
to SSS						
EPRE ratio of I	PDSCH to					
PDSCH EPRE ratio of (OCNG DMPS					
to SSS(Note 1)						
EPRE ratio of						
OCNG DMRS						
Ês		dBm/S	Config 1,2,3		-Infinity	-87
		CS	_			
SSB_RP Note 3		dBm/S	Config 1,2		-Infinity	-87
		CS NoteF				
-		Note5 dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 8		ub	Coming 1,2,3	LITIK OTTIY, SEE Clause	-iriiiiilly	14.09
Io ^{Note3}		dBm/95	Config 1,2,3	A.3.7A	-Infinity	-58.01
		.04	J , ,-		,	-
		MHz				
		Note5				
Propagation C	ondition		Config 1,2,3		A\	VGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or
	test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.5.2 Test Requirements

In test 1, with per-UE, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

2560 for UE supporting power class 1, or

1600 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD				
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1,2,3	1, 2				One NR FR1 and one NR FR2
Number							carrier frequency is used.
Active cell		Config 1,2,3		ll 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		Gap no		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
SMTC-SSB parameters		Config 1	SSB.1	FR1	•		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1				As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1	.1 FDD			
parameters on NR RF		Config 2		.1 TDD			
Channel 1		Config 3		.2 TDD			
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3				As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Para	meter	Unit	Test	Cell 1		Cell 2	
			configuratio	T1	T2	T1	T2
			n				

AoA setup			Config 1,2,3	NA	Setup 1 as specified in clause A.3.15
Beam Assump	tion ^{Note 7}		Config 1,2,3	N/A	Rough
NR RF Channe	el Number		Config 1,2,3	1	2
Duplex mode			Config 1	FDD	TDD
			Config 2,3	TDD	TDD
TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1
			Config 2	TDDConf.1.1	TDDConf.3.1
DW		N / I I —	Config 3	TDDConf.2.1	TDDConf.3.1
BW _{channel}		MHz	Config 1 Config 2	10: N _{RB,c} = 52 10: N _{RB,c} = 52	100: N _{RB,c} = 66 100: N _{RB,c} = 66
			Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66
Data RBs alloc	ated		Config 1	52	66
			Config 2	52	66
			Config 3	106	66
BWP BW		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 2	10: $N_{RB,c} = 52$	100: N _{RB,c} = 66
	T		Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP	Initial DL			DLBWP.0.1	N/A
configuration	BWP Initial UL				
	BWP			ULBWP.0.1	N/A
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1	OP.1
PDSCH Refere	•		Config 1	SR.1.1 FDD	-
measurement	channel		Config 2	SR.1.1 TDD	-
			Config 3	SR2.1 TDD	-
RMSI CORESI	ET Reference		Config 1	CR.1.1 FDD	-
Channel			Config 2	CR.1.1 TDD	
			Config 3	CR2.1 TDD	
Dedicated COF configuration	RESET RMC		Config 1	CCR.1.1 FDD	-
			Config 2	CCR.1.1 TDD	
			Config 3	CCR.2.1 TDD	
SMTC configur in A.3.11.1 and			Config 1	SMTC.2	SMTC.2
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing			Config 3	30	120
EPRE ratio of I					
EPRE ratio of I	PBCH DMRS				
to SSS					
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS					
			Config 1,2,3	0	0
EPRE ratio of I	PDSCH to				
PDSCH EPRE ratio of (
to SSS(Note 1) EPRE ratio of 0	OCNG to				
OCNG DMRS	(INULE I)		l		

N_{oc} Note2	dBm/15			-1	04.7
00	kHz				
	Note5				
$N_{oc}^{}$ Note2	dBm/S	Config 1,2		-9	95.7
1 oc	CS	Config 3		-9	95.7
	Note4				
SSB_RP Note 3	dBm/S	Config 1,2		-Infinity	-86.7
	CS	Config 3		-Infinity	-86.7
	Note5	· ·		•	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	Config 1,2,3	NA	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2,3	Link only, see clause A.3.7A	-Infinity	9
Io ^{Note3}	dBm/9.	Config 1,2		-	-
	36MHz	3			
	dBm/38	Config 3		-	-
	.16MHz	· ·			
	dBm/95	Config 1,2,3		-66.7	-57.2
	.04	G , ,			
	MHz				
	Note5				
Propagation Condition		Config 1,2,3		A۱	VGN
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power					
spectral density is achieved for all OFDM symbols.					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant					

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD				
3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode duplex mode						
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1.1 FDD		
parameters on NR RF		Config 2	TRS.1.1 TDD		
Channel 1		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	S	Config 1,2,3	7 for PC1; 4.5 for other PC	3.5 for PC1; 2.5 for other PC	

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Cell 1		C	ell 2	
		configuratio	T1	T2	T1	T2	
		n					
AoA setup		Config 1,2,3		NA	Setup 1 a	s specified in	
					claus	e A.3.15	
Beam AssumptionNote 7		Config 1,2,3	ı	N/A	R	ough	
NR RF Channel Number		Config 1,2,3	1 2		2		
Duplex mode		Config 1	FDD			TDD	
		Config 2,3	T	TDD		DD	
TDD configuration		Config 1	Not Applicable		TDD	TDDConf.3.1	
		Config 2	TDDConf.1.1		TDDConf.3.1		
C		Config 3	TDDConf.2.1		TDDConf.3.1		
BW _{channel}	MHz	Config 1	10: N _{RB,c} = 52 100:		100: N	$N_{RB,c} = 66$	
		Config 2	10: N	RB,c = 52	100: 1	$N_{RB,c} = 66$	
	Config 3 40: N _{RB,c} = 2		RB,c = 106	100: 1	$N_{RB,c} = 66$		
Data RBs allocated		Config 1	52 66		66		
		Config 2		52		66	
		Config 3	•	106		66	
BWP BW	MHz	Config 1	10: N	10: N _{RB,c} = 52		$N_{RB,c} = 66$	

			Config 2	10: N _{RB,c} = 52	100: N	I _{RB,c} = 66
			Config 3	40: N _{RB,c} = 106		I _{RB,c} = 66
BWP configuration	Initial DL BWP			DLBWP.0.1	1	N/A
	Initial UL BWP		Config 1,2,3	ULBWP.0.1		N/A
	Dedicated DL BWP		Coming 1,2,3	DLBWP.1.1	1	N/A
	Dedicated UL BWP			ULBWP.1.1	1	N/A
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1	C	P.1
PDSCH Refere			Config 1	SR.1.1 FDD		-
measurement	channel		Config 2	SR.1.1 TDD		
			Config 3	SR2.1 TDD		
RMSI CORES	ET Reference		Config 1	CR.1.1 FDD		-
Channel			Config 2	CR.1.1 TDD		
			Config 3	CR2.1 TDD		
Dedicated COI configuration	RESET RMC		Config 1	CCR.1.1 FDD		-
			Config 2	CCR.1.1 TDD		
			Config 3	CCR.2.1 TDD		
	SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.2	SMTC.2	
			Config 2,3	SMTC.1	SM	ITC.1
PDSCH/PDCC	PDSCH/PDCCH subcarrier		Config 1,2	15	,	120
spacing			Config 3	30	,	120
EPRE ratio of	PSS to SSS		Config 1,2,3	0		0
EPRE ratio of to SSS	PBCH DMRS					
	PBCH to PBCH					
	PDCCH DMRS					
EPRE ratio of						
	PDSCH DMRS					
to SSS EPRE ratio of	PDSCH to					
PDSCH EPRE ratio of	OCNG DMRS					
to SSS(Note 1 EPRE ratio of						
OCNG DMRS						
Ës		dBm/S CS	Config 1,2, 3		-Infinity	-87
SSB_RP Note 3		dBm/S CS Note5	Config 1,2		-Infinity	-87
			Config 3		-Infinity	-87
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note8		dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
Io ^{Note3}		dBm/95 .04 MHz	Config 1,2,3	A.3.7A	Infinity	-58.01
		Note5				
Propagation C	ondition		Config 1,2,3		AV	VGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or
	test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

3360 for UE supporting power class 1, or

2080 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.8.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell				
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,				
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD				
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations						

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati on	Test 1	Test 2	Test 3	Test 4	
NR RF Channel		Config 1,2,3	1, 2		-	One NR FR1 and one NR FR2	
Number		J , ,	,				carrier frequency is used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		Gap n		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
SMTC-SSB parameters		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2				As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1	.1 FDD			•
parameters on NR RF		Config 2	TRS.1	.1 TDD			
Channel 1		Config 3	TRS.1	.2 TDD			
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2			As specified in clause A.3.10.2	
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	11	108	11	108	
		, , , , , , , , , , , , , , , , , , ,	for PC1; 6.5 for othe r	for PC1; 67 for othe r	for PC1; 6.5 for othe r	for PC1; 67 for other PCT	
			PCT BD	PCT BD	PCT BD	BD	

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2	
		configuratio	T1	T2	T1	T2
		n				

			,		
AoA setup			Config 1,2,3	NA	Setup 1 as specified in
Beam Assump	tion ^{Note 7}		Config 1,2,3	N/A	clause A.3.15 Rough
NR RF Channe			Config 1,2,3	1	2
Duplex mode			Config 1	FDD	TDD
Duplex mode			Config 2,3	TDD	TDD
TDD configura	tion		Config 1	Not Applicable	TDDConf.3.1
1DD conligata			Config 2	TDDConf.1.1	TDDConf.3.1
			Config 3	TDDConf.2.1	TDDConf.3.1
BW _{channel}		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 3	40: $N_{RB,c} = 106$	100: N _{RB,c} = 66
Data RBs alloc	ated		Config 1	52	66
			Config 2	52	66
51115 5111			Config 3	106	66
BWP BW		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66
DWD	Initial DL		Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP configuration	BWP			DLBWP.0.1	N/A
comiguration	Initial UL		 		
	BWP			ULBWP.0.1	N/A
	Dedicated DL		Config 1,2,3	DLBWP.1.1	N/A
	BWP				
	Dedicated UL			LILDWD 4.4	NI/A
	BWP			ULBWP.1.1	N/A
OCNG Pattern			Config 1,2,3		
A.3.2.1.1 (OP.	•			OP.1	OP.1
PDSCH Refere			Config 1	SR.1.1 FDD	-
measurement of	channel		Config 2	SR.1.1 TDD	1
			Config 3	SR2.1 TDD	1
RMSI CORESI	ET Reference		Config 1	CR.1.1 FDD	-
Channel			Config 2	CR.1.1 TDD	
			Config 3	CR2.1 TDD	
Dedicated CORESET RMC			Config 1	CCR.1.1 FDD	-
configuration					
			Config 2	CCR.1.1 TDD	
			Config 3	CCR.2.1 TDD	
SMTC configur	otion defined				
in A.3.11.1 and			Config 1	SMTC.2	SMTC.2
III A.S. I I. I alic	1 A.S. 11.2		_		
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing			Config 3	30	120
EPRE ratio of I	PSS to SSS		J		
EPRE ratio of I	PRCH DMRS				
to SSS	- BCH DIVING				
	PBCH to PBCH				
DMRS	2011.01.2011				
EPRE ratio of PDCCH DMRS			1		
to SSS					
EPRE ratio of PDCCH to			0	•	_
PDCCH DMRS			Config 1,2,3	0	0
	PDSCH DMRS				
to SSS	20011		4		
EPRE ratio of I	PDSCH to				
PDSCH	OCNIC DAIDS		-		
EPRE ratio of of to SSS(Note 1)					
EPRE ratio of 0			 		
OCNG DMRS					
	` '	1			1

N_{oc} Note2	dBm/15			-1	04.7
1 oc	kHz				
	Note5				
$N_{oc}^{ m Note2}$	dBm/S	Config 1,2		-(95.7
1 oc	CS	Config 3		-(95.7
	Note4	_			
SSB_RP Note 3	dBm/S	Config 1,2		-Infinity	-86.7
	CS	Config 3		-Infinity	-86.7
	Note5	_		-	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	NA Link only and aloung	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2,3	Link only, see clause A.3.7A	-Infinity	9
Io ^{Note3}	dBm/9.	Config 1,2		-	-
	36MHz				
	dBm/38	Config 3		-	-
	.16MHz				
	dBm/95	Config 1,2,3		-66.7	-57.2
	.04				
	MHz				
	Note5				
Propagation Condition		Config 1,2,3		AV	VGN
Note 1: OCNG shall be use	d such that b	ooth cells are ful	ly allocated and a consta	nt total trans	mitted power
spectral density is achieved for all OFDM symbols.					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant					

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3 L1-RSRP measurement for beam reporting

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1		SR.3.2 TDD
	2		SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
	2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
	2		CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2
	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	S	5
T2	1~2		2
EPRE ratio of PSS to SSS	1~2	S	
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN

Propagation condition 1~2 AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.1.2-2: SSB specific test parameters

1-2 1~2	Unit dBm/15kHz	T1 Set	•	T1 ding to A.3.1	T2 15.1
1~2	dBm/15kHz	Set	•		15.1
1~2	dBm/15kHz		Ro	ugh	
	dBm/15kHz			-	
4			-1	05	
1	dBm/SSB SCS		-(96	
2			-(93	
1~2	dB	0	0	-Infinity	9
1	dBm/SSB SCS	-96	-96	-Infinity	-87
2		-93	-93	-Infinity	-84
1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
2		-63.97	-63.97	-66.98	-57.47
1~2	dB	0	0	-Infinity	9
urces for uplink	transmission are assigne	ed to the UE	prior to the	e start of tim	ne period
		•			
1	1~2 1 2 1 2 1~2 rces for uplink	1~2 dB 1 dBm/SSB SCS 2 dBm/95.04MHz 2 dB 1~2 dB rces for uplink transmission are assigned to the form other cells and noise sources in	1~2 dB 0 1 dBm/SSB SCS -96 2 -93 1 dBm/95.04MHz -63.97 2 -63.97 1~2 dB 0 rces for uplink transmission are assigned to the UE ce from other cells and noise sources not specified	1~2 dB 0 0 1 dBm/SSB SCS -96 -96 2 -93 -93 -93 1 dBm/95.04MHz -63.97 -63.97 2 -63.97 -63.97 -63.97 1~2 dB 0 0 rces for uplink transmission are assigned to the UE prior to the cefform other cells and noise sources not specified in the test in the centre.	1~2 dB 0 0 -Infinity 1 dBm/SSB SCS -96 -96 -Infinity 2 -93 -93 -Infinity 1 dBm/95.04MHz -63.97 -63.97 -66.98 2 -63.97 -63.97 -66.98

 N_{oc} to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to $+20~\mathrm{dB}$.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference	1		SR.3.2 TDD
measurement channel	2		SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD
Channel	2		CR.3.2 TDD
Dedicated CORESET	1		CCR.3.1 TDD
Reference Channel	2		CCR.3.7 TDD
000 " "	1		SSB.1 FR2
SSB configuration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI			
Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	S	5
T2	1~2	S	3
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS EPRE ratio of OCNG DMRS to			
SSSNote 1			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN
Note 1: OCNG shall be used s	ruch that the	recourses in Co	all 1 are fully

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.2.2-2: SSB specific test parameters

Daramatar	Config	Unit	SSB#0 S		SSI	SB#1	
Parameter Config		Offic	T1	T2	T1	T2	
Angle of arrival configuration			Set	Setup 1 according to A.3.15.1			
Beam Assumption ^{Note 4}	1-2			Rough			
$N_{_{OC}}$ Note2	1~2	dBm/15kHz		-1	05		
N Note2	1	dBm/SSB SCS		-9	96		
$N_{oc}^{}$ Note2	2			-(93		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	0	-Infinity	9	
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87	
SSB_KF	2		-93	-93	-Infinity	-84	
. Nata 2	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47	
lo ^{Note3}	2		-63.97	-63.97	-66.98	-57.47	
\hat{E}_s/N_{oc}	1~2	dB	0	0	-Infinity	9	
Note 1: The reso	ources for uplink	transmission are assign	ed to the UE	prior to the	e start of tin	ne period	
Note 2: Interfere		ells and noise sources n s and time and shall be r	-				

 N_{oc} to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.7.6.3.2.3 Test Requirements

Note 4:

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value		
SSB GSCN	1		freq1		
Duplex mode	1		TDD		
TDD Configuration	1		TDDConf.3.1		
BW _{channel}	1	MHz	100: N _{RB,c} = 66		
PDSCH Reference	1		SR.3.1 TDD		
measurement channel RMSI CORESET Reference					
Channel	1		CR.3.1 TDD		
Dedicated CORESET	1		CCR.3.1 TDD		
Reference Channel	I		CCR.3.1 IDD		
SSB configuration	1		SSB.1 FR2		
CSI-RS configuration	1		CSI-RS.3.3 TDD		
OCNG Patterns	1		OP.1		
Initial BWP Configuration	1		DLBWP.0.1		
3			ULBWP.0.1 DLBWP.1.1		
Dedicated BWP configuration	1		ULBWP.1.1		
SMTC configuration	1		SMTC.1		
TRS Configuration	1		TRS.2.1 TDD		
PDCCH/PDSCH TCI	1				
Configuration	1		TCI.State.2		
DRX configuration	1		Off		
reportConfigType	1		aperiodic		
reportQuantity	1		cri-RSRP		
Number of reported RS	1		2		
gcl-Info	1		SSB#0 for resource#0		
qoi-iiiio	ı		SSB#1 for resource#1		
reportSlotOffsetList	1		8		
Propagation condition	1		AWGN		
T1	1	S	5		
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH					
DMRS			_		
EPRE ratio of PDSCH DMRS to SSS	1	dB	0		
EPRE ratio of PDSCH to PDSCH					
DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG	1				
DMRS Note 1					
Note 1: OCNG shall be used such that the resources in Cell 1 are fully					

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1		Setup 1 according to A.3.15.1			
Beam Assumption ^{Note 4}	1		Ro	ugh		
$N_{oc}^{ m Note1}$	1	dBm/15kHz	-1	05		
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97			
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	1	dB	0 9			
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97 -86.97			
lo ^{Note2}	1	dBm/95.04MHz	-63.97 -57.47			
\hat{E}_s/N_{oc}	1	dB	0 9			
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.						
Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.						
Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3			
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}			
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}			
Note 1:	Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration				
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test				
Note 3:					

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations

A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		DRX.3
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS	1	dB	0
EPRE ratio of PDSCH to PDSCH	-		
DMRS			
EPRE ratio of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
5111110	l	l .	

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1		Setup 1 according to A.3.15.1			
Beam Assumption ^{Note 4}	1		Roi	ıgh		
$N_{oc}^{ m Note1}$	1	dBm/15kHz	-10	05		
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95	.97		
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	1	dB	0 9			
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97 -86.97			
lo Note2	1	dBm/95.04MHz	-63.97 -57.47			
\hat{E}_s/N_{oc}	1	dB	0 9			
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.						
Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE						
	* *	ystem implementation	•			

A.7.6.3.4.3 Test Requirements

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}		
	CSI-RS1	CSI-RS _RP1 -δ + G _{min} ≤ Reported RSRP(dBm) ≤ CSI-RS _RP1 +δ + G _{max}		
Note 1:	Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration			
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test			
Note 3:	G _{min} and G _{max} are th to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss		

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported

measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.

- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.7.7.1 SS-RSRP

A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	Unit	T1		T2	
Parameter	Offic	Cell 1	Cell 2	Cell 1	Cell 2
Cell ID		489	0	489	0

SSB ARFCN			freq1		freq1	
Duplex mode		TDD		TDD		
TDD configuration		TDDConf.3.1		TDDConf.3.1		
BW _{channel}	MHz		RB,c = 66	100: N _{RB,c} = 66		
Data RBs allocated		2	4		4	
Downlink initial BWP configuration		DLB WP.0. 1	-	DLB WP.0. 1	-	
Downlink dedicated BWP configuration		DLB WP.1. 1	-	DLB WP.1. 1	-	
Uplink initial BWP configuration		ULB WP.0. 1	-	ULB WP.0. 1	-	
Uplink dedicated BWP configuration		ULB WP.1. 1	-	ULB WP.1. 1	ı	
DRX cycle configuration		Not applic able	ı	Not applic able	ı	
TRS configuration		TRS.2 .1 TDD	-	TRS.2 .1 TDD	-	
TCI state		TCI.St ate.0	-	TCI.St ate.0	-	
PDSCH Reference measurement channel		SR.3. 2 TDD	-	SR.3. 2 TDD	-	
RMSI CORESET Reference Channel		CR.3. 1 TDD	-	CR.3. 1 TDD	-	
Dedicated CORESET Reference channel		CCR. 3.1 TDD	-	CCR. 3.1 TDD	-	
OCNG Patterns		OP.3	OP.3	OP.3	OP.3	
		SSB.3	SSB.3	SSB.3	SSB.3	
SSB configuration		FR2	FR2	FR2	FR2	
SMTC configuration		SMTC .1	SMTC .1	SMTC .1	SMTC .1	
Time offset with Cell 1	μs	-	3	-	3	
PDSCH/PDCCH subcarrier	kHz	120	120	120	120	
spacing	KIIZ	120	120	120	120	
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to						
PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS	,					
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG						
DMRS Note 1						
Propagation conditions		AWG N	AWG N	AWG N	AWG N	
Antenna configuration		1x2	1x2	1x2	1x2	

Note 5:

Void

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant
	total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	Void
Note 4	Void

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter		1124	T1		T2				
		Unit	Cell 1	Cell 2	Cell 1	Cell 2			
Angle of arrival configuration		Setup 1 according to clause A.3.15.1							
Assumption for UE beams ^{Note 7}			Rough		Rough				
$N_{oc}^{ m Note1}$ dBm/15kH $z^{ m Note4}$			-91.6		N/A				
$N_{oc}^{ m Note1}$		dBm/SCS Note4 -82.6 N/A		//A					
\hat{E}_s/N_{o}	c	dB	6.0	1.0	N/A	N/A			
Es		dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)			
SSB_RP ^{Note2}		dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)			
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ be	Note6	dB	2.44	-5.98	-5.98	-5.98			
Io ^{Note2}		dBm/95.04 MHz Note4 -50.05 (Table B.2.2-2 Rx Beam Peak +29.70c							
Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.									
Note 2: Note 3: Note 4: Note 5: Note 6:	Note 2: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: Void Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone Note 5: Void								
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation								

A.7.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

Test requirement Notes1,2,3						
	Cell 1	SSB_RP1 -δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G _{max}				
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}				
Note 1:	te 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration					
Note 2:						
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss				

A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2			
Parameter	Config	Ollit	Cell 1	Cell 2	Cell 1	Cell 2		
SSB ARFCN	1~2		freq1	freq2	freq1	freq2		
BW _{channel}	1~2		100: N _{RB.c} = 66		100: N _{RB,c} = 66			
Data RBs allocated	1		24		24 24		24	
Data RBS allocated	2		48		48			
Gap pattern ID			0		0			0
Duplex mode	1~2		TDD TDD		DD			

TDD configuration	1~2		TDDC	onf 3 1	TDDC	onf 3 1
1DD comigaration	1				SR.3.2 TDD	5111.0.1
PDSCH Reference	1		SR.3.2 TDD	_	5R.3.2 TDD	-
measurement channel	2		SR.3.3 TDD		SR.3.3 TDD	
RMSI CORESET	1		CR.3.2 TDD		CR.3.2 TDD	
Reference Channel	2		CR.3.2 TDD	,	CR.3.2 TDD	1
Dedicated CORESET	1		CCR.3.1 TDD		CCR.3.1 TDD	
Reference Channel	2		CCR.3.7 TDD	•	CCR.3.7 TDD	-
SSB configuration	1			3 FR2		3 FR2
_	2		SSB.	4 FR2	SSB.	4 FR2
PDSCH/PDCCH subcarrier spacing	1~2	kHz	12	20	12	20
OCNG Patterns	1~2		OF			P.3
Initial BWP Configuration	1~2		DLBW ULBW		DLBW ULBW	
Dedicated BWP	1~2		DLBWP.1.3		DLBWP.1.3	
configuration	1~2		ULBWP.1.3		ULBWP.1.3	
TRS Configuration	1~2		TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2		TCI.State.2	
SMTC configuration	1~2		SMT	TC.1	SMTC.1	
Time offset between Cell 2 and Cell 1	1~2	μs	3	3	3	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to						
PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to						
PDCCH DMRS EPRE ratio of PDSCH	1~2	dB	0	0	0	0
DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG	-					
DMRS to SSS ^{Note 1}						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~2	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~2	-	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

Davamatar	Confin	I lm!t	Tes	st 1	Test 2	
Parameter	Config	Unit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival			•	ccording to .3.15.4.2		ccording to3.15.4.2
configuration	1~2		AoA1 Spherical coverage	AoA2 Rx Beam Peak	AoA1 Spherical coverage	AoA2 Rx Beam Peak
Assumption for UE beams ^{Note 7}	1~2			ugh		ugh
$N_{oc}^{$	1	dBm/15kH	-90.6	-90.6	(Table B.2.3-2 Rx Beam	(Table B.2.3-2 Rx Beam
1 voc	2	z ^{Note4}	-93.7	-93.7	Peak ^{Note 8} +1.97dB)	Peak ^{Note 8} -3.03dB)
$N_{oc}^{}$ Note1	1		-81.6	-81.6	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +11.0dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +6.0dB)
1 voc	2	Note4	-81.7	-81.7	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +14.0dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +9.0dB)
\hat{E}_s/N_{oc}	1~2	dB	6.0	6.0	17.0	-1.0
SSB RPNote2	1	dBm/SCS	-75.6	-75.6	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +28.0dB)	(Table B.2. 3-2 Rx Beam Peak ^{Note 8} +5.0dB)
SSB_KF	2	ubiii/3C3	-75.7	-75.7	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +31.0dB)	(Table B.2. 3-2 Rx Beam Peak ^{Note 8} +8.0dB)
(SSB_RP _{Cell 1} - SSB_RP _{Cell 2})	1~2	dB	(0	23	.00
$\hat{E}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ BB $^{\mathrm{Note6}}$	1 2	dB	5.26 4.61	5.96 5.91	9.53	-3.46
IoNote2	1	dBm/95.04	-50.00	-50.00	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +52.68dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +33.13dB)
10.002	2	MHz ^{Note4}	-50.09	-50.09	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +55.69dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +36.14dB)
(lo _{freq 1} - lo _{freq 2})	1~2	dB	()	19	.55

Note 1:	Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN
	of appropriate power for $N_{\!oc}$ to be fulfilled.
Note 2:	SSB_RP, Es/lot, Io, (SSB_RP $_{Cell\ 2}$ – SSB_RP $_{Cell\ 1}$) and (lofreq 2 – lo freq 1) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	Void
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	Void
Note 6:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB _P or Δ MB _S from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS _{SSB} = 120 kHz, selected according to the operating band of cell 2 and UE power class, without Δ MB _{P,n} adjustment.

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3,4			
Cell 1		SSB_RP1 -δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G _{max}			
Cell 2		SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}			
Note 1:		uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone at for the cell n under consideration			
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test				
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss			
Note 4:		overage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from auses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X evalue.			

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes1,2,3,4				
Cell 2 – Cell 1		SSB_RP2 - SSB_RP1 -δ ≤ Reported RSRP(dB) ≤ SSB_RP2 - SSB_RP1 +δ –(X)				
Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration						
Note 2: Note 3:	δ is the RSRP relative accuracy requirement from Table 10.1.5.1.2-1 Void					
Note 4:		overage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from auses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X evalue.				

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	120 kHz SSB SCS, 100 MHz
	TDD duplex mode	bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	
	TDD duplex mode	

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP interfrequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The interfrequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Tes	st 1	Test 2		
Parameter	Config	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
	1		10:		10:		
	'		$N_{RB,c} = 52$		$N_{RB,c} = 52$		
BWchannel	2	MHz	10:	100:	10:	100:	
			$N_{RB,c} = 52$	$N_{RB,c} = 66$	$N_{RB,c} = 52$	$N_{RB,c} = 66$	
	3		40:		40:		
	4.0		$N_{RB,c} = 106$		N _{RB,c} = 106		
Data RBs allocated	1,2		52	24	52	66	
Data NB3 anocated	3		106	2-7	106		
	1		FDD	TDD	FDD	TDD	
Duplex mode	2		TDD		TDD		
	3		TDD		TDD		
	1		N/A		N/A		
			TDDConf.	TDDConf. 3.1	TDDConf.	TDDConf. 3.1	
TDD configuration	2		1.1		1.1		
	3		TDDConf.		TDDConf.		
	3		2.1		2.1		
DDCCII Deference	1		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference	2		SR.1.1 TDD	-	SR.1.1 TDD	-	
measurement channel	3		SR.2.1 FDD		SR.2.1 FDD		
_	1	•	CR.1.1 FDD	-	CR.1.1 FDD	-	

RMSI CORESET	2		CR.1.1 TDD	-	CR.1.1 TDD	-	
Reference Channel	3		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET	1		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Reference Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
Reference Charmer	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-	
	1		SSB.1 FR1		SSB.1 FR1		
SSB configuration	2		SSB.1 FR1	SSB.3 FR2	SSB.1 FR1	SSB.3 FR2	
	3		SSB.2 FR1		SSB.2 FR1		
OCNG Patterns	1~3		OP.1	OP.3	OP.1	OP.1	
Initial BWP Configuration	1~3		ULBW	/P.0.1 /P.0.1	DLBW ULBW	/P.0.1	
Dedicated BWP configuration	1~3			/P.1.3 /P.1.3		/P.1.3 /P.1.3	
TRS Configuration	1~3		TRS.2	TRS.2.1 TDD		TRS.2.1 TDD	
PDCCH/PDSCH TCI Configuration	1~3		TCI.State.2		TCI.State.2		
SMTC configuration	1~3		SMTC.1		SMTC.1		
Time offset between Cell 2 and Cell 1	1~3	μs	:	3	3		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1}	1~3	dB	0	0	0	0	
EPRE ratio of OCNG to OCNG DMRS Note 1							
Propagation condition	1~3	-	NA .	AWGN	NA .	AWGN	
Antenna configuration	1~3	-	Link only, see clause A.3.7A	1x2	Link only, see clause A.3.7A	1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Ī	Barameter	Confin	Unit	Test 1		Test 2 NOTE 3	
ı	Parameter	Config	Unit	Cell 1	Cell 2	Cell 1	Cell 2

Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b				
Assumption for UE beams ^{Note 4}			N/A	Rough	N/A	Rough				
N «	1~3	dBm/15 kHz		-90	-	NA				
N «	1~3	dBm/SS B SCS		-80.97		NA				
\hat{E}_s/N_{oc}	1~3	dB		5		NA				
Es	1~3	dBm/SC S	NA Link only,		NA Link only,	(Table B.2.3-2 Spherical coverage +1dB)				
SSB_RPNote1	1~3	dBm/SC S	see clause A.3.7A	-76.0	see clause A.3.7A	Table B.2.3-2 Spherical coverage +1dB)				
$\hat{\mathbf{E}}/\mathbf{I}_{ ext{otbb}^{ ext{Note6}}}$	1~3	dB		4.35		-3.81				
Io ^{Note1}	1~3	dBm/ 95.04M Hz		-50.18		SSB_RP+ 28.98				
Note 1: Es/lot, SSB RP and I	Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information									

- Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Void
- Note 3: No additional noise is added by the test system in Test 2.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of

appropriate power for N_{oc} to be fulfilled.

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

A.7.7.2 SS-RSRQ

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description				
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit		Test 1		Test 2	
		Unit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			Fred		Freq1		
Duplex mode			TD		TDD		
TDD configuration			TDDCo			Conf.3.1	
BWchannel		MHz	100: N _{RE}	$_{3,c} = 66$	100: N	RB,c = 66	
Data RBs allocated			66			36	
	Initial DL BWP			DLBV	√P.0.1		
BWP	Dedicated DL BWP			DLBV	/P.1.1		
configuration	Initial UL BWP			ULBV	/P.0.1		
	Dedicated UL BWP			ULBV	/P.1.1		
TRS configuration			TRS.2.1		TRS.2.		
TKS Corniguration			TDD		1 TDD		
TCI state			TCI.State		TCI.Sta		
TOI State			.0		te.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
1 DOOTT Reference	measurement channel		TDD		TDD		
RMSI CORESET R	Reference Channel		CR.3.1	_	CR.3.1		
TOTAL CONTEST I	Colorollo Gilarillo		TDD		TDD		
Control channel RMC			CCR.3.1	_	CCR.3.	_	
			TDD		1 TDD		
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration	n		005.4	SM		005.4	
SSB configuration			SSB.1	SSB.1	SSB.1	SSB.1	
	de a considera de la cica de	1.11=	FR2	FR2	FR2	FR2	
PDSCH/PDCCH st		kHz	120			120	
SS-RSSI-Measurer				Not Applicable			
EPRE ratio of PSS EPRE ratio of PBC							
EPRE ratio of PBC							
	CH_DMRS to SSS CH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDS		uБ	U	U	U	U	
	CH to PDSCH_DMRS IG DMRS to SSS ^{Note 1}						
EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation condition			AWO	<u> </u> 	۸۱۸	VGN	
Antenna configurat			1x2	1x2	1x2	1x2	
	shall be used such that bot	h celle are fully					
	pectral density is achieved			u a constat	וו וטומו וומוז	SITILLEU	
Note 2: Void	pectral defisity is achieved	IOI AII OFDIVI S	syrribuis.				
Note 3: Void							
Note 4: Void							

Void Note 4: Note 5: Void

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

		l lmi4	Tes	t 1	Te	st 2
		Unit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of a	arrival configuration		Setup 1 according Setup 1 according to clause A.3.15.1 clause A.3.15			
Assumption	on for UE beams ^{Note 9}				Rough	
Noc Note1		dBm/15kHz ^N	-9:	5	-!	95
$N_{oc}^{ m Note1}$		dBm/SCS ^{Note}	-8	6	-86	
\hat{E}_s/N_{oc}		dB	3	-3	-3	3
SSB_RPN		dBm/SCS Note4	-83 -83		-89	-89
SS-RSRC	Note2	dB	-14.77 -14.77		-16.81	-16.81
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-1.76	-1.76	-4.76	-4.76
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-5	0		54
Note 1:	Interference from other cells and	noise sources no	ot specified i	n the test is	s assumed to	be constant
	over subcarriers and time and sha	all be modelled a	as AWGN of	appropriate	e power for $\it I$	V_{oc} to be
fulfilled. Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves. Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.						
Note 4: Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone As observed with 0dBi gain antenna at the centre of the quiet zone					

A.7.7.2.1.3 Test Requirements

Void

Void

Void

Note 6:

Note 7:

Note 8:

Note 9:

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

test system implementation

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Parameter		Unit		Test 1		Test 2	
	meter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN		Freq1	freq2	freq1	Freq2		
SSB Configuration			SSB.1	SSB.	SSB.1	SSB.1	
J			FR2	1 FR2	FR2	FR2	
Duplex mode			TD			DD	
TDD configuration			TDDCo			Conf.3.1	
BW _{channel}		MHz	100: N _{RE}			$_{RB,c} = 66$	
Data RBs allocated	Lettel DL DWD		66			66	
DIMD configuration	Initial DL BWP				3WP.0.1		
BWP configuration	Dedicated DL BWP				3WP.1.1		
	Initial UL BWP Dedicated UL BWP				3WP.0.1		
	Dedicated OL BWP		TRS.2.	ULE I	WP.1.1 TRS.2.		
TRS configuration			1 TDD	-	1 TDD	-	
			TCI.Sta		TCI.Sta		
TCI state			te.0	-	te.0	-	
			SR.3.1		SR.3.1		
PDSCH Reference m	easurement channel		TDD	-	TDD	-	
			CR.3.1		CR.3.1		
RMSI CORESET Ref	erence Channel		TDD	-	TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
- Corto i allomo							
			SMTC.	SMT	SMTC.	SMTC.1	
SMTC configuration			1 FR2	C.1	1 FR2	FR2	
DDCCH/DDCCH auch	parriar apacina	I/LI=	120	FR2	120	120	
PDSCH/PDCCH subo		kHz	120	120	120	120	
EPRE ratio of PBCH							
EPRE ratio of PBCH							
EPRE ratio of PDCCI							
EPRE ratio of PDCCI		dB	0	0	0	0	
		uБ				U	
EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
LI IL IAMO OI CONG	Divinco to Goo						
EPRE ratio of OCNG							
Propagation conditions				AWG			
opagation condition			AWGN	N	AWGN	AWGN	
Antenna configuration		1x2	1x2	1x2	1x2		
	all be used such that bot	h cells are fu					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
raiailletei	Offic	Cell 1	Cell 2	Cell 1	Cell 2

AoA setu	AoA setup		Setup 1 in clause A.3.15.		Setup 1 in clause A.3.15.	
Assumption for UE beams ^{Note 8}				ugh	Rough	
N oc Note1		dBm/15kHz ^N	-94.03	-94.03	-94.03	-94.03
N oc Note1		dBm/SCS ^{Note}	-85.0	-85.0	-85.0	-85.0
\hat{E}_s/N_{oc}		dB	-1.75	-1.75	-3	-1.75
SSB_RP	Note2	dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSR0	QNote2	dB	-14.75	-14.75	-15.56	-15.56
Ê , /I ot		dB	-1.75	-1.75	-3	-3
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25
Note 1:	Interference from other cells and constant over subcarriers and time for $N_{\rm ce}$ to be fulfilled.					
Note 2:	SS-RSRQ, SSB_RP, and lo level information purposes. They are n	ot settable parar	neters the	mselves.		
Note 3:	SS-RSRQ and SS-RSRP minimu interference and noise at each re-			ied assumi	ing indepe	ndent
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone					
Note 6:	Void					
Note 7:	Void		0.4.0			
Note 8:	Information about types of UE be		.2.1.3, and	aoes not I	imit UE	
	implementation or test system im	piementation				

A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.7.7.3 SS-SINR

A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Tes	Test 1		Test 2	
Parameter	Onit	Cell 1	Cell 1 Cell 2		Cell 2	
SSB ARFCN		Fre	eq2	Freq2		
Duplex mode		TDD TI		TE	DD	
TDD configuration		TDDC	onf.3.1	TDDC	TDDConf.3.1	
BW _{channel}	MHz	100: N _F	RB,c = 66	100: N _R	$_{B,c} = 66$	
Data RBs allocated		6	66	6	6	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration				VP.1.1		
Uplink initial BWP configuration				VP.0.1		
Uplink dedicated BWP configuration				VP.1.1		
DRX cycle configuration	ms			plicable		
TRS configuration				.1 TDD		
TCI state			TCI.S	State.0		
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
1 DOOT Reference measurement charmer		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1		
		TDD		TDD		
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_	
Channel		.1 TDD	00.4	1 TDD	00.4	
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	
SMTC configuration		000.4		TC.1	000.4	
SSB configuration		SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	SSB.1 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	
SS-RSSI-Measurement			Not Ap	plicable		
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH to PBCH_DMRS						
EPRE ratio of PDCCH_DMRS to SSS						
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS						
EPRE ratio of PDSCH to PDSCH_DMRS						
EPRE ratio of OCNG DMRS to SSSNote 1						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation conditions			AW	/GN		
Note 1: OCNG shall be used such that bot				stant total		
transmitted power spectral density	is achieved for	or all OFDM	symbols.			
Note 2: Void						

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Tes	Test 1		st 3	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
		Set	Setup 1		Setup 1	
Angle of arrival configuration		accord	according to		ding to	
		clause A.3.15.1		clause A.3.15.1		
Assumption for UE beams ^{Note 9}		Rough		Ro	ugh	

N oc Note1		dBm/15kHz Note4	-105		-105		
N oc Note1	N oc Note1		-96		-96		
\hat{E}_s/N_{oc}	;	dB	4.54	2.66	-3	-3	
SSB_RP		dBm/SCS Note4	-91.46	-93.34	-99	-99	
SS-SINR	Note2	dB	0	-3.2	-4.76	-4.76	
Ê s /I ot		dB	0	-3.2	-4.76	-4.76	
lo ^{Note2}		dBm/95.04 MHz Note4	-59.2		-64		
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm oc}$ to be fulfilled.						
Note 2:	SS-SINR, SSB_RP, and lo levels information purposes. They are no				eters for		
Note 3:	SS-SINR and SS-RSRP minimun interference and noise at each re-	•	•	d assumin	g indepen	dent	
Note 4:	Equivalent power received by an	antenna with 0 c	dBi gain at	the centre	of the quie	et zone	
Note 5:	As observed with 0 dBi gain anter				•		
Note 6:	Void		·				
Note 7:	Void						
Note 8:	8: Void						
Note 9:	Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						

A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Doromotor	Unit	Te	st 1	Test 2		Test 3	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode		TDD		TDD		TDD	
TDD configuration			onf.3.1	TDDConf.3.1		TDDConf.3.1	
BW _{channel}	MHz	100: N _F	$_{RB,c} = 66$	100: N _F	$R_{B,c} = 66$	100: N _F	$R_{B,c} = 66$
Data RBs allocated		6	66		6	6	6
Downlink initial BWP configuration					/P.0.1		
Downlink dedicated BWP configuration				DLBV			
Uplink initial BWP configuration				ULBV			
Uplink dedicated BWP configuration				ULBV			
DRX cycle configuration	ms				olicable		
TRS configuration					.1 TDD		
TCI state					tate.0		
		SR.3.1		SR.3.1		SR.3.1	
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-
		CR.3.1		CR.3.1		CR.3.1	
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-
		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
OCNG Patterns		OF.1	OF.1	OF.1	OF.1	OF.1	OF.1
		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.
SMTC configuration		1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2
SSB configuration		SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	SSB.3
and the same of th		FR2	FR2	FR2	FR2	FR2	FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS	15						•
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSSNote 1							
EPRE ratio of OCNG to OCNG DMRS Note							
1							
Propagation conditions		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2		Test 3	
Faranietei		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2

Angle of arrival configuration	degrees	Setup 1 according to A.3.15.1		Setup 1 according to A.3.15.1		accord A.3.	up 1 ding to 15.1
Assumption for UE beams ^{Note 10}		Ro	ugh	Ro	ugh	Ro	ugh
N_{oc} Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
N oc Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
SSB_RPNote2	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0
Ê s /I ot	dB	-0.5	-0.5	11	11	-3.0	-3.0
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 2: SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: Void
- Note 7: Void
- Note 8: Void
- Note 9: Void
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR on the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.7.7.4 L1-RSRP measurement for beam reporting

A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations in each supported band

A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	1~2		66	66
PDSCH Reference	1		SR.3.2 TDD	SR.3.2 TDD
measurement channel	2		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD	CR.3.1 TDD
Channel	2		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	2		CCR.3.7 TDD	CCR.3.7 TDD
000 " "	1		SSB.1 FR2	SSB.1 FR2
SSB configuration	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial DWD Configuration	4.0		DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~2		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3	DLBWP.1.3
Dedicated BWF configuration			ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI	1~2		TCI.State.2	TCI.State.2
Configuration				
SMTC configuration	1~2		SMTC.1	SMTC.1
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot320	slot320
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH to PDSCH				
DMRS				
EPRE ratio of OCNG DMRS to SSSNote 1				
EPRE ratio of OCNG to OCNG	1			
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

 ${\rm for} \ \frac{N_{oc}}{\rm to \ be \ fulfilled.}$

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test 2 NOTE 3	
Farameter	coming	Oilit	SSB0	SSB1	SSB0	SSB1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 according to	
			A.3.15.1		A.3.15.1	
Assumption for UE beams ^{Note 4}			Rough		Rough	
N oc	1, 2	dBm/15 kHz	-100		n.a.	
N_{oc}	1	dBm/SS	-91		n.a.	
	2	B SCS	-88		n.a.	
\hat{E}_{s}/I_{ot}	1~2	dB	10	-2	n.a.	
SSB_RP ^{Note1}	1	dBm/SC	-81	-93	As in Table	B.2.4-2
33B_RP.166	2	S	-78	-90	As in Table	B.2.4-2
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-51.57 SS-RSR		SS-RSRP+	28.98
\hat{E}_s/N_{oc}	1~2	dB	10	-2	n.a.	

Note 1: SSB_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

A.7.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB0 and absolute accuracy of SSB1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.7.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3		
	SSB0	SSB_RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq SSB_RP0 + δ + G _{max}		
	SSB1	SSB_RP1 - δ + G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 + δ + G _{max}		
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration			
Note 2:	: δ is the RSRP absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the lo used in the test			
Note 3:	e 3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class			

A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD Configuration	1		TDDConf.3.1	TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1		OP.1	OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS	1	4D		0
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1	dB	0	U
DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1				

OCNG shall be used such that both cells are fully allocated and a constant total Note 1:

transmitted power spectral density is achieved for all OFDM symbols.

Interference from other cells and noise sources not specified in the test is assumed to be Note 2: constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

			Tes	st 1	Test 2 NOTE 3	
Parameter	Config	Unit	CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 acc	cording to
			A.3.	15.1	A.3.1	5.1
Assumption for UE beams ^{Note 4}			Rou	ıgh	Rou	gh
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.	
Ê s /I ot	1~2	dB	10	-2	n.a.	
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2	
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-59.86		SS-RSRF	°+28.98
\hat{E}_s / N_{oc}	1~2	dB	-51.57	-2	n.a	

- Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 3: No additional noise is added by the test system in Test 2.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3		
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}		
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} ≤ Reported RSRP(dBm) ≤ CSI-RS _RP1 + δ + G _{max}		
Note 1:		equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone st for the CSI-RS n under consideration		
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test			
Note 3:	G _{min} and G _{max} are the to the UE power cla	ne minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according ss		

A.8 E-UTRA standalone tests for NR RRM

Editor notes: All NR RRM tests under E-UTRA standalone operations are included in this Annex. All EN-DC related NR RRM tests are in A.4 and A.5.

A.8.1 Void

A.8.2 RRC_IDLE state mobility

A.8.2.1 Inter-RAT NR Cell re-selection

A.8.2.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

A.8.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.8.2.1.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.8.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case

	Parameter	Unit	Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 2 in the initial phase
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T1 end condition	Active cell			Cell1	During T1 period the UE reselects to cell 1
	Neighbour cell			Cell2	
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T3
RF Channe	el Number		1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offse	t between cells		1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	length	S	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACE	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1		S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.
T2		s	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2, 3, 4, 5, 6	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.8.2.1.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test		Cell 2	
		configuration	T1	T2	T3
TDD configuration		1, 4	N/A		
		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
PDSCH Reference		1, 4		SR.1.1 FDD	
measurement channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
RMSI CORESET		1, 4		CR.1.1 FDD	
Reference Channel		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
RMC CORESET		1, 4		CCR.1.1 FDD	
Reference Channel		2, 5		CCR.1.1 TDD	
		3, 6		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3, 4, 5, 6		OP.1	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 4		SSB.1 FR1	
		2, 5		SSB.1 FR1	
		3, 6		SSB.2 FR1	
Initial DL BWP		1, 2, 3, 4, 5, 6		DLBWP.0.1	
configuration					
Initial UL BWP		1, 2, 3, 4, 5, 6		ULBWP.0.1	
configuration		4 0 0 4 5 0		000	
RLM-RS	ID /000	1, 2, 3, 4, 5, 6	SSB		
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
Pcompensation	dB	1, 2, 3, 4, 5, 6		0	

Qhysts	dB	1, 2, 3, 4, 5, 6		0			
Qoffsets, n	dB	1, 2, 3, 4, 5, 6	0				
Cell_selection_and_		1, 2, 3, 4, 5, 6					
reselection_quality_m			SS-RSRP				
easurement							
\hat{E}_{s}/I_{ot}	dB	1, 4	-4	-infinity	12		
		2, 5					
		3, 6					
N_{oc} Note2	dBm/SCS	1, 4		-98			
1 · oc		2, 5		-98			
		3, 6		-95			
N_{oc} Note2	dBm/15 kHz	1, 4		-98			
1 oc		2, 5					
		3, 6					
\hat{E}_{s}/N_{oc}	dB	1, 4	-4	-infinity	12		
		2, 5					
		3, 6					
SS-RSRP Note3	dBm/SCS	1, 4	-102	-infinity	-86		
		2, 5	-102	-infinity	-86		
		3, 6	-99	-infinity	-83		
lo	dBm/9.36 MHz	1, 4	-68.60	-70.05	-57.78		
	dBm/9.36 MHz	2, 5	-68.60	-70.05	-57.78		
	dBm/38.16 MHz	3, 6	-62.50	-63.95	-51.69		
Treselection	S	1, 2, 3, 4, 5, 6	0	0	0		
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6		50			
Thresh _{x, highP}	dB	1, 2, 3, 4, 5, 6	48				
Thresh _{serving} , lowP	dB	1, 2, 3, 4, 5, 6	44				
Thresh _{x, lowP}	dB	1, 2, 3, 4, 5, 6	50				
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit	Cell 1				
		T1	T2	T3		
E-UTRA RF Channel number		1				
BW _{channel}	MHz		10			
OCNG Patterns defined in TS 36.133 [15]		OP.2 TDD	for test configura	ation 1, 2, 3;		
clause A.3.2		OP.2 FDD	for test configur	ation 4, 5, 6		
PBCH_RA	dB					
PBCH_RB	dB					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB					
PHICH_RA	dB		_			
PHICH_RB	dB		0			
PDCCH_RA	dB					
PDCCH_RB	dB					
PDSCH_RA	dB					
PDSCH_RB	dB					
OCNG_RA ^{Note 1}	dB					
OCNG_RB ^{Note 1}	dB					
Qrxlevmin	dBm		-140			
$N_{oc}^{}$ Note 2	dBm/15 kHz		-98			
RSRP Note 3	dBm/15 KHz	-84	-84	-84		
$\hat{\mathbf{E}}_{\scriptscriptstyle \mathrm{s}}/\mathrm{I}_{\scriptscriptstyle \mathrm{ot}}$	dB	14	14	14		
\hat{E}_s/N_{oc}	dB	14 14 14				
Treselection _{EUTRAN}	S	0				
SnonintrasearchP	dB		50			
Thresh _{x, highP}	dB		48			
Thresh _{serving, lowP}	dB	44				
Thresh _{x, lowP}	dB	50				
Propagation Condition			AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.8.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR} + T_{SI-NR}$,

Where:

T_{higher_priority_search} See clause 4.2.2 in TS 36.133 [15]

T_{evaluate, NR} See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

 T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.8.3 RRC_CONNECTED state mobility

A.8.3.1 Handover

A.8.3.1.1 E-UTRAN - NR handover in FR1

A.8.3.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements as specified in clause 6.1.2.1 specified in clause 5.3.4 in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.8.3.1.1-1. General test parameters are provided in Table A.8.3.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.8.3.1.1-3 and A.8.3.1.1-4 respectively.

Table A.8.3.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	E-UTRAN cell
	Neighbouring cell		Cell 2	NR cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measur	rement quantity		RSRP	
b2-Threshold1		dBm	-83	Absolute E-UTRAN RSRP
				threshold for event B2
b2-Threshold2NR		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.8.3.1.1-4	for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset betwe	en cells		3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 8.1.2.1-1
				started before T2 starts [15]
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.8.3.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

Parameter	Unit	Configuration	Cell 1		
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		2	
Duplex mode		1, 2, 3		FDD	
		4, 5, 6		TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6		6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	1	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 5 0 MHz: N _{RB,c} = 10	0
PRACH ConfigurationNote2		1, 2, 3	4		
		4, 5, 6		53	
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD		
DL Reference Measurement				10 MHz: R.3 FDD)
Channel ^{Note3}				20 MHz: R.6 FDD)
		4, 5, 6		5 MHz: R.4 TDD	
				10 MHz: R.0 TDD	
				20 MHz: R.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FDD	
parameters:				10 MHz: R.6 FDD	
DL Reference Measurement				20 MHz: R.10 FDI	
Channel ^{Note3}		4, 5, 6		5 MHz: R.11 TDD	
				10 MHz: R.6 TDD	
OON O. D. W. Note?		4.0.0		20 MHz: R.10 TDI	
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OP.20 FDD		
				0 MHz: OP.10 FD	
		4, 5, 6		0 MHz: OP.17 FC 5 MHz: OP.9 TDC	
		4, 5, 6		0 MHz: OP.9 TDL	
PBCH_RA PBCH_RB	dB	1, 2, 3, 4, 5, 6	20 MHz: OP.7 TDD 0		

PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG_RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	7	7	7
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	7	7	7
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix Note7					

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parameter	Unit	Configuration		Cell 2	
i arameter	Onit	Comiguration	T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4	FDD		
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
3		3, 6		TDDConf.2.1	
BW _{channel}	MHz	1, 4	10:	$N_{RB,c} = 52$ (FE	DD)
		2, 5		$N_{RB,c} = 52$ (TE	
		3, 6	40:	$N_{RB,c} = 106 (T)$	DD)
PDSCH reference measurement channel		1, 4		SR.1.1 FDD	
onarmor .		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
PRACH configuration			FR1 PI	RACH configur	ation 1
OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP	1, 2, 3, 4, 5, 6		DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL			ULBWP.1.1	
	BWP				
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
-		3, 6	SSB.2 FR1		
b2-Threshold2NR	dBm	1, 2, 4, 5		-106	
		3, 6		-103	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to					
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to	-				
PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to	-				
SSS					
EPRE ratio of PDSCH to	1				
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS					
NocNote2	dBm/15 KHz	1, 2, 3, 4, 5, 6		-98	
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-98	
Ĉ /NI	40	3, 6	::£::t+. :	-95	0
Ês/Noc Ês/Iot ^{Note3}	dB dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 3, 4, 5, 6 1, 2, 4, 5	-inifinity -inifinity	-98	0 -98
	ubiii/303	3, 6	-inifinity	-95	-95
Io ^{Note3}	dBm/9.36 MHz	1, 2, 4, 5	-70.05	-67.04	-67.04
	dBm/38.16 MHz	3, 6	-63.96	-60.94	-60.94
Propagation condition	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix		, , , -			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Ê_s/l_{ot}, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.8.3.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 112 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in TS36.133.

 $T_{interrupt} = 62$ ms in the test; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4.3.

A.8.4 Measurement procedure

A.8.4.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay

A.8.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX

A.8.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.1.1-1 below. Test parameters and cell-specific parameters for the NR cell are provided in Tables A.8.4.1.1.1-2 and A.8.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1.

Table A.8.4.1.1.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: T	ne UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.1.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Parameter	Unit	Test	Value		Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel		Config		1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6		I	is used.
NR RF Channel		Config		1	One NR FR1 carrier frequencies is
Number		1,2,3,4,5,6		ı	used.
Active cell		Config	Co	II 1	Cell 1 is on E-UTRA RF channel
		1,2,3,4,5,6	Ce	II I	number 1.
Neighbour cell		Config	Co	II 2	Cell 2 is on NR RF channel number
		1,2,3,4,5,6	Ce	:II Z	1.
SSB configuration		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 2,5	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 3,6	SSB.:	2 FR1	As specified in clause A.3.10.1
CP length		Config	Nov	em al	Applicable to both cells.
		1,2,3,4,5,6	INOI	mal	
DRX		Config	0	FF	DRX is not used
		1,2,3,4,5,6	U	ГГ	
Frame time offset	ms	Config 1,2,3,4			Asynchronous cells.
between serving and			3	7	The timing of Cell 2 relative to the
neighbour cells					timing of Cell 1.
	μs	Config 5,6		2	Synchronous cells.
			3		
SFN offset between		Config			SFN of Cell 2 relative to SFN of
serving and neighbour		1,2,3,4,5,6	0	1	Cell 1.
cells					
T1	S	Config		1	
		1,2,3,4,5,6		1	

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2	
NR RF Channel Number		Config 1,2,3,4,5,6	1	
Dunlay made		Config 1,4	FDD	
Duplex mode		Config 2,3,5,6	TDD	
		Config 1,4	10: $N_{RB,c} = 52$	
BW _{channel}	MHz	Config 2,5	10: $N_{RB,c} = 52$	
		Config 3,6	40: $N_{RB,c} = 106$	
TDD configuration		Config 2,5	TDDConf.1.1	
1DD configuration		Config 3,6	TDDConf.2.1	
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1	
SMTC configuration		Config 1,2,3,4,5,6	SMTC.1	
PDSCH/PDCCH subcarrier	LU I=	Config 1,2,4,5	15	
spacing	kHz	Config 3,6	30	
EPRE ratio of PSS to SSS	dB			
EPRE ratio of PBCH DMRS to SSS	dB			
EPRE ratio of PBCH to PBCH DMRS	dB	Config 1,2,3,4,5,6	0	
EPRE ratio of OCNG DMRS to SSS Note 1	dB			
EPRE ratio of OCNG to OCNG DMRS Note 1	dB			
N _{oc} Note2	dBm/15kHz		-98	
N _{oc} Note2	4D/CCC	Config 1,2,4,5	-98	
Noc	dBm/SCS	Config 3,6	-95	
SS-RSRP Note 3, 4	dBm/SCS	Config 1,2,4,5	-94	
55-KSKP 1100 9, 1		Config 3,6	-91	
$\mathbf{\hat{E}}_{s}/I_{ot}$	dB	Config 1,2,3,4,5,6	4	
Ês/N _{oc}	dB	Config 1,2,3,4,5,6 4		
In Note 3	dBm/9.36MHz	Config 1,2,4,5	-64.59	
10 11016 3	dBm/38.16MHz	Config 3,6	-58.50	
Propagation Condition		Config 1,2,3,4,5,6	AWGN	

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.1.2 E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX

A.8.4.1.2.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.2.1-1 below. Test parameters are provided in Tables A.8.4.1.2.1-2 below. Cell-specific parameters for the E-UTRA and NR cells are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1, and Table A.8.4.1.1.1-3 in clause A.8.4.1.1.1, respectively.

Table A.8.4.1.2.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.2.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Parameter	Unit Test	Value		Comment	
		configuration	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1		One NR FR1 carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	Cell 1		Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	Cell 2		Cell 2 is on NR RF channel number 1.
		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
SSB configuration		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
CP length		Config 1,2,3,4,5,6	Normal		Applicable to both cells.
DRX		Config 1,2,3,4,5,6	DRX.4		DRX configuration as specified in clause A.3.3.4
Frame time offset between serving and neighbour cells	ms	Config 1,2,4,5	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 3,6	3		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	S	Config 1,2,3,4,5,6	1		

A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2 \times TTI_{DCCH}$ longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2 E-UTRA – NR Inter-RAT Measurements

A.8.4.2.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is only required to be tested in one of the supported test configurations.			

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Parameter Unit Test Value		alue	Comment	
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5,	E-UTRA ce	II 1 (PCeII)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5,	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5,	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	s	1, 2, 3, 4, 5,	1	1	
Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.1.1-3 Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.1.1-4					

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1	12	
Duplex mode		1, 2, 3, 4, 3, 6	FDE	<u> </u>	
Duplex mode		4, 5, 6	TDE		
TDD special subframe		4, 5, 6	6	,	
configuration ^{Note1}		7, 5, 6	0		
TDD uplink-downlink		4, 5, 6	1		
configuration ^{Note1}		1, 0, 0	'		
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25		
ST Charmer		1, 2, 0, 1, 0, 0	10 MHz: N _F		
			20 MHz: N _R		
PDSCH parameters:		1, 2, 3	5 MHz: R.		
DL Reference Measurement		1, _, =	10 MHz: R		
Channel ^{Note2}			20 MHz: R		
		4, 5, 6	5 MHz: R.		
		, -, -	10 MHz: R		
			20 MHz: R		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:		, ,	10 MHz: R		
DL Reference Measurement			20 MHz: R.	10 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.	11 TDD	
		, ,	10 MHz: R.6 TDD		
			20 MHz: R.10 TDD		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD		
			10 MHz: OP.10 FDD		
			20 MHz: OP	.17 FDD	
		4, 5, 6	5 MHz: OP	.9 TDD	
			10 MHz: OF	P.1 TDD	
			20 MHz: OF	P.7 TDD	
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17 17		
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	17	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	/	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low		
Correlation Matrix Note6		1, 2, 0, 4, 0, 0	1/2 [···	
J J J G G G G G G G G G G G G G G G			l .		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Ce	ell 2	
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4	F	DD	
		2, 3, 5, 6	Т	DD	
TDD configuration		2, 5		Conf.1.1	
		3, 6		Conf.2.1	
BW _{channel}	MHz	1, 2, 4, 5		RB,c = 52	
		3, 6		B,c = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	0	P.1	
SMTC configuration defined in A.3.11.1		1, 4		TC.2	
and A.3.11.2		2, 3, 5, 6		TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15	
LOTI LUCID	ID (000	3, 6		30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		101 98	
EPRE ratio of PSS to SSS		3, 6 1, 2, 3, 4, 5, 6	-	90	
EPRE ratio of PBCH DMRS to SSS		1, 2, 3, 4, 3, 0			
EPRE ratio of PBCH to PBCH DMRS		 			
EPRE ratio of PDCCH DMRS to SSS		†			
EPRE ratio of PDCCH to PDCCH DMRS		†			
EPRE ratio of PDSCH DMRS to SSS		†		0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note 1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
N _{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-	98	
N oc Note2	dBm/SCS	1, 2, 4, 5		98	
		3, 6		95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91	
		3, 6	-Infinity	-88	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26	
	dBm/38.16MH z	3, 6	-63.95	-56.16	
Propagation Condition		1, 2, 3, 4, 5, 6	TDL-C 30	0ns 100Hz	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2	Low	
Note 1: OCNG shall be used such that the density is achieved for all OFDM s	symbols.				
Note 2: Interference from other cells and r subcarriers and time and shall be					
Note 3: SS-RSRP and lo levels have been settable parameters themselves.		•		•	
Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each					

A.8.4.2.1.2 Test Requirements

receiver antenna port.

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test		Va	lue		Comment	
		configuratio n	Test 1	Test 2	Test 3	Test 4		
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1				One E-UTRA carrier frequency is used.	
NR RF Channel Number		1, 2, 3, 4, 5, 6			1		One FR1 NR carrier frequency is used.	
Active cell		1, 2, 3, 4, 5, 6	E-UTR	A cell 1 (Po	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.	
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].	
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]	
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0					
CP length		1, 2, 3, 4, 5, 6	Normal					
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0					
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used	
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3	
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
cells		2, 3, 5, 6	3µs				Synchronous cells.	
T1	S	1, 2, 3, 4, 5, 6	5					
T2	S	1, 2, 3, 4, 5, 6	2	11	2	11		
	Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.2.1-3							

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1	
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD)	
		4, 5, 6	TDD)	
TDD special subframe configuration ^{Note1}		4, 5, 6	6		
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1		
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _R	B,c = 25	
			10 MHz: N _F	$_{RB,c} = 50$	
			20 MHz: $N_{RB,c} = 100$		
PDSCH parameters:		1, 2, 3	5 MHz: R.	7 FDD	
DL Reference Measurement			10 MHz: R	.3 FDD	
Channel ^{Note2}			20 MHz: R.6 FDD		
		4, 5, 6	5 MHz: R.	4 TDD	
			10 MHz: R	.0 TDD	
			20 MHz: R	.3 TDD	

PCFICH/PDCCH/PHICH parameters:		1, 2, 3	5 MHz: R.′ 10 MHz: R			
DL Reference Measurement			20 MHz: R.10 FDD			
Channel ^{Note2}		4, 5, 6	5 MHz: R.	I1 TDD		
			10 MHz: R	.6 TDD		
			20 MHz: R.			
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD			
			10 MHz: OP			
			20 MHz: OP			
		4, 5, 6	5 MHz: OP	-		
			10 MHz: OF			
			20 MHz: OP.7 TDD			
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77			
PBCH_RA		1, 2, 3, 4, 5, 6				
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA	⊣		_			
PHICH_RB	dB		0			
PDCCH_RA						
PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RANote3						
OCNG_RB ^{Note3}	15 (45)	4 0 0 4 5 0	10			
NocNote4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104			
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17		
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	17	17		
RSRPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low			
Correlation Matrix Note6						

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 5: Ê_s/l_{ot}, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	C	ell 2			
		configuration	T1	T2			
NR RF Channel Number		1, 2, 3, 4, 5, 6		1			
Duplex mode		1, 4	F	DD			
		2, 3, 5, 6		DD			
TDD configuration		2, 5		Conf.1.1			
		3, 6		Conf.2.1			
BW _{channel}	MHz	1, 2, 4, 5		RB,c = 52			
		3, 6		B,c = 106			
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6		P.1			
SMTC configuration defined in A.3.11.1		1, 4		ITC.2			
and A.3.11.2		2, 3, 5, 6		ITC.1			
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15			
		3, 6		30			
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		101			
		3, 6	-	·98			
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6					
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS							
EPRE ratio of PDSCH DMRS to SSS				0			
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS (Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-	.98			
N Note2	dBm/SCS	1, 2, 4, 5	-	.98			
TV oc		3, 6	-	·95			
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91			
		3, 6	-Infinity	-88			
$\hat{E}_{_{ m s}}/{ m I}_{_{ m ot}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26			
	dBm/38.16MH	3, 6	-63.95	-56.16			
	Z	•					
Propagation Condition		1, 2, 3, 4, 5, 6	TDL-C 30	00ns 100Hz			
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2	2 Low			
Note 1: OCNG shall be used such that the	cell is fully alloca	ted and a constant	total transmitted	power spectral			
Note 2: Interference from other cells and r	density is achieved for all OFDM symbols.						
Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not							

settable parameters themselves.

A.8.4.2.2.2 **Test Requirements**

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA ce	II 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 6	2	1	
Note 1: The value of b	2-Thres	hold1 is defined	d in Table A.8	.4.2.3.1-3	•
Note 2: The value of b	2-Thres	shold2NR is def	ined in Table	A.8.4.2.3.1-4	

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD)
		4, 5, 6	TDD)
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _R	B,c = 25
			10 MHz: N _F	•
			20 MHz: N _R	B,c = 100
PDSCH parameters:		1, 2, 3	5 MHz: R.	7 FDD
DL Reference Measurement			10 MHz: R	.3 FDD
Channel ^{Note2}			20 MHz: R	.6 FDD
		4, 5, 6	5 MHz: R.	4 TDD
			10 MHz: R	.0 TDD
			20 MHz: R	.3 TDD

	ı					
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD			
parameters:			10 MHz: R.6 FDD			
DL Reference Measurement			20 MHz: R.10 FDD			
Channel ^{Note2}		4, 5, 6	5 MHz: R.′	I1 TDD		
			10 MHz: R	.6 TDD		
			20 MHz: R.10 TDD			
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD			
			10 MHz: OP	.10 FDD		
			20 MHz: OP	.17 FDD		
		4, 5, 6	5 MHz: OP	.9 TDD		
			10 MHz: OF	P.1 TDD		
			20 MHz: OF	P.7 TDD		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77			
PBCH_RA		1, 2, 3, 4, 5, 6				
PBCH_RB						
PSS_RA						
SSS_RA						
PCFICH_RB						
PHICH_RA						
PHICH_RB	dB		0			
PDCCH_RA						
PDCCH RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RA ^{Note3}						
OCNG_RB ^{Note3}						
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	ļ		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17		
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	17	17		
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87		
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c}		
10,1000				/50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low			
Correlation Matrix Note6						

1088

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Се	II 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6		
Duplex mode		1, 4	F	
		2, 3, 5, 6		D
TDD configuration		2, 5	TDDC	
		3, 6	TDDC	onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _{RI}	s,c = 52
		3, 6	40: N _{RB}	,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF	P.1
SMTC configuration defined in A.3.11.1		1, 4	SMT	C.2
and A.3.11.2		2, 3, 5, 6	SMT	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		5
1 Boot in Boot about not opacing	KI IZ	3, 6		0
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-1	
DZ TITIOOTOIGZIAT	dBit#000	3, 6	 -9	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS		1, 2, 3, 4, 3, 6		
EPRE ratio of PBCH to PBCH DMRS		+		
EPRE ratio of PDCCH DMRS to SSS		+		
EPRE ratio of PDCCH to PDCCH DMRS		+		
EPRE ratio of PDSCH DMRS to SSS		†	(١
EPRE ratio of PDSCH to PDSCH		†	,	,
EPRE ratio of OCNG DMRS to SSS (Note		†		
1)				
EPRE ratio of OCNG to OCNG DMRS]		
(Note 1)				
Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-6	8
Note2	dBm/SCS	1, 2, 4, 5	-6	18
oc oc		3, 6	-6)5
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MH z	3, 6	-63.95	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	TDL-C 300	ns 100Hz
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6	1x2	Low
Note 1: OCNG shall be used such that the density is achieved for all OFDM solution. Note 2: Interference from other cells and recognitions.	symbols. noise sources not	specified in the test	is assumed to be	constant over
subcarriers and time and shall be Note 3: SS-RSRP and lo levels have been			OL.	
aattable peremeters themselves		•		•

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement

reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1: The UE is only	required to be tested in one of the supported test configurations.

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configuratio n	Test 1	1 3		Test 4	
E-UTRA RF		1, 2, 3, 4, 5,			1	'	One E-UTRA carrier frequency is used.
Channel Number		6					
NR RF Channel		1, 2, 3, 4, 5,		,	1		One FR1 NR carrier frequency is used.
Number		6					
Active cell		1, 2, 3, 4, 5, 6		A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5,	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5,	2	13	2	13	
Note 1: The valu	e of b2-	Threshold1 is de	efined in	Table A.8.	4.2.4.1-3		1

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.4.1-4

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neighbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1			
			T1	T2		
RF channel number		1, 2, 3, 4, 5, 6	11			
Duplex mode		1, 2, 3	FDD			
T00		4, 5, 6	TDD)		
TDD special subframe configuration Note1		4, 5, 6	6			
TDD uplink-downlink		4, 5, 6	1			
configuration ^{Note1}						
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _R	•		
			10 MHz: N _F			
			20 MHz: N _R			
PDSCH parameters:		1, 2, 3	5 MHz: R.			
DL Reference Measurement			10 MHz: R			
Channel ^{Note2}		4 = 0	20 MHz: R			
		4, 5, 6	5 MHz: R.			
			10 MHz: R			
			20 MHz: R			
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.			
parameters:			10 MHz: R			
DL Reference Measurement			20 MHz: R.			
Channel ^{Note2}		4, 5, 6	5 MHz: R.			
			10 MHz: R.6 TDD			
OON O. D		4.0.0	20 MHz: R.10 TDD			
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD			
			10 MHz: OP			
		4 = 0	20 MHz: OP			
		4, 5, 6	5 MHz: OP.9 TDD			
			10 MHz: OF			
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	20 MHz: OF -77			
PBCH_RA	dbiii	1, 2, 3, 4, 5, 6	-11			
PBCH_RB		1, 2, 3, 4, 3, 0				
PSS_RA	 					
SSS_RA						
PCFICH_RB	 					
PHICH_RA						
PHICH_RB	dB		0			
PDCCH_RA	UB UB		0			
PDCCH_RB						
PDSCH_RA						
PDSCH_RB	 					
OCNG_RA ^{Note3}						
OCNG_RB ^{Note3}						
N _{oc} Note4	dBm/15kHz			1		
	dBIII/13KHZ	1, 2, 3, 4, 5, 6	-104 17 17			
Ê _s /N _{oc} Ê _s /I _{ot} ^{Note5}	dB dB	1, 2, 3, 4, 5, 6	17	<u>17</u> 17		
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-87	-87		
SCH_RP ^{Note5}	dBm/15kHz					
		1, 2, 3, 4, 5, 6	-87	-87		
lo ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)		
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	0		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lo	DW		
Correlation Matrix Note6						
Note 1: Special subframe and	والمناوسيوا وامتاوس		enecified in table 4.2-1 in To	00.044 [00]		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 2		
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6	,		
Duplex mode		1, 4	FDD		
		2, 3, 5, 6		D	
TDD configuration		2, 5	TDDC		
		3, 6	TDDC		
BW _{channel}	MHz	1, 2, 4, 5	10: N _{RI}	_{B,c} = 52	
		3, 6	40: N _{RB}		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	OF		
SMTC configuration defined in A.3.11.1		1, 4	SMT		
and A.3.11.2		2, 3, 5, 6	SMT		
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	1	5	
		3, 6		0	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-1	01	
		3, 6	-6	8	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS		1			
PRE ratio of PDCCH to PDCCH DMRS		Ī			
PRE ratio of PDSCH DMRS to SSS			()	
EPRE ratio of PDSCH to PDSCH		1			
EPRE ratio of OCNG DMRS to SSS (Note		İ			
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
Note2 N _{oc} Note2	dBm/15kHz	1, 2, 3, 4, 5, 6	-98		
N oc Note2	dBm/SCS	1, 2, 4, 5	-98		
		3, 6	-6	95	
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91	
		3, 6	-Infinity	-88	
$\hat{E}_{\rm s}/{ m I}_{ m ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7	
O ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26	
	dBm/38.16MH	3, 6	-63.95	-56.16	
Propagation Condition	Z	1, 2, 3, 4, 5, 6	TDL-C 300	Ons 100Hz	
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6	1x2 Low		
Matrix Note 1: OCNG shall be used such that the density is achieved for all OFDM solution. Solution of the cells and results and time and shall be	symbols. noise sources not modelled as AWG	specified in the test SN of appropriate po	is assumed to be ower for $_{N_{\ oc}}$ to be	constant over e fulfilled.	
Note 3: SS-RSRP and lo levels have been settable parameters themselves.		er parameters for in		es. They are no	

A.8.4.2.4.2 Test Requirements

receiver antenna port.

Note 4:

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

SS-RSRP minimum requirements are specified assuming independent interference and noise at each

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement

reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration Description						
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations.						

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA cel	I 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between		1	3ms		Asynchronous cells.
serving and neighbour cells					The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3μs		Synchronous cells.
T1	s	1, 2	10		
T2	s	1, 2	6	3	
Note 1: The value of b	1-Thres	holdNR is defin	ed in Table A	.8.4.2.5.1-3	

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	C	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.2.1		1, 2	Set	up 2a
Assumption for UE beams ^{Note 5}		1, 2	Ro	ough
NR RF Channel Number		1, 2		1
Duplex mode		1, 2		DD
TDD configuration		1, 2	TDDC	Conf.3.1
BWchannel	MHz	1, 2 1, 2	100: N	RB,c = 24
OCNG patterns defined in A.3.2.1.3		1, 2	О	P.3
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	20
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-112	
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				T
Ês	dBm/SCS	1, 2	-Infinity	-80.6
SSB-RP Note 3	dBm/SCS	1, 2	-Infinity	-80.6
Ê _s /I _{ot} BB Note 6	dB	1, 2	-Infinity	8.3
Io ^{Note3}	dBm/95.04MH	1, 2	-Infinity	-56.0
Propagation Condition	Z	1, 2	۸۱۸	l VGN
Propagation Condition Note 1: OCNG shall be used such that a condition	l	,		

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)					
	Test 1: D1 ms Test 2: D2 ms					
UE power class 3	3200	1600				

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

A.8.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.6.1-1, A.8.4.2.6.1-2 and A.8.4.2.6.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.6.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.6.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.6.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

Configuration Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1: The UE is only re	Note 1: The UE is only required to be tested in one of the supported test configurations.				

Table A.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	Value Test Test 2 Test 3 Test 4 1 3			Comment	
		configuratio n			Test 4		
E-UTRA RF Channel Number		1, 2	1				One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2			1		One FR2 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTR	A cell 1 (Po	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dB m	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal	Normal			
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2	3μs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	6	83	6	83	
Note 1: The valu	e of b1-	ThresholdNR is	defined i	n Table A.	8.4.2.6.1	-3	

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Se	tup 1
Assumption for UE beams ^{Note 5}		1, 2	R	ough
NR RF Channel Number		1, 2		1
Duplex mode		1, 2		DD
TDD configuration		1, 2		Conf.3.1
BWchannel	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	C	P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)	ID /45111	4.0		0.4.7
N_{oc}	dBm/15kHz	1, 2	-1	04.7
Note2	dBm/SCS	1, 2	-95.7	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	8
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8
Io ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0
	Z			
Propagation Condition		1, 2	A۱	VGN

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)						
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 ms						
UE power class 3	4800	51200	4800	51200			

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

A.8.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.7.1-1, A.8.4.2.7.1-2 and A.8.4.2.7.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.7.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.7.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.7.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

Configuration	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: The LIF is only required to be tested in one of the supported test configurations				

Table A.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment	
		configurati on	Test 1	Test 2		
E-UTRA RF Channel Numbers		1, 2		1	One E-UTRA carrier frequency is used.	
NR RF Channel Numbers		1, 2	1		One FR2 NR carrier frequency is used.	
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.	
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].	
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]	
Hysteresis	dB	1, 2	0			
CP length		1, 2	Normal			
TimeToTrigger	S	1, 2	0			
Filter coefficient		1, 2	0		L3 filtering is not used	
DRX		1, 2	OFF		DRX is not used	
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
		2	3μs		Synchronous cells.	
T1	s	1, 2	5			
T2	s	1, 2	5	3		
Note 1: The value of b	1-Thres	holdNR is defin	ed in Table A	8.4.2.7.1-3		

Table A.8.4.2.7.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter			Cell 2		
		configuration	T1	T2	
AoA setup defined in A.3.15.1		1, 2	Se	tup 1	
Assumption for UE beams ^{Note 5}		1, 2	Rough		
NR RF Channel Number		1, 2		1	
Duplex mode		1, 2		DD	
TDD configuration		1, 2		Conf.3.1	
BWchannel	MHz	1, 2	100: N	$I_{RB,c} = 66$	
OCNG patterns defined in A.3.2.1.1		1, 2	C	P.1	
SMTC configuration defined in A.3.11.1		1	SM	ITC.2	
and A.3.11.2		2	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106	
EPRE ratio of PSS to SSS		1, 2			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS				0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)	-ID /4 EL-LI-	4.0		04.7	
N_{oc}	dBm/15kHz	1, 2	-1	04.7	
Note2	dBm/SCS	1, 2	-95.7		
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	8	
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8	
Io ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0	
	Z				
Propagation Condition		1, 2	AV	VGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)			
	Test 1: D1 ms Test 2: D2 ms			
UE power class 3	4160	2080		

A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.8.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Unit	Test		Value			Comment	
		configuratio	Test	Test 2	Test	Test 4		
		n	1		3			
E-UTRA RF		1, 2		•	1		One E-UTRA carrier frequency is used.	
Channel								
Number								
NR RF Channel		1, 2	1			One FR2 NR carrier frequency is used.		
Number								
Active cell		1, 2	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel	
						number 1 as defined in clause A.3.7.2.2.		
Neighbour cell		1, 2	NR cell	NR cell 2			NR cell 2 is on NR RF channel number 1.	
Gap Pattern Id		1, 2	0		4		As specified in clause Table 8.1.2.1-1 of	
-							TS 36.133 [15].	
Measurement		1, 2	39 19			As specified in TS 36.331 [16].		
gap offset								
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP	
							measurement on cell 2 for event B1 [16]	
Hysteresis	dB	1, 2	0					
CP length		1, 2	Normal					
TimeToTrigger	S	1, 2	0					
Filter coefficient		1, 2	0				L3 filtering is not used	
DRX			DRX.	DRX.12	DRX.	DRX.12	As specified in clause A.3.3	
			9		9			
Time offset		1	3ms				Asynchronous cells.	
between serving							The timing of Cell 2 is 3ms later than the	
and neighbour							timing of Cell 1.	
cells		2	3µs				Synchronous cells.	
T1	s	1, 2	5					
T2	s	1, 2	7	70	7	70		
Note 1: The va	lue of b1-	ThresholdNR is	defined i	in Table A.	8.4.2.8.1	-3		

Table A.8.4.2.8.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

Parameter			Cell 2		
		configuration	T1	T2	
AoA setup defined in A.3.15.1		1, 2	Se	tup 1	
Assumption for UE beams ^{Note 5}		1, 2	Rough		
NR RF Channel Number		1, 2		1	
Duplex mode		1, 2		DD	
TDD configuration		1, 2		Conf.3.1	
BWchannel	MHz	1, 2	100: N	$I_{RB,c} = 66$	
OCNG patterns defined in A.3.2.1.1		1, 2	C	P.1	
SMTC configuration defined in A.3.11.1		1	SM	ITC.2	
and A.3.11.2		2	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	,	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106	
EPRE ratio of PSS to SSS		1, 2			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS				0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)	-ID /4.51-LI-	4.0		04.7	
N_{oc}	dBm/15kHz	1, 2	-1	04.7	
Note2	dBm/SCS	1, 2	-95.7		
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	8	
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8	
Io ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0	
	Z				
Propagation Condition		1, 2	AV	VGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

Table A.8.4.2.8.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Test case	Measurement reporting delay (ms)					
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 ms					
UE power class 3	6240	66560	6240	66560		

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.5 Measurement performance

A.8.5.1 SFTD accuracy

A.8.5.1.1 SFTD accuracy

A.8.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT FR1 SFTD measurements.

A.8.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.8.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR FR1 target cell. The test parameters of cell 1 are given in clause A.8.5.1.1.2-2. The test parameters of cell 2 are given in Table A.8.5.1.1.2-3. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.8.5.1.1.2-4.

Table A.8.5.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD	
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.8.5.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Unit	Test 1

E-UTRA RF Channel Number		1
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}		5 MHz: N _{RB,c} = 25
D V V Channel		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 30
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
DE Reference Measurement offarmer		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
DE Reference Measurement ename		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	
N _{oc} Note4	dBm/15 kHz	-104
Ê _s /N _{oc}	dB	-3
Ês/lot	dB	-3
RSRP Note5	dBm/15 kHz	-107
SCH_RP Note5	dBm/15 kHz	-107
Io Note5	dBm/Ch BW	-74.45
		+10log
		(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
Nata 4. On a sial accludence a seed coelinter days	. l' l	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: Es/lot, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.5.1.1.2-3: Test parameters for SFTD accuracy (Cell 2)

	Parameter	Config	Unit	Test 1
SSB GSCN	r drameter	1~6	Offic	freq1
002 000.1		1,4		FDD
Duplex mod	e	2,5	_	TDD
Варюх шеа		3,6		TDD
		1,4		N/A
TDD Config	uration	2,5	_	TDDConf.1.1
l IDD Coning	uration	3,6	_	TDDConf.2.1
DW		1,4	_ MHz	10: N _{RB,c} = 52
BW _{channel}		2,5	_ IVI⊓Z T	10: N _{RB,c} = 52
		3,6		40: N _{RB,c} = 106
PDSCH Ref	erence measurement	1,4 2,5	_	SR.1.1 FDD
channel				SR.1.1 TDD
		3,6		SR.2.1 TDD
		1,4		CR.1.1 FDD
RMSI CORE	ESET Reference Channel	2,5		CR.1.1 TDD
		3,6		CR.2.1 TDD
		1,4		CCR.1.1 FDD
RMC CORE	SET Reference Channel	2,5		CCR.1.1 TDD
		3,6		CCR.2.1 TDD
		1,4		SSB.1 FR1
SSB configu	ıration	2,5		SSB.1 FR1
J		3,6		SSB.2 FR1
SMTC confi	guration	1~6		SMTC.1
DL BWP coi		1~6		DLBWP.1.1
UL BWP coi		1~6		ULBWP.1.1
OCNG Patte		1~6		OP.1
	EPRE ratio of PSS to SSS			0
	of PBCH DMRS to SSS			
	of PBCH to PBCH DMRS			
	of PDCCH DMRS to SSS			
	of PDCCH to PDCCH			
DMRS		4.0	4D	0
	of PDSCH DMRS to SSS	1~6	dB	0
	of PDSCH to PDSCH			
DMRS				
EPRE ratio of OCNG DMRS to SSSNote				
<u>'</u>				
	of OCNG to OCNG DMRS			
Note 1				
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
N_{oc} Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
00110162	NR_TDD_FR1_D	1~0	UDIII/ IUNI IZ	-10 4
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
•	NR FDD FR1 H			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
1		l		
ŀ	NR FDD FR1 B			
	NR_FDD_FR1_B NR_TDD_FR1_C			
	NR_TDD_FR1_C			
	NR_TDD_FR1_C NR_FDD_FR1_D,	1,2,4,5		-104
	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5	dDm/SSD SOS	-104
N _{ac Note2}	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,	1,2,4,5	dBm/SSB SCS	-104
$N_{oc\; ext{Note2}}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E	1,2,4,5	dBm/SSB SCS	-104
$N_{oc\; { m Note}2}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G	1,2,4,5	dBm/SSB SCS	-104
$N_{oc\; ext{Note2}}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	1,2,4,5	dBm/SSB SCS	-104
$N_{oc\ Note2}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A,	1,2,4,5	dBm/SSB SCS	-104
$N_{oc\ Note2}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H		dBm/SSB SCS	
$N_{oc\ Note2}$	NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A,	1,2,4,5 3,6	dBm/SSB SCS	-104 -101

	T	T		
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Ê s /I ot		1~6	dB	-3
\hat{E}_{s}/N_{oc}		1~6	dB	-3
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	4045		107
	NR_TDD_FR1_D	1,2,4,5		-107
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
SS-RSRP	NR_FDD_FR1_H		4D /CCC	
Note3	NR_FDD_FR1_A,		dBm/SCS -	-104
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	3,6		
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,		dBm/9.36 MHz	-74.28
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B]		
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5		
	NR_TDD_FR1_D	1,2,4,5		
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H			
10	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			-68.18
	NR_FDD_FR1_D,	3,6	dBm/38.16	
	NR_TDD_FR1_D		MHz	
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagatio		1~6		AWGN
Antenna co	nfiguration	1~6		1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.8.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.8.5.2 E-UTRA – NR Inter-RAT Measurement Performance requirements

A.8.5.2.1 SS-RSRP

A.8.5.2.1.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR1 SS-RSRP measurements.

A.8.5.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.1.1.2-2.

Table A.8.5.2.1.1.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Config)	Description			
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations				

Table A.8.5.2.1.1.2-2: SS-RSRP inter-RAT test parameters

Parameter		Unit		st 1		st 2	
SSB ARFCN			Cell 2 Cell 2 freq1 freq1				
Duploy mode Config 1,4			FDD				
Coning 2,3,5,6			TDD				
	Config 1,4		Not Applicable				
TDD configuration	Config 2,5		TDDConf.1.1				
	Config 3,6			TDDC	onf.2.1		
Downlink initial BWP cor			DLBWP.0.1				
Uplink initial BWP config			ULBWP.0.1				
DRX Cycle configuration	T	ms	Not Applicable				
	Config 1,4						
PDSCH Reference measurement channel	Config 2,5			-		_	
	Config 3,6						
	Config 1,4						
RMSI CORESET Reference Channel	Config 2,5		-		-		
	Config 3,6						
	Config 1,4						
Dedicated CORESET Reference Channel	Config 2,5			-		-	
	Config 3,6						
OCNG Patterns			OP.1				
SS-RSSI-Measurement			Not Applicable				
SMTC configruation			SMTC.1				
SSB configuration	Config 1,2,4,5		SSB.1 FR1				
OOD configuration	Config 3,6		SSB.2 FR1				
PDSCH/PDCCH	Config 1,2,4,5	kHz	15				
subcarrier spacing	Config 3,6	KI IZ		30			
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0	0	0	0	
Note2 Config 1,2,3,4,5,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G	dBm/15k Hz	-1 -94.65 -1 		17 6.5 16 5.5 15		
	NR_FDD_FR1_G NR_FDD_FR1_H					3.5	

	Config 1,2,4	,5		-94.65	Same as Noc for 15kHz
N oc Note2		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-114
		NR_FDD_FR1_B NR_TDD_FR1_C	dBm/SC S		-113.5 -113
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	3	-91.65	-112.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-112
		NR_FDD_FR1_G NR_FDD_FR1_H	-		-111 -110.5
Ê s /I ot	1	1	dB	10	-4
\hat{E}_{s}/N_{oc}			dB	10	-4
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-121
		NR_FDD_FR1_B			-120.5
	Config	NR_TDD_FR1_C NR_FDD_FR1_D	-	-84.65	-120
	1,2,4,5	NR_TDD_FR1_D	-		-119.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-119
SS-		NR_FDD_FR1_G	ID (00		-118
RSRP ^{Not}		NR_FDD_FR1_H NR_FDD_FR1_A	dBm/SC S		-117.5
e3	Config 3,6	NR_TDD_FR1_A		-81.65	-118
		NR_FDD_FR1_B NR_TDD_FR1_C			-117.5 -117
		NR_FDD_FR1_D			
		NR_TDD_FR1_D			-116.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-116
		NR_FDD_FR1_G			-115
		NR_FDD_FR1_H NR_FDD_FR1_A			-114.5
	Config 1,2,4,5	NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6			-87.76
		NR_FDD_FR1_B		-56.28	-87.26
		NR_TDD_FR1_C	dBm/		-86.76
		NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz		-86.26
		NR_FDD_FR1_E			-85.76
		NR_TDD_FR1_E NR_FDD_FR1_G			-84.76
Io ^{Note3}		NR_FDD_FR1_H			-84.26
10.		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6			-84.76
		NR_FDD_FR1_B]		-84.26
	Config 2.0	NR_TDD_FR1_C	dBm/	EO 10	-83.76
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MH z	-50.19	-83.26
		NR_FDD_FR1_E NR_TDD_FR1_E			-82.76
		NR_FDD_FR1_G			-81.76
Drongers	n condition	NR_FDD_FR1_H			
Propagation condition Antenna configuration			-		WGN 1x2
Antenna Coningulation			l .	<u> </u>	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total
	transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to
11010 2.	be constant over subcarriers and time and shall be modelled as AWGN of appropriate
	· · ·
	power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP, and lo levels have been derived from other parameters for information
	purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and
	noise at each receiver antenna port.
Note 5:	NR operating band groups are as defined in clause 3.5.2.
Note 6:	The test configuration excludes support for band n51 and it is not required to run this
INOIC U.	·
	test on band n51 in this release of the specification.

A.8.5.2.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.1.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR2 SS-RSRP measurements.

A.8.5.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRP inter-RAT measurement are tested by using test setup in Table A.8.5.2.1.2.2-2 and Table A.8.5.2.1.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.1.2.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Configuration	Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.8.5.2.1.2.2-2: SS-RSRP Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	
raiailletei	Onit	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: $N_{RB,c} = 66$	
Downlink initial BWP configuration		DLBV	/P.0.1	
Uplink initial BWP configuration		ULBV	/P.0.1	
DRX cycle configuration	ms	Not ap	olicable	
PDSCH Reference measurement channel		-	•	
RMSI CORESET Reference Channel		-	•	
OCNG Patterns		OP.1	OP.1	
SMTC configuration		SMTC.1	SMTC.1	
SSB configuraiton		SSB.3 FR2	SSB.3 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Void.				

Note 3: Void. Note 4: Void.

Table A.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

	D	1111	Test 1	Test 2	
	Parameter	Unit	Cell 2	Cell 2	
			Setup 1	Setup 1	
Angle of a	arrival configuration		according to	according to	
			A.3.15.1	A.3.15.1	
	on for UE beams ^{Note 10}		Rough	Rough	
$N_{oc}^{ m Note1}$		dBm/15kHz Note4	-105	N/A	
$N_{oc}^{ m Note1}$		dBm/SCS Note4	-96	N/A	
Es		dBm/SCS		(Table B.2.3-2 Rx Beam Peak	
ES		Note4		+1dB)	
				(Note 7)	
\hat{E}_{s}/N_{a}	oc	dB	11	N/A	
		dBm/SCS		(Table B.2.3-2 Rx Beam Peak	
SSB_RP	SSB_RP ^{Note2}		-85	+1dB)	
				(Note 7)	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB	$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 2, Note 9		9.97	-3.81	
				(Table B.2.3-2 Rx	
I Noto?		dBm/95.04	55.05	Beam Peak	
Io ^{Note2}		MHz Note4	-55.65	+30dB)	
				(Note 8)	
Note 1:	Where used, interference from ot assumed to be constant over sub			fied in the test is	
	appropriate power for N_{ac} to be t	fulfilled.			
Note 2:	SSB_RP, Es/lot and lo levels have		from other parameter	rs for information	
	purposes. They are not settable p				
Note 3:	Void				
Note 4:	Equivalent power received by an	antenna with 0d	Bi gain at the centre	of the quiet zone.	
Note 5:	Void				
Note 6:					
Note 7:	SSB_RP is applied at 1dB above the minimum level specified in Table B.2.3-2 for beam peak.				
Note 8:	lo is applied at 10log ₁₀ (792)dB+1dB above the minimum level specified in Table B.2.3-2 for beam peak.				
Note 9:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from TS 38.101-2 [19] Table				
	6.2.1.3-4.	nu relaxation fac	IOI DIVIDPITOTTI 15 38	o. 101-2 [19] Table	
Note 10:					
	p.omomanom or tool by otolli lill	p.omomadom			

A.8.5.2.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.2 SS-RSRQ

A.8.5.2.2.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR1 SS-RSRQ measurements.

A.8.5.2.2.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.2.1.2-2.

Table A.8.5.2.2.1.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations

Table A.8.5.2.2.1.2-2: SS-RSRQ inter-RAT test parameters

Parame	eter	Unit		st 1		st 2		st 3
SSB ARFCN				II 2 q1	Ce fre			e ll 2 eq1
	Config 1,4		FDD			110	/ 41	
Duplex mode	Cornig 2,3,5,6		TDD					
	Config 1,4		Not Applicable					
TDD configuration	Config 2,5		TDDConf.1.1					
	Config 3,6			TDDConf.2.1				
Downlink initial BWP cor	-					VP.0.1		
Uplink initial BWP config	uration				ULBV	VP.0.1		
DRX Cycle configuration		ms			Not Ap	plicable		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5			-		-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5			-	-		-	
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5		-		-		-	
	Config 3,6							
OCNG Patterns					0	P.1		
SS-RSSI-Measurement					Not Ap	plicable		
SMTC configruation					SM	TC.1		
SSR configuration	Config 1,2,4,5		SSB.1 FR1					
SSB configuration	Config 3,6		SSB.2 FR1					
PDSCH/PDCCH	Config 1,2,4,5	I.L.	15					
subcarrier spacing	Config 3,6	kHz			3	30		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS	+- CCC							
EPRE ratio of PBCH to PBC								
EPRE ratio of PDCCH DMR	S to SSS		_	_	_	_	_	_
EPRE ratio of PDCCH to PI EPRE ratio of PDSCH DMR	S to SSS	dB	0	0	0	0	0	0
EPRE ratio of PDSCH to PI	DSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)								
Note2 Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D	dBm/15k Hz	-80	.18	-10	06	-1 ⁻	16 5.5 15
	NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						-114 -113 -112.5	

	Config 3,6			-86.27	-113	Same as Noc for Config 1,2,4,5
	Config 1,2,4	.,5		-80.18	-106	Same as Noc for 15kHz
N_{oc} Note2	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SC S	-83.27	-110	-113 -112.5 -112 -111.5 -111 -110 -109.5
Ê s /I ot	l	MC_1 00_1 M_11	dB	-1.75	-1.75	-1.75
\hat{E}_{s}/N_{oc}			dB	-1.75	-1.75	-1.75
SS- RSRPNot e3	Config 1,2,4,5 Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E	dBm/SC S	-81.93 -85.02	-107.75 -111.75	-117.75 -117.25 -116.75 -116.25 -115.75 -114.75 -114.25 -113.75 -113.25 -112.75
		NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-111.75 -111.25
SS-RSRQ	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-40.59	-14.76
Io ^{Note3}	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	- dBm/ 9.36MHz	-50	-75.83	-85.83 -85.33 -84.83 -84.33 -83.83 -82.83 -82.33
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C	dBm/ 38.16MH z	-50	-76.73	-79.73 -79.23 -78.73

	NR_FDD_FR1_D NR_TDD_FR1_D			-78.23
	NR_FDD_FR1_E NR_TDD_FR1_E			-77.73
	NR_FDD_FR1_G]		-76.73
	NR_FDD_FR1_H			-76.53
Propagation co	ndition	-	AWGN	
Antenna config	uration	-	1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

A.8.5.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRQ inter-RAT measurement are tested by using test setup in Table A.8.5.2.2.2.2-2 and Table A.8.5.2.2.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.2.2.1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Note 4:

Void.

Table A.8.5.2.2.2-2: SS-RSRQ Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	
Parameter	Unit	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: $N_{RB,c} = 66$	
Downlink initial BWP configuration		DLBV	/P.0.1	
Uplink initial BWP configuration		ULBV	/P.0.1	
DRX cycle configuration	ms	Not ap	plicable	
PDSCH Reference measurement channel		-	-	
RMSI CORESET Reference Channel		-	-	
OCNG Patterns		OP.1	OP.1	
SMTC configuration		SMTC.1	SMTC.1	
SSB configuration		SSB.3 FR2	SSB.3 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
Note 1: OCNG shall be used such that bo	oth cells are fully	allocated and a cons	stant total	
transmitted power spectral densit	y is achieved for	all OFDM symbols.		
Note 2: Void.				
Note 3: Void.				
Note 1: Void				

Table A.8.5.2.2.2.3: SS-RSRQ Inter-RAT OTA related test parameters

			Test 1	Test 2		
Parameter		Unit	Cell 2	Cell 2		
Angle of arrival configuration			Setup 1 according to A.3.15.1	Setup 1 according to A.3.15.1		
Assumpti	on for UE beams ^{Note 10}		Rough	Rough		
$N_{oc}^{}$ Note1		dBm/15kHz Note4	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)		
$N_{oc}^{ m Note1}$		dBm/SCS Note4	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)		
\hat{E}_s/N_{oc}		dB	-0.5	-1.75		
SSB_RP ^{Note2}		dBm/SCS Note4	-96.2	(Table B.2.3-2 Rx Beam Peak +2.25dB)		
CC DCDC	Note2	dB	2.27	(Note 8)		
	SS-RSRQ ^{Note2}		-3.27	-14.82		
\hat{E}_{s}/I_{ot} No	ote2	dB	-0.5	-1.75		
Io ^{Note2}	Io ^{Note2}		-63.95	(Table B.2.3-2 Rx Beam Peak +35.22dB)		
				(Note 9)		
Note 1:	Interference from other cells and constant over subcarriers and time for N_{oc} to be fulfilled.	e and shall be m	nodelled as AWGN o	f appropriate power		
Note 2: Note 3:	SSB_RP, SS-RSRQ, Es/lot and I information purposes. They are n Void			r parameters for		
Note 4: Note 5: Note 6:	Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone. Note 5: Void					
Note 7:	Note 7: Noc for SCS 15kHz is applied at -10log ₁₀ (8)+4dB above the minimum level specified in Table B.2.3-2 for beam peak. Noc for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak.					
Note 8:	SSB_RP is applied at 2.25dB above beam peak.		·			
Note 9:	lo is applied at 10log ₁₀ (792)+6.22 for beam peak.					
Note 10:	Information about types of UE be implementation or test system im		.2.1.3, and does not	imit UE		

A.8.5.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

In this test case there are two cells on different carriers and measurement gaps are provided

A.8.5.2.3 SS-SINR

A.8.5.2.3.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR1 SS-SINR measurements.

A.8.5.2.3.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.3.1.2-2.

Table A.8.5.2.3.1.2-1: SS- SINR Inter-RAT SS- SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only re	equired to be tested in one of the supported test configurations

Table A.8.5.2.3.1.2-2: SS-SINR inter-RAT test parameters

Parameter		Unit	Test 1	Test 2	Test 3		
	etei .	Oilit	Cell 2	Cell 2 freq1	Cell 2		
SSB ARFCN	Config 1 4		freq1	freq1			
Duplex mode	Config 1,4 Config 2,3,5,6		FDD TDD				
	Config 1,4		Not Applicable				
TDD configuration	Config 2,5	 	TDDConf.1.1				
	Config 3,6	-		TDDConf.2.1			
Downlink initial BWP cor	nfiguration			DLBWP.0.1			
Uplink initial BWP config	uration			ULBWP.0.1			
DRX Cycle configuration		ms		Not Applicable			
	Config 1,4						
PDSCH Reference measurement channel	Config 2,5		-	-	-		
	Config 3,6						
	Config 1,4						
RMSI CORESET Reference Channel	Config 2,5		-	-	-		
	Config 3,6						
	Config 1,4						
Dedicated CORESET Reference Channel	Config 2,5		-	-	-		
	Config 3,6						
OCNG Patterns				OP.1			
SS-RSSI-Measurement				Not Applicable			
SMTC configruation				SMTC.1			
SSB configuration	Config 1,2,4,5			SSB.1 FR1			
SSB Comiguration	Config 3,6			SSB.2 FR1			
PDSCH/PDCCH	Config 1,2,4,5	I/U~	15				
subcarrier spacing	Config 3,6	kHz		30			

EDDE ratio	of DSS to SS	29									
	PRE ratio of PSS to SSS PRE ratio of PBCH DMRS to SSS		1								
	of PBCH to F		1								
	of PDCCH D		4								
		DCCH to PDCCH DMRS		0	0	0	0	0	0		
	ratio of PDSCH DMRS to SSS		dB	U	U		U		0		
	of PDSCH to		-								
		MRS to SSS ^(Note 1)	}								
EDDE ratio	of OCNG bi	OCNG DMRS (Note 1)	-								
LI IXL IAII	0.0010010	NR_FDD_FR1_A									
		NR_TDD_FR1_A NOTE 6						-11	19.5		
		NR_FDD_FR1_B	1					-1	19		
		NR_TDD_FR1_C	i <i></i>						18.5		
N oc Note2	Config	NR_FDD_FR1_D	dBm/15k	-8	88	-10	8.5				
oc	1,2,4,5	NR_TDD_FR1_D	Hz			_		-1	18		
		NR_FDD_FR1_E	1					4.	17.5		
		NR_TDD_FR1_E						-11	17.5		
		NR_FDD_FR1_G	ĺ					-11	16.5		
		NR_FDD_FR1_H	Ĭ						16		
	Config 4 2 4			_	١٥	40	0.5	Same a	s Noc for		
1	Config 1,2,4	,ວ			88	-10	0.0		kHz		
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-11	16.5		
		NR_FDD_FR1_B	1					-1	16		
Note2		NR_TDD_FR1_C	dBm/SC	-85					15.5		
IV oc	Config 3,6	NR_FDD_FR1_D	S			S -85	-105.5				
	Coming 5,5	NR_TDD_FR1_D					-00		-105.5	-1	15
		NR_FDD_FR1_E	-								
		NR_TDD_FR1_E						-114	14.5		
		NR_FDD_FR1_G						-11	14.5		
		NR_FDD_FR1_H						13			
Ê , /I ot	l		dB	-1.	75	2	0		4.0		
								1			
\hat{E}_{s}/N_{oc}		NP EDD EP1 A	dB	-1.		2		1	4.0		
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-12	4.0 23.5		
		NR_TDD_FR1_A						-12 -12	4.0 23.5 23		
	Config	NR_TDD_FR1_A NOTE 6						-12 -12	4.0 23.5		
	Config	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D		-1.		2		-12 -12 -1	4.0 23.5 23 22.5		
	Config 1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D		-1.	75	2	0	-12 -12 -1	4.0 23.5 23		
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_B		-1.	75	2	0	-12 -12 -1 -12	4.0 23.5 23 22.5 22		
		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E		-1.	75	2	0	-12 -12 -1 -12 -12	4.0 23.5 23 22.5 22 21.5		
\hat{E}_s/N_{oc}		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G	dB	-1.	75	2	0	-12 -12 -1 -12 -12	4.0 23.5 23 22.5 22 21.5 20.5		
Ê , /N oc		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	dB dBm/SC	-1.	75	2	0	-12 -12 -1 -12 -12	4.0 23.5 23 22.5 22 21.5		
\hat{E}_s/N_{oc}		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A	dB	-1.	75	2	0	-12 -12 -12 -12 -12 -12 -12 -12	4.0 23.5 23 22.5 22 21.5 20.5 20		
Ê , /N oc SS- RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_FDD_FR1_A	dB dBm/SC	-1.	75	2	0	-12 -12 -12 -12 -12 -12 -12 -12	4.0 23.5 23 22.5 22 21.5 20.5		
Ê , /N oc SS- RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6	dB dBm/SC	-1.	75	2	0	-12 -12 -1 -12 -12 -12 -12 -12	4.0 23.5 22.5 22 21.5 20.5 20.5		
Ê , /N oc SS- RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dB dBm/SC	-1.	75	2	0	-12 -12 -12 -12 -12 -12 -12 -12 -13 -14 -15 -15 -15 -16 -17 -17 -17 -17 -17 -17 -17 -17 -17 -17	4.0 23.5 22.5 22 21.5 20.5 20.5 20		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -12 -12 -12 -12 -12 -12 -13 -14 -15 -15 -15 -16 -17 -17 -17 -17 -17 -17 -17 -17 -17 -17	4.0 23.5 22.5 22 21.5 20.5 20.5		
Ê , /N oc SS- RSRPNot		NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_C NR_FDD_FR1_D	dB dBm/SC	-1.	75	-88	0	-12 -12 -12 -12 -12 -12 -12 -12 -12	4.0 23.5 23 22.5 22 21.5 20.5 20.5 20.5 20.5		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -12 -12 -12 -12 -12 -12 -12	4.0 23.5 22.5 22 21.5 20.5 20.5 20		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -12 -12 -12 -12 -12 -12 -12 -12	4.0 23.5 22.5 22 21.5 20.5 20.5 20 19.5		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -12 -14 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5		
Ê s /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -15 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê s /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -15 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5		
Ê s /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -15 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -15 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot	1,2,4,5	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_TDD_FR1_A	dB dBm/SC	-1.	.75	-88	3.5	-12 -12 -13 -14 -12 -14 -15 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B	dBm/SC S	-1. -89	.75	-88	0 3.5 5.5	-12 -12 -12 -12 -12 -12 -12 -12 -14 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_A NCTE 6 NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B	dB dBm/SC	-1. -89	.75	-88	0 3.5 5.5	-12 -12 -12 -12 -12 -12 -12 -12 -14 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_A NCTE 6 NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D	dBm/SC S	-1. -89	.75	-88	0 3.5 5.5	-12 -12 -12 -12 -12 -12 -12 -12 -14 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS- RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D	dBm/SC S	-1. -89	.75	-88	0 3.5 5.5	-12 -12 -12 -12 -12 -12 -12 -12 -14 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		
Ê , /N oc SS-RSRPNot e3	1,2,4,5 Config 3,6	NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_A NCTE 6 NR_FDD_FR1_A NCTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D	dBm/SC S	-1. -89	.75	-88	0 3.5 5.5	-12 -12 -12 -12 -12 -12 -12 -12 -14 -17 -17 -17 -17 -17 -17	4.0 23.5 23 22.5 22 21.5 20.5 20 20.5 19 18.5 17.5		

		NR_FDD_FR1_G					
		NR_FDD_FR1_H					
	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-90.09		
		NR_FDD_FR1_B				-89.59	
	Config	NR_TDD_FR1_C	dBm/			-89.09	
	Config 1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	- dBm/ 9.36MHz	-57.83	-60.5	-88.59	
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09	
		NR_FDD_FR1_G				-87.09	
Io ^{Note3}	ote3	NR_FDD_FR1_H				-86.59	
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-84	
		NR_FDD_FR1_B				-83.5	
		NR_TDD_FR1_C	dBm/			-83	
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MH z	-51.73	-54.41	-82.5	
		NR_FDD_FR1_E NR_TDD_FR1_E				-82	
		NR_FDD_FR1_G				-81	
		NR_FDD_FR1_H				-80.5	
	n condition		-		AWGN		
Antenna co	onfiguration		-		1x2		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-SINR inter-RAT measurement are tested by using test setup in Table A.8.5.2.3.2.2-2 and A.8.5.2.3.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.3.2.2-1: SS-SINR Inter-RAT SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.3.2.2-2: SS-SINR Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	Test 3
Parameter	Unit	Cell 2	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1	freq1
Duplex mode		TDD	TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Downlink initial BWP configuration			DLBWP.0.1	
Uplink initial BWP configuration			ULBWP.0.1	
DRX cycle configuration	ms		Not applicable	
PDSCH Reference measurement channel		-	-	-
RMSI CORESET Reference Channel		-	-	-
OCNG Patterns		OP.1	OP.1	OP.1
SMTC configuration		SMTC.1	SMTC.1	SMTC.1
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.3.2.2-3: SS-SINR Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2	Test 3
Parameter	Unit	Cell 2	Cell 2	Cell 2
		Setup 1	Setup 1	Setup 1
Angle of arrival configuration		according to	according to	according to
		A.3.15.1	A.3.15.1	A.3.15.1
Assumption for UE beams ^{Note 10}		Rough	Rough	Rough
$N_{oc}^{$	dBm/15kHz Note4	-104.7	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)
$N_{oc}^{}$ Note1	dBm/SCS Note4	-95.7	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
\hat{E}_s/N_{oc}	dB	-0.5	11	-1.0
SSB_RP ^{Note2}	dBm/SCS Note4	-96.2	-84.7	(Table B.2.3-2 Rx Beam Peak +3dB) (Note 8)
SS-SINR ^{Note2}	dB	-0.5	11	-1.0
$\hat{E}_{_{\! s}}/I_{_{\! ot}}$ Note2	dB	-0.5	11	-1.0
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-63.95	-55.38	(Table B.2.3-2 Rx Beam Peak +35.54dB) (Note 9)
Note 1: Interference from other cells	and noise sources no	t specified in the tes	st is assumed to be o	onstant over

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SSB_RP, SS-SINR, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone.
- Note 5: Void
- Note 6: Voice
- Note 7: N_{oc} for SCS 15kHz is applied at -10log₁₀(8)+4dB above the minimum level specified in Table B.2.3-2 for beam peak. N_{oc} for SCS 120kHz is applied at 4dB above the minimum level specified in Table B.2.3-2 for beam peak
- Note 8: SSB_RP is applied at 3dB above the minimum level specified in Table B.2.3-2 for beam peak.
- Note 9: lo is applied at level $10\log_{10}(792) + 6.54$ dB above the minimum level specified in Table B.2.3-2 for beam peak.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.8.5.2.3.2.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

Annex B (normative):

Conditions for RRM requirements applicability for operating bands

B.1 Conditions for NR RRC_IDLE state mobility

B.1.1 Introduction

In Annex B.1, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR FDD FR1 H	-120.5	-117.5	

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

		NR		Mini	mum SSE	ote 3	SSB Ês/lot	
Parameter	Angle of			SCS _{SSB} =	= 120 kHz	SCS _{SSB} = 240 kHz	dB	
				UE Pow	er class		UE Power class	
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-4
	Rx Beam	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
	Peak	n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄		
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		
covera	Spherical	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	
		n261	- 117.3+Z₁	-99.8	-98.2	- 115.8+Z ₄		

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.
- NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.1.2-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This clause defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this clause.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this clause.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

B.2.1.1 General

In Annex B.2, the following conditions are specified:

- The conditions for RRC connection release with redirection to NR requirements in clause 6.2.3.2.1,
- The conditions for UE transmit timing adjustment in clause 7.1,
- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 9, UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in clause 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in clause 10.

B.2.1.2 Derivation of Minimum SSB RP values for FR1

[FFS]

B.2.1.3 Derivation of Minimum SSB_RP values for FR2

Editor's note:

- The Assumption for UE beams (fine or rough) in Annex A RRM test cases is defined based on power class 3, and unless otherwise stated also applies for other UE power classes

B.2.1.3.1 Minimum SSB_RP values for Rx Beam Peak angle of arrival

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

$$\label{eq:minimum} \begin{split} & Minimum \ SSB_RP = Reference \ sensitivity \ _{PC3, \ n260, \ 50MHz} + Y \ -10Log_{10}(PRB_{Refsens} \ x \ 12) - SNR_{Refsens} + SSB \ \hat{E}s/Iot + \\ & \Delta MB_{P,n} \end{split}$$

where:

Reference sensitivity $_{PC3, n260, 50MHz}$ is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE power class						
1 2 3 4						
FFS	9.0	7.0	FFS			

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

ΔMB_{P,n} is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-109.5 + \Delta MB_{P,n})$ dBm/120kHz for intra-frequency measurements and $(-107.5 + \Delta MB_{P,n})$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = -109.5 dBm/120kHz + Refsens $_{PC_X, Band_Y, 50MHz}$ - Refsens $_{PC_X, n260, 50MHz}$ + Y_{PC_X} - Y_{PC_X} + Y_{PC

 $For\ Inter-frequency:\ Minimum\ SSB_RP\ (PC_X,\ Band_Y) = -107.5\ dBm/120kHz + Refsens\ _{PC_X,\ Band_Y,\ 50MHz} - Refsens\ _{PC_3,\ n260,\ 50MHz} + Y\ _{PC_X} - Y\ _{PC3} + \Delta MB_{P,n}\ .$

B.2.1.3.2 Minimum SSB_RP values for angle of arrival within Spherical coverage

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = EIS spherical coverage $_{PC3, n260, 50MHz}$ +Z -10Log $_{10}$ (PRB $_{Refsens}$ x 12) - SNR $_{Refsens}$ + SSB \hat{E} s/Iot + $\Delta MB_{S,n}$,

where:

EIS spherical coverage PC3, n260, 50MHz is the EIS spherical coverage value in dBm specified for power class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1;

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1;

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

Value "Z" in dB, for each UE power class					
1 2 3 4					
FFS	9.0	7.0	FFS		

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32;

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

ΔMB_{S,n} is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-96.9 + \Delta MB_{S,n})$ dBm/120kHz for intra-frequency measurements and is $(-94.9 + \Delta MB_{S,n})$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = -96.9 dBm/120kHz + EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$ - EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = -94.9 dBm/120kHz + EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$ - EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$

B.2.1.4 Gain to SS-RSRP measurement point for FR1

In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP measurement point.

B.2.1.5 Gain to SS-RSRP measurement point for FR2

B.2.1.5.1 Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

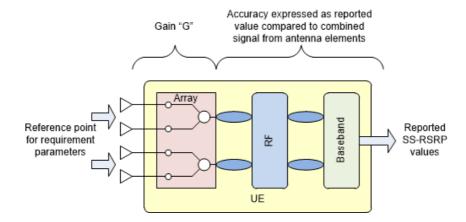


Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

	UE Power class					
	1	2	3	4		
Minimum, dBi	FFS	FFS	-10	FFS		
Maximum, dBi	FFS	FFS	+20	FFS		

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm / S	SCS _{SSB}	
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124	
	NR_FDD_FR1_B	-126.5	-123.5	
Conditions	NR_TDD_FR1_C	-126	-123	> 6
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	≥ -6
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122	
	NR_FDD_FR1_G	-124	-121	
	NR_FDD_FR1_H	-123.5	-120.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.		<u>-</u>

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

				1	SSB Ês/lot				
		ND			dBm / SC	Sssb			
Parameter	Angle of arrival	NR operating		SCS _{SSB} = 120 kHz		SCS _{SSB} = 120 kHz SCS _{SSB} = 240 kHz			4D
		bands		UE pow	UE power class	dB			
			1	2	3	4	1, 2, 3, 4		
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-6	
	Rx Beam	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
	Peak	n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄			
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄			
cover	Spherical	•	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-6	
	Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄		<u></u> 0	
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		ı	

Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

Note 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.2-2:

B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

⁻ The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

⁻ The value of Z for power classes 1 and 4 is FFS, where Z_1 and Z_4 are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

Table B.2.3-1: Conditions for inter-frequency measurements in FR1

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
raiailletei	Mix operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
		KIIZ	KIIZ	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
Conditions	NR_TDD_FR1_C	-124	-121	> 1
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.	•	

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

				Minim	num SSB_F	SSB Ês/lot		
		NR			dBm / SC	S _{SSB}		
Parameter	Angle of arrival	operating bands	50.5ccp = 170 KH7		SCS _{SSB} = 120 kHz		SCS _{SSB} = 240 kHz	dB
		bands		UE pow	er class		UE power class	аь
			1	2	3	4	1, 2, 3, 4	
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCSssB = 120 kHz) +3dB	≥-4
	Rx Beam Peak	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		
		n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄		
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄		
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄		
	Spherical coverage Note 1	n258	- 118.3+Z₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4
		n260	- 115.3+Z₁		-94.9	- 111.8+Z ₄	kHz) +3dB	=-
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

Editor's notes for Table B.2.3-2:

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁, and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

B.2.4 Conditions for NR L1-RSRP reporting

B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1

		Minimum	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	
raiametei	iait operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
Conditions	NR_TDD_FR1_C	-123	-120	≥ -3
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥-3
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR_FDD_FR1_H	-120.5	-117.5	
NOTE 1:NR	operating band groups are defined in clause	e 3.5.2.		

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

				Minimum SSB_RP Note 2, Note 3								
		ND										
Parameter	Angle of arrival	NR operating		SCS _{SSB} =	= 120 kHz	SCS _{SSB} = 240 kHz	40					
		bands		UE pow	er class	UE power class	dB					
			1	2	3	4	1, 2, 3, 4					
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄						
	Rx Beam	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120	≥-3				
	Peak	n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄	kHz) +3dB					
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄						
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄						
	Spherical coverage	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-3				
	Note 1	n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB					
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄						

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.1-2:

⁻ The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1

	ND energting		Minimum CSI-RS_RP		CSI-RS Ês/lot	
Parameter	NR operating band groups Note1		dB			
	band groups ****	SCS _{CSI-RS} = 15 kHz	SCS _{CSI-RS} = 30 kHz	SCS _{CSI-RS} = 60 kHz	ав	
	NR_FDD_FR1_A,					
	NR_TDD_FR1_A,	-124	-121	-118		
	NR_SDL_FR1_A					
	NR_FDD_FR1_B	-123.5	-120.5	-117.5		
	NR_TDD_FR1_C	-123	-120	-117		
Conditions	NR_FDD_FR1_D,	-122.5	-119.5	-116.5	≥ -3	
	NR_TDD_FR1_D	-122.3	-119.5	-110.5		
	NR_FDD_FR1_E,	-122	-119	-116		
	NR_TDD_FR1_E	-122	-119	-110		
	NR_FDD_FR1_G	-121	-118	-115		
	NR_FDD_FR1_H	-120.5	-117.5	-114.5		

NOTE 1: NR operating band groups are defined in clause 3.5.2.

Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2

				Minimum CSI-RS_RP Note 2, Note 3 dBm / SCScsi-Rs								
Parameter	Angle of arrival	NR operating		SCS _{CSI-RS}	SCS _{CSI-RS} = 120 kHz	JD.						
		bands		UE pow	er class	UE power class	dB					
			1	2	3	4	1, 2, 3, 4					
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄						
	Rx Beam	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCS _{CSI-RS} = 60	≥-3				
	Peak	n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄	kHz) +3dB	2-3				
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄						
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄						
	Spherical	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCScsi-Rs = 60	≥-3				
	coverage Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB	=-0				
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄						

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}	dB
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	uБ
	NR_FDD_FR1_A, NR_TDD_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NR	operating band groups are defined in clause	3.5.2.		

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

				Minimum SSB_RP Note 2, Note 3								
		ND										
Parameter	Angle of arrival	NR operating		SCS _{SSB} =	SCS _{SSB} = 240 kHz	-ID						
		bands		UE pow	UE power class	dB						
			1	2	3	4	1, 2, 3, 4					
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄						
	Rx Beam	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCS _{SSB} = 120	≥-4				
	Peak	n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄	kHz) +3dB					
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄						
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄						
	Spherical	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4				
	coverage Note 1	n260	- 115.3+Z₁		-94.9	- 111.8+Z ₄	kHz) +3dB	≥-4				
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄						

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.6 Void

B.2.6.1 Void

Table B.2.6.1-1: Void

Table B.2.6.1-2: Void

B.2.6.2 Void

B.3 RRM Requirements Exceptions

B.3.1 Introduction

Annex B.3 covers exceptions for side conditions based on receiver sensitivity for CA, DC, and SUL.

B.3.2 Receiver sensitivity relaxation for CA

B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this clause applies for both SC and CA operation.

B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this clause, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.4 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3A.4 of TS 38.101-1 [18], and

- the exception requirements specified in clause 7.3A.4 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this clause, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.5 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in clause 7.3A.5 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.3 Receiver sensitivity relaxation for DC

B.3.3.1 Receiver sensitivity relaxation for EN-DC

Editor's note: TBD

B.3.3.2 Receiver sensitivity relaxation for NE-DC

Editor's note: TBD

B.3.4 Receiver sensitivity relaxation for SUL

B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3C.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this clause applies for both SC and SUL operation.

B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this clause, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3C.2 of TS 38.101-1 [18], when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3C.2 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3C.2 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.4.1 should not be applied.

Annex C (informative): Change history

						Change history	
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-05	RAN4#83	R4-1706324				Specification skeleton	0.0.1
2017-09						Email approved	0.1.0
2017-09	RAN4-NR AH #3					Capture TPs approved in the meeting	0.2.0
2017-10	RAN4#84 -Bis	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12	RAN4#85	R4-1714546				Capture TPs approved in RAN4#85	0.4.0
2017-12	RAN#78	RP-172407				v1.0.0 submitted for plenary approval	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0032		В	CR to TS38.133	15.1.0
2018-06	RAN#80	RP-181075	0037		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87	15.2.0
2018-09	RAN#81	RP-181896	0043		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-AH-1807 and RAN4 #88	15.3.0
2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-88bis and RAN4-89	15.4.0
2019-03	RAN#83	RP-190569	0064	1	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90	15.5.0
2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91	15.6.0
2019-09	RAN#85	RP-192022	0084		F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#92 (Rel-15)	15.7.0
2019-12	RAN#86	RP-193039	0089		F	Correction to the starting point of the DRX cycle length interval	15.8.0
2019-12	RAN#86	RP-193042	0090		F	CR to 38.133 R15 Add the missing units to DRX cycle values	15.8.0
2019-12	RAN#86	RP-192997	0092	1	F	Specification of UE antenna gain range	15.8.0
2019-12	RAN#86	RP-192992	0094		F	Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak	15.8.0
2019-12	RAN#86	RP-192997	0096		F	Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0098		F	Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0100		F	Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0102		F	Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192992	0104		F	Correction to Random access test case in FR1 for PSCell in EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0106		F	CR on handover 38.133	15.8.0
2019-12	RAN#86	RP-192994	0108		F	CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0109		F	CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0110		F	CR on the BWP switch test cases SA FR1 (clause A.6.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0111		F	CR on the BWP switch test cases SA FR2 (clause A.7.5.6)	15.8.0
2019-12	RAN#86	RP-193042	0116		F	CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)	15.8.0
2019-12	RAN#86	RP-193040	0120		F	CR on handover RRM requirement (clause 6.1.1.5) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0122		F	CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0126		F	CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0128		F	CR on test cases for FR2 handover (clause A.7.3.1) (R15)	15.8.0
2019-12	RAN#86	RP-193042	0130		F	CR to 38.133 on TCI state switching (Clause 8.10) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0136		F	CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15	15.8.0
2019-12	RAN#86	RP-193042	0144	1	F	Editorial correction for SCell activation and deactivation delay	15.8.0
2019-12	RAN#86	RP-193040	0147	1	F	CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)	15.8.0
2019-12	RAN#86	RP-193041	0155	1	F	CR on NR MTTD and MRTD definition for R15	15.8.0
2019-12 2019-12	RAN#86	RP-193039	0158	1	F	CR for SCell activation delay in FR2	15.8.0
2019-12	RAN#86 RAN#86	RP-193040 RP-192993	0160 0166	1	F	CR for scheduling restriction due to L1-RSRP measurement CR on SSB setting for new gap and SMTC setting (Clause A.3.10)	15.8.0 15.8.0
2019-12	RAN#86	RP-192995	0168		F	CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1	15.8.0
2019-12	RAN#86	RP-192995	0170	1	F	(Clause A.4.7.3) CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause	15.8.0
2019-12	RAN#86	RP-192993	0184	1	F	A.6.7.3) CR on cell-reselection test cases for NR SA FR2 R15	15.8.0
2019-12	RAN#86	RP-192993 RP-192995	0184	1	F	endorsed CR on intra-frequency measurement and reporting for EN-DC FR2 R15	15.8.0
2019-12	RAN#86	RP-192996	0188	1	F	endorsed CR on intra-frequency measurement and reporting for NR SA FR2 R15	15.8.0
	ļ	DD 400000	0400	1	F		15.8.0
2010-12	RAN#86	RP-10700K					
2019-12 2019-12	RAN#86 RAN#86	RP-192996 RP-192996	0190 0192		F	endorsed CR on RLM scheduling restrictions for EN-DC FR2 R15 endorsed CR on RLM scheduling restrictions for NR SA FR2 R15	15.8.0

2019-12						·	
	RAN#86	RP-193039	0208		F	Correction on the TCI state switching (clause 8.10)	15.8.0
2040 40	RAN#86	RP-193039	0214	1	F	CR for 38133 editorial for clause 8.1,8.8,8.9,8.10,8.11 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0215	1	F	CR for 38133 editorial for clause 8.5 in Rel-15	15.8.0
2019-12	RAN#86	RP-193039	0216	1	F	CR for 38133 editorial for clause 9.3 in Rel-15	15.8.0
2019-12	RAN#86	RP-193040	0217	1	F	CR on 38133 for removal the duplicated reference in clause 2	15.8.0
2019-12	RAN#86	RP-193040	0218	1	F	CR on 38133 for clause 11 in Rel-15	15.8.0
2019-12	RAN#86	RP-192994	0224	2	F	CR on TC of UE transmit timing (A.4.4.1.1, A.5.4.1.1, A.6.4.1.1,	15.8.0
						A.7.4.1.1) Rel-15	
2019-12	RAN#86	RP-193042	0229	1	F	Update on requirements related to inter-band EN-DC and NE-DC	15.8.0
				-	-	synchronous requirements	
2019-12	RAN#86	RP-192995	0232	1	F	Editorial corrections to measurement accuracy tests	15.8.0
2019-12	RAN#86	RP-192992	0234	•	F	Corrections to SS-RSRQ and SS-SINR OTA tests with SA	15.8.0
2019-12	RAN#86	RP-192992	0236		F	Corrections to SS-RSRQ and SS-SINR OTA tests with EN-DC	15.8.0
2019-12	RAN#86	RP-193042	0238	1	F	Editorial corrections to clause 9.2	15.8.0
				ı			
2019-12	RAN#86	RP-192992	0241		F	Corrections to band applicability of measurement accuracy tests	15.8.0
2019-12	RAN#86	RP-192996	0243	1	F	Introduction of bandwidth limited OCNG for OTA testing	15.8.0
2019-12	RAN#86	RP-192992	0247	1	F	Corrections to test cases for SA FR2 inter-frequency measurement	15.8.0
						(clause A.7.6.2)	
2019-12	RAN#86	RP-193041	0249		F	CR to 38.133 NR reporting criteria	15.8.0
2019-12	RAN#86	RP-192993	0263	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
						EN-DC in FR1	
2019-12	RAN#86	RP-192993	0265	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
			<u> </u>			SA in FR1	
2019-12	RAN#86	RP-192993	0267	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
						EN-DC in FR2	
2019-12	RAN#86	RP-192993	0269	1	F	CR on correcting CSI-RS based BFD and link recovery tests for	15.8.0
	00					SA in FR2	2.2.0
2019-12	RAN#86	RP-193040	0275	1	F	CR on delay uncertainty of RRC Release with redirection	15.8.0
2010 12	10 11 1// 00	111 1000-10	0210	'	•	requirements in TS 38.133	10.0.0
2019-12	RAN#86	RP-193040	0277	1	F	CR on known condition of PSCell addition requirement in NE-DC	15.8.0
2019-12	RAN#86	RP-193041	0277	1	F	CR on known condition of PSCell addition requirement in NR DC	15.8.0
2019-12	RAN#86	RP-193041	0281	1	F	CR on RRC Re-establishment requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0283	2	F	CR on scope of interruption requirements of EN-DC in TS 38.133	15.8.0
2019-12	RAN#86	RP-193041	0285	1	F	CR on scope of MTTD requirements in TS 38.133	15.8.0
2019-12	RAN#86	RP-192994	0287	1	F	CR on SSB-based RLM test case for EN-DC FR1	15.8.0
2019-12	RAN#86	RP-192994	0289	1	F	CR on SSB-based RLM test case for NR SA FR1	15.8.0
2019-12	RAN#86	RP-193042	0291	1	F	Editorial CR on clause 8.2	15.8.0
2019-12	RAN#86	RP-193041	0295	1	F	CR on NR inter-frequency identification	15.8.0
2019-12	RAN#86	RP-193041	0297	1	F	CR on NR intra-frequency measurements	15.8.0
2019-12	RAN#86	RP-193039	0311	1	F	Correction on CSSF within measurement gap (clause 9.1.5.2)	15.8.0
2019-12	RAN#86	RP-193041	0313		F	CR on RLM scheduling restriction (clause 8.1.7)	15.8.0
2019-12			0315	1	F	CR on SCell activation requirements (clause 8.3.2)	15.8.0
	RAN#86	RP-193041				CR to add QCL definition (clause 3.6)	15.8.0
2019-12	RAN#86	RP-193041			F		
2019-12 2019-12	RAN#86	RP-193042	0317		F		
2019-12 2019-12 2019-12	RAN#86 RAN#86	RP-193042 RP-192993	0317 0319		F	CR on power offset in TRS RMC (A.3.17)	15.8.0
2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995	0317 0319 0321		F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2)	15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997	0317 0319 0321 0323		FFF	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1)	15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995	0317 0319 0321		FFF	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996	0317 0319 0321 0323 0325		F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1)	15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997	0317 0319 0321 0323	1	FFF	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause	15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996	0317 0319 0321 0323 0325		F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1)	15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996	0317 0319 0321 0323 0325 0327	1	F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996 RP-192996	0317 0319 0321 0323 0325 0327 0329 0331	1	F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996 RP-192996 RP-192997	0317 0319 0321 0323 0325 0327	1	F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996 RP-192996	0317 0319 0321 0323 0325 0327 0329 0331	1	F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996 RP-192996 RP-192997	0317 0319 0321 0323 0325 0327 0329 0331 0333	1	F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192997 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335	1 1 1	F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR1 SA (clause A.6.6.4)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339	1 1 1	F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR1 SA (clause A.6.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192996	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339	1 1 1	F F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR1 SA (clause A.6.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192996 RP-192996	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339 0343	1 1 1	F F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4) L1-RSRP accuracy test FR2 SA (clause A.7.7.4)	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192996	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339	1 1 1	F F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR2 SA (clause A.6.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4) L1-RSRP accuracy test FR2 SA (clause A.7.7.4) CR 38.133 (8.3.2) Amendment of requirements depending on	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192996 RP-192996 RP-192996 RP-193039	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339 0343 0345	1 1 1	F F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR2 SA (clause A.6.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4) L1-RSRP accuracy test FR2 SA (clause A.7.7.4) CR 38.133 (8.3.2) Amendment of requirements depending on T_SMTC_Max	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
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2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12 2019-12	RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86 RAN#86	RP-193042 RP-192993 RP-192995 RP-192996 RP-192996 RP-192996 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192997 RP-192996 RP-193039	0317 0319 0321 0323 0325 0327 0329 0331 0333 0335 0337 0339 0343 0345 0357	1 1 1	F F F F F F F F	CR on power offset in TRS RMC (A.3.17) CR to introduce new PDCCH RMC (A.3.1.3.2) Maintenance CR for measurement accuracy (clause 10.1) FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) L1-RSRP delay test FR2 SA (clause A.6.6.4) L1-RSRP delay test FR2 SA (clause A.7.6.3) L1-RSRP accuracy test FR2 EN-DC (clause A.5.7.4) L1-RSRP accuracy test FR2 SA (clause A.7.7.4) CR 38.133 (8.3.2) Amendment of requirements depending on T_SMTC_Max CR 38.133 (8.3.3) Correction of SCell deactivation delay CR 38.133 (A.7.5.7) TCs for PSCell addition and release delay CR to TS 38.133: New common clause with OTA related	15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0 15.8.0
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Deam reporting				0495				
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2020-03 RAN#87 RP-200400 0531 F Correction to UL reconfiguration delay TCs 15.9.0 2020-03 RAN#87 RP-200400 0537 F CR on SSB RLM test cases EN-DC R15 15.9.0 2020-03 RAN#87 RP-200400 0539 F CR on SSB RLM test cases SA R15 15.9.0 2020-03 RAN#87 RP-200400 0541 F CR on cell reselection test cases for FR2 SA R15 15.9.0 2020-03 RAN#87 RP-200400 0543 F OCNG pattern for TDM-ed SSB R15 15.9.0 2020-03 RAN#87 RP-200400 0563 F NR editorial correction 15.9.0 2020-03 RAN#87 RP-200400 0563 F NR editorial correction 15.9.0 2020-03 RAN#87 RP-200400 0579 1 F CR 38.133 (8.11) Corrections to PSCell change delay 15.9.0					 			
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2020 02	RAN#87	RP-200400	0586		F	PRACH configurations in FR1 SSB based RLM tests	15.9.0
2020-03	RAN#87	RP-200400	0588		F	PRACH configurations in FR1 SSB based BFR tests	15.9.0
2020-06	RAN#88	RP-200987	0594	1	F	[CR] Editorial corrections for 38.133 R15 Core Part	15.10.0
2020-06	RAN#88	RP-200987	0597	1	F	[CR] Editorial corrections for 38.133 R15 Perf Part	15.10.0
2020-06	RAN#88	RP-200987	0601	1	F	CR to Intra-frequency handover from FR1 to FR1	15.10.0
2020-06	RAN#88	RP-200987	0605		F	CR to A.6.1.2.1 Cell reselection to higher priority E-UTRAN	15.10.0
2020-06	RAN#88	RP-200987	0607		F	Correction to General test parameters in A.6.6.1.2	15.10.0
2020-06	RAN#88	RP-200987	0619	1	F	CR on CSSF correction for R15 TS38.133	15.10.0
2020-06	RAN#88	RP-200987	0628	1	F	CR on Active TCI State Switching requirements - Rel15	15.10.0
2020-06	RAN#88	RP-200988	0633	2	F	Rapportuer CR for TS38.133	15.10.0
2020-06	RAN#88	RP-200987	0650		F	Add UE Beam assumption for RRM Test cases in A.7.3, A.7.4,	15.10.0
			0000			A.7.7	
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2020-06	RAN#88	RP-200987	0652		F	Add UE Beam assumption for RRM Test cases in A.5.3, A.5.4,	15.10.0
						A.5.7	
2020-06	RAN#88	RP-200987	0654		F	Update of FR2 RLM Test cases with 2 Angles of Arrival	15.10.0
2020-06	RAN#88	RP-200987	0656		F	Update of Tx Timing Test cases	15.10.0
2020-06	RAN#88	RP-200987	0658		F	Update of FR2 RLM and BFD-LR Test cases	15.10.0
2020-06	RAN#88	RP-200987	0660		F	Update of FR2 SS-RSRP Test cases	15.10.0
2020-06	RAN#88	RP-200987	0662	1	F	CR on TCI state switch	15.10.0
2020-06	RAN#88	RP-200987	0664		F	CR on PDSCH RMC	15.10.0
2020-06	RAN#88	RP-200987	0679		F	Correction of CFRA RSRP threshold	15.10.0
2020-06	RAN#88	RP-200987	0695	1	F	CR on SMTC period for beam management requirements	15.10.0
2020-06	RAN#88	RP-200987	0697	L	F	CR for CSI-RS based L1-RSRP measurement period	15.10.0
2020-06	RAN#88	RP-200987	0699		F	CR on RACH test cases with CSI-RS resource R15	15.10.0
2020-06	RAN#88	RP-200987	0703	t	F	CR on TS38.133 for modification of the layer 3 and layer 1	15.10.0
2020-00	17/11/400	111 -200901	0103				13.10.0
						measurement sharing factor when both SSB and RSSI symbol to	
						be measured are considered	
2020-06	RAN#88	RP-200987	0705		F	CR on TS38.133 for modification on number of cells and number	15.10.0
						of SSB to be measured for FR2 intra-frequency measurement	
2020-06	RAN#88	RP-200987	0707	1	F	[CR] TCI state switch delay 38.133 R15	15.10.0
2020-06	RAN#88	RP-200987	0714		F		_
				1		Correction of NR SA FR2 inter-freq measurement reporting	15.10.0
2020-06	RAN#88	RP-200987	0726		F	CR: Correction of L1-RSRP measurement period	15.10.0
2020-06	RAN#88	RP-200987	0728	1	F	CR to TS 38.133: Correction to CSI-RS configurations in A.3.14	15.10.0
						(Rel-15)	
2020-06	RAN#88	RP-200987	0730		F	CR to TS 38.133: Correction to SMTC configuration in	15.10.0
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2020-06	RAN#88	RP-200987	0732		F	CR to TS 38.133: Clarifications to AoA setup Annex A.5 (Rel-15)	15.10.0
2020-06	RAN#88	RP-200987	0734		F	CR to TS 38.133: Clarifications to AoA setup Annex A.7 (Rel-15)	15.10.0
2020-06	RAN#88	RP-200987	0737	1	F	Applicability of QCL	15.10.0
2020-06	RAN#88	RP-200987	0747	1	F	CR on Psharingfactor	15.10.0
2020-06	RAN#88	RP-200987	0749				15.10.0
				1	F	CR on E-UTRAN Serving Cell Parameters	
2020-06	RAN#88	RP-200987	0751	1	F	CR on Modified parameters for BFD TCs with 4Rx antenna	15.10.0
2020-06	RAN#88	RP-200987	0753	1	F	CR on BFD TCs	15.10.0
2020-06	RAN#88	RP-200987	0755	1	F	CR on UL carrier RRC reconfiguration Delay TC	15.10.0
2020-06	RAN#88	RP-200987	0757	1	F	CR to FR1 SCell activation delay test cases	15.10.0
2020-06	RAN#88	RP-200987	0759	1	F	CR to inter-frequency measurement TCs	15.10.0
2020-06	RAN#88	RP-200987	0761	1	F	CR to interruption TCs	15.10.0
2020-06	RAN#88	RP-200987	0776		F	CR on interruption due to Acitve BWP switch	15.10.0
2020-06	RAN#88	RP-200987	0780		F	CR on UE transmit timing	15.10.0
2020-06	RAN#88	RP-200987	0782	†	F	Editoral CR on TS 38.133 Rel-15	15.10.0
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2020-06	RAN#88		070		_	IOD DDO O	
		RP-200987	0784		F	CR on RRC Connection Release with Redirection test cases	15.10.0
2020-06	RAN#88	RP-200987	0786		F	CR on RRC Re-establishment test cases	15.10.0 15.10.0
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2020-06 2020-06	RAN#88 RAN#88	RP-200987 RP-200987	0786 0788		F F	CR on RRC Re-establishment test cases CR on Timing advance test cases for EN-DC	15.10.0 15.10.0 15.10.0
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2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06	RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88	RP-200987 RP-200987	0786 0788 0790 0798 0800 0812 0815 0820 0822 0824 0826 0828 0830 0832 0834 0866		F F F F F F F F F F	CR on RRC Re-establishment test cases CR on Timing advance test cases for EN-DC CR on Timing test cases for NR SA Correction onTCI state switching R15 Accuracy of carrier aggregation in NR R15 CR 38.133 (8.10.5) Corrections to RRC-based TCI state change CR 38.133 (8.3.2) Corrections to SCell Activation delay requirements CR on FR2 measurement requirements outside gaps R15 CR on inter-RAT RSTD requirements for NE-DC in 38.133 R15 CR on SCell activation requirements R15 CR on SSB based L1-RSRP measurement R15 CR on L1-RSRP delay tests for FR2 R15 CR to L1-RSRP accuracy TC for FR2 EN-DC R15 CR to L1-RSRP accuracy TC for FR2 SA R15 CR to TCI state switch TC R15 Clarification on RLM CR to Redirection from NR in FR1 to E-UTRAN	15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0
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2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-09 2020-09	RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#89 RAN#89	RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-200987 RP-201512 RP-201512	0786 0788 0790 0798 0800 0812 0815 0820 0822 0824 0826 0828 0830 0832 0834 0866 0888		F F F F F F F F F F F	CR on RRC Re-establishment test cases CR on Timing advance test cases for EN-DC CR on Timing test cases for NR SA Correction onTCI state switching R15 Accuracy of carrier aggregation in NR R15 CR 38.133 (8.10.5) Corrections to RRC-based TCI state change CR 38.133 (8.3.2) Corrections to SCell Activation delay requirements CR on FR2 measurement requirements outside gaps R15 CR on inter-RAT RSTD requirements for NE-DC in 38.133 R15 CR on SCell activation requirements R15 CR on SSB based L1-RSRP measurement R15 CR on L1-RSRP delay tests for FR2 R15 CR to L1-RSRP accuracy TC for FR2 EN-DC R15 CR to L1-RSRP accuracy TC for FR2 SA R15 CR to TCI state switch TC R15 Clarification on RLM CR to Redirection from NR in FR1 to E-UTRAN CR to timing advance adjustment accuracy in FR1 CR to SS-RSRQ Intra-Frequency and Inter-frequency FR1 measurement accuracy	15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0
2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-06 2020-09	RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88 RAN#88	RP-200987 RP-200987	0786 0788 0790 0798 0800 0812 0815 0820 0822 0824 0826 0828 0830 0832 0834 0866 0888		F F F F F F F F F F	CR on RRC Re-establishment test cases CR on Timing advance test cases for EN-DC CR on Timing test cases for NR SA Correction onTCI state switching R15 Accuracy of carrier aggregation in NR R15 CR 38.133 (8.10.5) Corrections to RRC-based TCI state change CR 38.133 (8.3.2) Corrections to SCell Activation delay requirements CR on FR2 measurement requirements outside gaps R15 CR on inter-RAT RSTD requirements for NE-DC in 38.133 R15 CR on SCell activation requirements R15 CR on SSB based L1-RSRP measurement R15 CR on L1-RSRP delay tests for FR2 R15 CR to L1-RSRP accuracy TC for FR2 EN-DC R15 CR to TCI state switch TC R15 Clarification on RLM CR to Redirection from NR in FR1 to E-UTRAN CR to timing advance adjustment accuracy in FR1 CR to SS-RSRQ Intra-Frequency and Inter-frequency FR1	15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0 15.10.0

2020-09	RAN#89	RP-201512	0900		F	Update to FR2 event-triggered reporting RRM Test cases in A.5.6	15.11.0
						and A.7.6	
2020-09	RAN#89	RP-201512	0902		F	Update to FR2 SS-RSRP RRM Test cases in A.5.7 and A.7.7	15.11.0
2020-09	RAN#89	RP-201512	0904		F	CR to EN-DC timing advance adjustment accuracy in FR2	15.11.0
2020-09	RAN#89	RP-201512	0906		F	CR to configuration of CSI-RS for tracking	15.11.0
2020-09	RAN#89	RP-201512	0908	1	F	Update of RRC-based Active BWP Switch test cases	15.11.0
2020-09	RAN#89 RAN#89	RP-201512	0910		F	Update to FR2 Annex B RRM side conditions	15.11.0
2020-09 2020-09	RAN#89	RP-201512 RP-201512	0912 0921		F	Add UE Beam assumption for RRM Test cases in A.5.5 Add UE Beam assumption for RRM Test cases in A.7.5 Rel-15	15.11.0 15.11.0
2020-09	RAN#89	RP-201512	0932		F	CR for TS38.133 Rel-15, Correction for RRM core requirements	15.11.0
2020-09	RAN#89	RP-201512	0934	1	F	CR for TS38.133 Rel-15, Correction for test cases of BWP	15.11.0
2020 00	10 11 11 100	111 201012			•	switching	10.11.0
2020-09	RAN#89	RP-201512	0945	1	F	CR on TS38.133 for handover test cases	15.11.0
2020-09	RAN#89	RP-201512	0947		F	CR on TS38.133 for introducing the PDSCH RMC configuration in	15.11.0
						cell re-selection test cases	
2020-09	RAN#89	RP-201512	0955	1	F	CR on FR2 measurement capability for R15	15.11.0
2020-09	RAN#89	RP-201512	0962		F	CR on Inter-RAT RSTD measurements (section 9.4.4)	15.11.0
2020-09	RAN#89	RP-201512	0964	1	F	CR on active BWP switch in R15	15.11.0
2020-09	RAN#89	RP-201512	0985		F	CR for SCell activation delay in FR2 in R15	15.11.0
2020-09	RAN#89	RP-201512	0987	1	F	CR on TCI state switch delay in R15	15.11.0
2020-09	RAN#89	RP-201512	1002	1	F	Fine/rough beam assumption for idle mode and measurement	15.11.0
2020-09	RAN#89	RP-201512	1022		F	procedure test case Clarification of SNR values in RLM Test cases	15.11.0
2020-09	RAN#89	RP-201512	1022		F	CR to TS 38.133: Corrections to CSI-RS configurations in A.3.14	15.11.0
2020-09	IVAIN#09	KI -201312	1024		'	(Rel-15)	13.11.0
2020-09	RAN#89	RP-201512	1026		F	CR to TS 38.133: Corrections to event triggered test cases (Rel-	15.11.0
=====		0.0	1.020		•	15)	
2020-09	RAN#89	RP-201512	1028		F	CR to TS 38.133: Corrections to inter-RAT test cases (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1030		F	CR to TS 38.133: Corrections to AoA setup information in some	15.11.0
						test cases (Rel-15)	
2020-09	RAN#89	RP-201512	1032	1	F	CR on maintaining handover tests in Rel-15	15.11.0
2020-09	RAN#89	RP-201512	1047	1	F	CR on reporting criteria for EN-DC in 38.133 R15	15.11.0
2020-09	RAN#89	RP-201512	1049	1	F	CR on test cases for Active TCI state switch delay R15	15.11.0
2020-09	RAN#89	RP-201512	1051	1	F	Addition of new default configurations for RMC scheduling	15.11.0
2020-09	RAN#89	RP-201512	1053	1	F	Correction to beam failure detection and link recovery test cases	15.11.0
2020-09	RAN#89	RP-201512	1055	1	F	Correction to BWP switching delay test cases	15.11.0
2020-09	RAN#89	RP-201512	1057		F	Correction to FR1 intra-frequency measurement with gap test	15.11.0
2020-09	RAN#89	RP-201512	1059	1	F	Correction to inter-RAT HO test cases	15.11.0
2020-09	RAN#89	RP-201512	1069	ı	F	CR on correction to CSSF within gap R15	15.11.0
2020-09	RAN#89	RP-201512	1003	1	F	CR on SCell activation requirements R15	15.11.0
2020-09	RAN#89	RP-201512	1073	1	F	CR on BWP switching delay requirements R15	15.11.0
2020-09	RAN#89	RP-201512	1074	1	F	CR on UL BWP configuration for RRM test cases R15	15.11.0
2020-09	RAN#89	RP-201512	1076	1	F	CR to add UE beam assumption for TC in A.5.6 R15	15.11.0
2020-09	RAN#89	RP-201512	1096	1	F	CR to 38.133: Correction to RRC basd BWP switch delay	15.11.0
						requirements	
1 i							
2020-09	RAN#89	RP-201512	1098	1	F	CR to 38.133: Correction to interruption requirements for per-FR	15.11.0
				1		gap in FR2	
2020-09	RAN#89 RAN#89	RP-201512 RP-201512	1098	1	F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15	15.11.0 15.11.0
2020-09	RAN#89	RP-201512	1110	1	F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F)	15.11.0
				1		gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat	
2020-09	RAN#89 RAN#89	RP-201512 RP-201512	1110		F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F)	15.11.0 15.11.0
2020-09 2020-09 2020-12	RAN#89 RAN#89 RAN#90	RP-201512 RP-201512 RP-202487	1110 1112 1118	1	F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases	15.11.0 15.11.0 15.12.0
2020-09 2020-09 2020-12 2020-12	RAN#89 RAN#89 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487	1110 1112 1118 1120		F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6	15.11.0 15.11.0 15.12.0 15.12.0
2020-09 2020-09 2020-12 2020-12 2020-12	RAN#89 RAN#89 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122	1	F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0
2020-09 2020-09 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#89 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124	1	F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126	1	F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126 1128	1	F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126	1	F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487	1110 11112 11118 1120 1122 1124 1126 1128 1130	1	F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX	15.11.0 15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202486	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132	1 1 1	F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202487	1110 11112 11118 1120 11122 11124 11126 11128 1130 1132 1145 1147 1159	1 1 1 1	F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1145 1147 1159 1161	1 1 1 1	F F F F F F F F F F F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 for cell reselection test case	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1145 1147 1159 1161 1163	1 1 1 1 1 1	F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 for cell reselection test case Correction of active BWP switch test case	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1145 1147 1159 1161 1163 1167	1 1 1 1 1 1 4	F F F F F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 Rel-15, Correction for RRM core and test cases	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202487 RP-202487 RP-202487 RP-202487	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1145 1147 1159 1161 1163	1 1 1 1 1 1 4	F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 Rel-15, Correction for RRM core and test cases CR for TS38.133 Rel-15, Correction for RRM core and test cases CR on carrier frequency range of PCell/PSCell for the maximum	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202486 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1147 1159 1161 1163 1167 1195	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	F F F F F F F F F F F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 Rel-15, Correction for RRM core and test cases CR on carrier frequency range of PCell/PSCell for the maximum number of RLM-RS resources	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
2020-09 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#89 RAN#90	RP-201512 RP-201512 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202487 RP-202486 RP-202486 RP-202487 RP-202487 RP-202486 RP-202486 RP-202486 RP-202486	1110 1112 1118 1120 1122 1124 1126 1128 1130 1132 1145 1147 1159 1161 1163 1167 1195	1 1 1 1 1 1 1 1 1 1 1	F F F F F F F F F F F F F F F F F F F	gap in FR2 [CR] Replacing x in references with correct numbers (Core R15 Cat F) [CR] Replacing x in references with correct numbers (Perf R15 Cat F) [RB allocation and Noc level in RLM Test cases Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6 240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases Correct UE beam assumption for Test Cases in A.5.6 Aggregation level of CORESET for RMC scheduling Clarify FR1 NSA SS-SINR measurement TCs FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case CR on TS38.133 Rel-15, Correction for RRM core and test cases CR for TS38.133 Rel-15, Correction for RRM core and test cases CR on carrier frequency range of PCell/PSCell for the maximum number of RLM-RS resources CR on MO merge in R15	15.11.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0 15.12.0
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2020-12	RAN#90	RP-202487	1226	1	F	Corrections to frequency range in interfrequency measurement	15.12.0
				· ·		procedures tests	
2020-12	RAN#90	RP-202487	1229		F	Correction on TBD values in FR1+FR2 interfrequency RSRP accuracy tests	15.12.0
2020-12	RAN#90	RP-202486	1231		F	Addition of symbol definitions	15.12.0
2020-12	RAN#90	RP-202487	1235	1	F	Square bracket removal in 38.133 section A.1 to A.5	15.12.0
2020-12	RAN#90	RP-202487	1237	1	F	Square bracket removal in 38.133 section A.6 to A.8	15.12.0
2020-12	RAN#90	RP-202486	1251	1	F	CR to TS 38.133 on DCI based BWP switch requirements applicability	15.12.0
2020-12	RAN#90	RP-202487	1258	1	F	Correction to CSI-RS RMC configuration R15	15.12.0
2020-12	RAN#90	RP-202487	1260	1	F	Correction to cell reselection test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1262	1	F	Correction to inter-RAT handover test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1264	1	F	Correction to NR measurement under LTE SA test cases R15	15.12.0
2020-12 2020-12	RAN#90 RAN#90	RP-202487 RP-202487	1266 1270	1	F	Correction to inter-RAT SFTD measurement test cases R15 CR on maintaining BFD/CBD measurements test cases R15	15.12.0 15.12.0
2020-12	RAN#90	RP-202486	1295	1	F	CR on RRC-based BWP switch requirements	15.12.0
2020-12	RAN#90	RP-202487	1297	1	F	CR on RRC-based active TCI state switch test case Rel-15	15.12.0
2020-12	RAN#90	RP-202486	1310		F	[CR] Specify RRC processing delay in TCI state switching delay	15.12.0
2020-12	RAN#90	RP-202487	1312	1	F	[CR] NR Perf Maintenance R15 Cat F	15.12.0
2020-12	RAN#90	RP-202486	1316	1	F	CR on SCell activation requirements R15	15.12.0
2020-12	RAN#90	RP-202487	1318		F	CR on FR2 unkown SCell activation test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1320		F	CR on BWP in L1-RSRP delay and accuracy test cases R15	15.12.0
2020-12	RAN#90	RP-202486	1335	1	F	Introducing reference to the source of the Lmax and NRLM.	15.12.0
2020-12	RAN#90	RP-202487	1341	1	F	CR to TS 38.133: Corrections to inter-RAT FR1 test cases (Rel-15)	15.12.0
2020-12	RAN#90	RP-202487	1343	1	F	CR to TS 38.133: Corrections to inter-RAT FR2 test cases (Rel-15)	15.12.0
2020-12	RAN#90	RP-202487	1349	_	F	CR 38.133 Corrections to test cases for TCI state switching	15.12.0
2020-12	RAN#90	RP-202487	1363	1	F	Removal of annex B.2.6 on one shot timing adjustment in 38.133	15.12.0
2020-12	RAN#90	RP-202487	1365	1	F	Correction to NR FR1 DL active BWP switch of Cell with non-DRX in SA (A.6.5.6.2.1)	15.12.0
2020-12	RAN#90	RP-202486	1371	2	F	CR to 38.133 on Active BWP switch and Active TCI State Switching requirements - Rel15	15.12.0
2021-03	RAN#91	RP-210116	1404	1	F	CR on correcting SSB and RACH configuration in CSI-RS based	15.13.0
2021-03	RAN#91	RP-210116	1416	1	F	beam failure detection and link recovery tests [CR] RRM test case maintenance R15 Cat F	15.13.0
2021-03	RAN#91	RP-210116	1422	1	F	Update FR2 Reference channels and OCNG for FR2 RRM Test cases	15.13.0
2021-03	RAN#91	RP-210116	1425		F	CR to FR1 SA SS-SINR measurement TCs	15.13.0
2021-03	RAN#91	RP-210116	1428		F	CR on E-UTRA carrier for EN-DC event triggered reporting tests	15.13.0
2021-03	RAN#91	RP-210116	1431		F	Add missing FR2 Test case setups and Beam assumptions	15.13.0
2021-03	RAN#91	RP-210116	1494		F	Correction to cell reselection test case	15.13.0
2021-03	RAN#91 RAN#91	RP-210116 RP-210116	1503 1512		F	Update of DRX configuration in FR1 Event-triggered Test cases Correction on PRACH configuration for FR2 Non-Contention	15.13.0 15.13.0
				_	-	based Random Access in R15 Correction on PRACH configuration for Beam Failure Detection	
2021-03	RAN#91	RP-210116	1515	1	F	and Link Recovery Test in R15 Correction on PRACH RMC for FR1 CSI-RS based Non-	15.13.0
2021-03	RAN#91	RP-210116	1518		F	Contention based Random Access for BFR in R15	15.13.0
2021-03	RAN#91	RP-210117	1537	2	F	CR on Scell activation delay maintenance (R15) CR for test requirements correction of SA event triggered reporting	15.13.0
2021-03	RAN#91	RP-210116	1545		F	tests for FR1 inter-frequency measurements with SSB time index detection when DRX is used	15.13.0
2021-03	RAN#91	RP-210117	1548	1	F	CR on R15 remaining issues	15.13.0
2021-03	RAN#91	RP-210116	1563	1	F	Correction on the power of the first preamble for random access in EN-DC and SA in R15	15.13.0
2021-03	RAN#91	RP-210116	1566	2	F	Correction on the time for Scell activation and CSI-report in R15	15.13.0
2021-03	RAN#91	RP-210116	1569	1	F	Correction on the Noc level in TS38.133 in R15	15.13.0
2021-03	RAN#91	RP-210117	1605	1	F	CR on the filter for beam failure indications in 38.133	15.13.0
2021-03	RAN#91	RP-210116	1614 1617		F	Correction to Aperiodic CSI-RS configurations R15 Correction to radio link monitoring test cases R15	15.13.0 15.13.0
	D V V I # O 1					Correction to radio link monitoring test cases R 15	
2021-03	RAN#91	RP-210116		2	⊏	Correction to beam failure recovery test cases P15	15 12 0
2021-03	RAN#91	RP-210116	1620	2	F	Correction to L1-RSRP reporting delay test cases R15	15.13.0 15.13.0
2021-03 2021-03	RAN#91 RAN#91	RP-210116 RP-210116	1620 1623	1	F	Correction to L1-RSRP reporting delay test cases R15	15.13.0
2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122	1620 1623 1634	1 2		Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15	15.13.0 15.13.0
2021-03 2021-03	RAN#91 RAN#91	RP-210116 RP-210116	1620 1623	1	F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15	15.13.0
2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122	1620 1623 1634 1637	1 2 1	F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with	15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122 RP-210116 RP-210116	1620 1623 1634 1637 1653 1712	1 2 1 1	F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (ReI-15)	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122 RP-210116 RP-210116	1620 1623 1634 1637 1653 1712	1 2 1 1	F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-15) CR to TS 38.133: Corrections to TC A.4.5.7.1 (Rel-15)	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122 RP-210116 RP-210116	1620 1623 1634 1637 1653 1712	1 2 1 1	F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-15) CR to TS 38.133: Corrections to TC A.4.5.7.1 (Rel-15) CR on test cases for inter-RAT measurement r15	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122 RP-210116 RP-210116	1620 1623 1634 1637 1653 1712	1 2 1 1	F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-15) CR to TS 38.133: Corrections to TC A.4.5.7.1 (Rel-15) CR on test cases for inter-RAT measurement r15 CR on SCell activation delay, cell idenfication requirements on deactivated SCell and inter-RAT ECID requirements for NE-DC	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210116 RP-210116 RP-210116 RP-210116 RP-210117	1620 1623 1634 1637 1653 1712 1715 1749	1 2 1 1 1 1	F F F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-15) CR to TS 38.133: Corrections to TC A.4.5.7.1 (Rel-15) CR on test cases for inter-RAT measurement r15 CR on SCell activation delay, cell idenfication requirements on deactivated SCell and inter-RAT ECID requirements for NE-DC R15	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0 15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210122 RP-210122 RP-210116 RP-210116 RP-210116 RP-210116	1620 1623 1634 1637 1653 1712 1715 1749	1 2 1 1 1	F F F F	Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15 Correction on test cases of inter-frequency Measurements R15 CR to TS 38.133: Redundant and incorrect TCI state in tests with TRS (Rel-15) CR to TS 38.133: Corrections to TC A.4.5.7.1 (Rel-15) CR on test cases for inter-RAT measurement r15 CR on SCell activation delay, cell idenfication requirements on deactivated SCell and inter-RAT ECID requirements for NE-DC	15.13.0 15.13.0 15.13.0 15.13.0 15.13.0 15.13.0

		RP-211083	1012		F	CR to CSI-RS based L1-RSRP measurement on resource set with	1
<u>2021-06</u>	RAN#92	KP-211063	1813		Г	repetition off TCs	<u>15.14.0</u>
2021-06	RAN#92	RP-211084	1816		F	CR to the notation of SMTC in the general test parameters of Reestablishment TCs	15.14.0
2021-06	RAN#92	RP-211084	1819		F	CR to BWP configuration for interruption test case.	15.14.0
2021-06	RAN#92	RP-211080	1825	1	F	Update of DRX configuration in Event-triggered Test cases	15.14.0
2021-06	RAN#92	RP-211081	1831	1	F	Update RRM Test cases where 66RBs gives insufficient dB range	15.14.0
2021-06	RAN#92	RP-211081	1834	1	F	Update Reference channels and OCNG for FR2 240kHz SSB SCS RRM Test cases	15.14.0
2021-06	RAN#92	RP-211081	1837	1	F	Cat-F CR to Cell Reselection Tests with Async Cells in Rel-15	15.14.0
2021-06	RAN#92	RP-211081	1842	1	F	Cat-F CR to FR2 CORESET and Search Space RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1845		F	Cat-F CR to PDSCH RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1848		F	Cat-F CR to TRS Configuration in Rel-15 Test Case	15.14.0
2021-06	RAN#92	RP-211081	1855	1	F	Maintenance CR for test cases - R15	15.14.0
2021-06	RAN#92	RP-211085	1862		F	CR on BFD and link recovery test cases	15.14.0
2021-06	RAN#92	RP-211080	1885	1	F	Maintenance on CSSF for EN-DC and deactivated SCell measurement R15	15.14.0
2021-06	RAN#92	RP-211080	1896	1	F	Core requirement maintenance on signal characteristics (R15)	15.14.0
2021-06	RAN#92	RP-211081	1928	1	F	Correction on the SS-RSRP difference value for SS-RSRP measurement TC in R15	15.14.0
2021-06	RAN#92	RP-211081	1931	1	F	Correction on the CSI-reporting period for SCell activation delay in R15	15.14.0
2021-06	RAN#92	RP-211080	1938	1	F	CR on scheduling restriction of UE during intra-frequency measurements on FR2 in R15	15.14.0
2021-06	RAN#92	RP-211087	1981		F	CR to TS 38.133: Correction of TDD Configuration for several TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211081	1984	1	F	CR to TS 38.133: Correction of OCNG pattern for several TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211087	1987		F	CR to TS 38.133: Correction of IRAT TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211087	1990		F	CR to TS 38.133: Corrections to SS-RSRP/RSRQ/SINR accuracy TCs (Rel 15)	15.14.0
2021-06	RAN#92	RP-211080	1993	1	F	CR to TS 38.133: Several corrections to TCs (Rel 15)	15.14.0
2021-06	RAN#92	RP-211087	2031		F	CR on measurement on deactivated SCell and interruption to NR serving cells for measurements on deactivated NR Scell	15.14.0
2021-06	RAN#92	RP-211088	2056		F	Correction to CSI-RS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211089	2063		F	Correction to TRS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211081	2066	1	F	Correction to FR1 test cases using DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2070		F	Correction to reference configurations related to DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2072		F	Correction to interruption during measurement on deactivated SCell test cases_R15	15.14.0
2021-06	RAN#92	RP-211089	2074		F	Correction of test parameters for SA inter-frequency event triggered reporting TCs	15.14.0
2021-06	RAN#92	RP-211080	2103	1	F	CR on Rel-15 SCell activation, SMTC determination and UL timing 38133	15.14.0
2021-06	RAN#92	RP-211090	2109		F	CR on NR-DC PSCell addition and release delay in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2112	1	F	Maintenance CR for RRM test cases in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2137	1	F	Correction to AoA setup in FR2	15.14.0
2021-09	RAN#93	RP-211922	2197		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2200		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 1 (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2203		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 2 (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2206		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 3 (Rel-15)	15.15.0
2021-12	RAN#94	RP-212854	2237		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.16.0
2021-12	RAN#94	RP-212855	2240		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance (Rel-15)	15.16.0

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