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*Technical Specification*

**LTE;**
**Evolved Universal Terrestrial Radio Access (E-UTRA)**
**and Evolved Packet Core (EPC);**
**User Equipment (UE) conformance specification;**
**Part 3: Test suites**
**(3GPP TS 36.523-3 version 8.3.0 Release 8)**

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# Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

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# Contents

# 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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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

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# Introduction

The present document is part 3 of a multi-part conformance test specification for the 3GPP evolved User Equipment (UE). The specification contains a TTCN-3 design frame work and the detailed test specifications in TTCN-3 for evolved UE at the UE-E-UTRAN radio interface.

- 3GPP TS 36.523-1 [1]: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".
- 3GPP TS 36.523-2 [2]: "User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".
- **3GPP TS 36.523-3: "Test Suites"** (the present document).

# 1 Scope

The present document specifies the protocol and signalling conformance testing in TTCN-3 for the 3GPP UE at the UE-E-UTRAN radio interface.

The following TTCN test specification and design considerations can be found in the present document:

- the test system architecture;
- the overall test suite structure;
- the test models and ASP definitions;
- the test methods and usage of communication ports definitions;
- the test configurations;
- the design principles and assumptions;
- TTCN styles and conventions;
- the partial PIXIT proforma;
- the test suites.

The Abstract Test Suites designed in the document are based on the test cases specified in prose (3GPP TS 36.523-1 [1]). The applicability of the individual test cases is specified in the test ICS proforma specification (3GPP TS 36.523-2 [1]).

The present document is valid for UE implemented according to 3GPP Rel-8 upwards.

# 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 36.523-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[2] 3GPP TS 36.523-2: "User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".

[3] 3GPP TS 36.508: "Common test environments for User Equipment (UE) conformance testing".

[4] 3GPP TS 36.509: "Terminal logical test interface; Special conformance testing functions".

[5] 3GPP TS 34.123-1: "User Equipment (UE) conformance specification; Part 1: Protocol conformance specification".

[6] 3GPP TS 34.123-2: "User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".

[7] 3GPP TS 34.123-3: "User Equipment (UE) conformance specification; Part 3: Abstract Test Suite (ATS)".

[8] 3GPP TS 34.108: "Common test environments for User Equipment (UE) conformance testing".

[9] 3GPP TS 34.109: "Terminal logical test interface; Special conformance testing functions".

[10] 3GPP TS 51.010-1: "Mobile Station (MS) conformance specification; Part 1: Conformance Specification".

[11] 3GPP TS 51.010-2: "Mobile Station (MS) conformance specification; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

[12] 3GPP TS 51.010-5: "Mobile Station (MS) conformance specification; Part 5: Inter-RAT (GERAN to UTRAN) Abstract Test Suite (ATS)".

[13] ETSI ES 201 873-1: "Methods for Testing and Specification (MTS); The Tree and Tabular Combined Notation version 3; Part 1: TTCN-3 Core Language".

[14] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); "UE Procedures in Idle Mode".

[15] 3GPP TS 36.306 "Evolved Universal Terrestrial Radio Access (E-UTRA); "UE Radio Access Capabilities".

[16] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Medium Access Control (MAC) protocol specification".

[17] 3GPP TS 36.322:"Evolved Universal Terrestrial Radio Access (E-UTRA); "Radio Link Control (RLC) protocol specification".

[18] 3GPP TS 36.323: "Evolved Universal Terrestrial Radio Access (E-UTRA); "Packet Data Convergence Protocol (PDCP) Specification".

[19] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".

[20] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".

[21] 3GPP TS 24.301: "Non-Access-Stratum (NAS) Protocol for Evolved Packet System (EPS); Stage 3".

[22] 3GPP TS 24.303: "Mobility Management based on DSMIPv6; User Equipment (UE) to network protocols; Stage 3".

[23] 3GPP TS 24.304: "Mobility management based on Mobile IPv4; User Equipment (UE) - foreign agent interface; Stage 3".

[24] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[25] 3GPP TS 33.402: "3GPP System Architecture Evolution (SAE); Security aspects of non-3GPP accesses".

[26] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[27] ETSI ES 201 873-4: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 4: TTCN-3 Operational Semantics".

[28] ETSI ES 201 873-5: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 5: TTCN-3 Runtime Interface (TRI)".

[29] ETSI ES 201 873-6: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3; Part 6: TTCN-3 Control Interface (TCI)".

[30] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".

[31] 3GPP TS 27.005: "Use of Data Terminal Equipment - Data Circuit terminating Equipment (DTE-DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS)".

[32] 3GPP TS 27.007: "AT command set for 3G User Equipment (UE)".

[33] 3GPP TS 27.060: "Packet domain; Mobile Station (MS) supporting Packet Switched services".

[34] 3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

[35] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation".

[36] 3GPP TS 25.331: "RRC Protocol Specification".

[37] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [26] apply.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [26] apply.

# 4 E-UTRAN/SAE system architecture and test models

## 4.1 Test system architecture

### 4.1.1 General system architecture

The general system architecture is shown in figure 4.1.1-1.

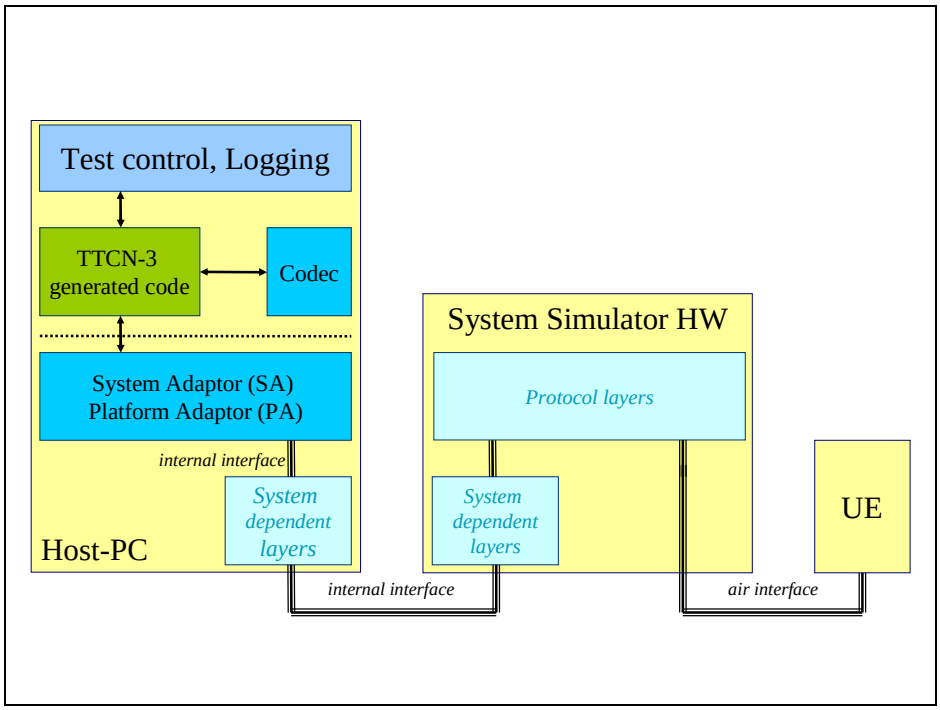


**Figure 4.1.1-1: Architecture of system simulator**

The scope of the present document is the TTCN-3 implementation of conformance tests. Specifications and definitions of the present document affect the codec and the system adaptor (SA). Test control and logging are out of scope as well as the interface between the TTCN-3 generated code and the system adaptor which can be either standardised TRI or proprietary.

The main assumptions regarding the system architecture are:

- TTCN-3 code runs on the host system only:
  - No TTCN-3 components are downloaded to system simulator HW.
  - Layer 2 tests (MAC, RLC) are controlled by appropriate configuration primitives in TTCN-3 but neither layer 2 nor parts of it are implemented in TTCN-3; the system simulator performs low layer procedure autonomously but all system simulator implementations shall result in the same test pattern at the air interface.
- Proprietary interfaces e.g. instead of the TRI are not considered in the test model.
- The timing considerations of the conformance tests shall be supported by appropriate timing information (e.g. system frame number) provided from/to the system simulator rather than by timing measurements in TTCN-3.

## 4.1.2 Component architecture

For E-UTRAN conformance tests each access technology (RAT) is hosted by a separate TTCN-3 parallel component (PTC):

- E-UTRAN.
- UTRAN.
- GERAN.
- Other technologies like 3GPP2 UTRAN.

The PTCs are controlled by the TTCN-3 master test component (MTC) which:

- is independent from the RAT;
- may host the upper tester for MMI and AT commands;
- creates, synchronises and terminates the PTCs;
- starts and terminates test cases.

Figure 4.1.2-1 shows this component architecture for a E-UTRAN and UTRAN scenario.

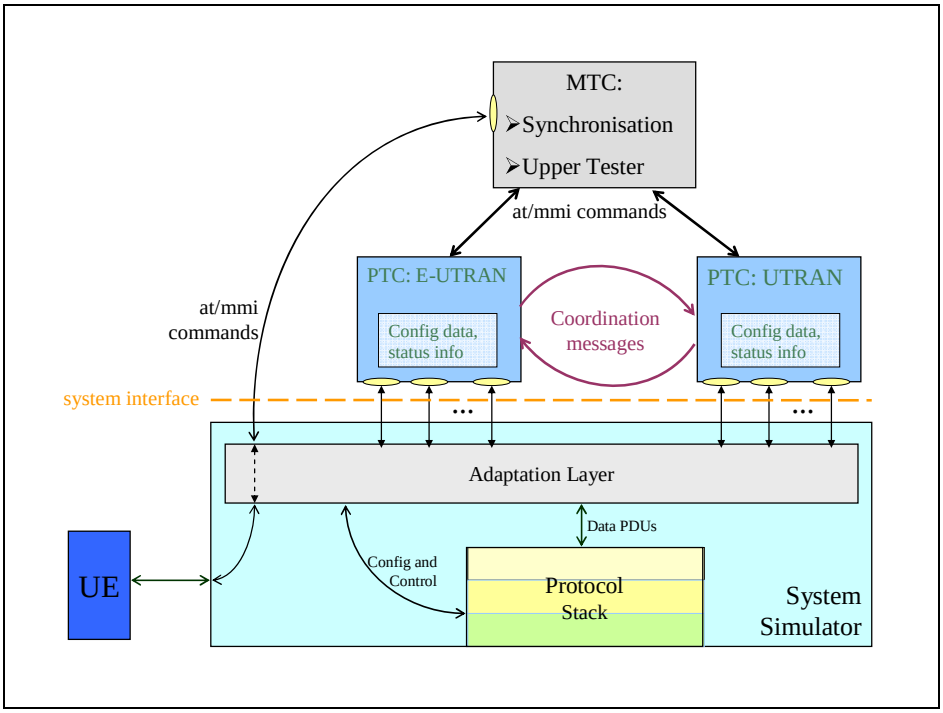


**Figure 4.1.2-1:E-UTRAN-UTRAN component model**

According to this model there are different interfaces to be considered:

MTC - PTC:

- common synchronisation of PTCs;
- upper tester primitives.

MTC - System Interface:

- upper tester primitives.

PTC - PTC:

- primitives containing information for IRAT handover.

PTC - System Interface:

- primitives containing peer-to-peer message;
- configuration primitives.

# 4.2 E-UTRAN test models

## 4.2.1 Layer 2 test models

When test loop mode is used for the Layer 2 tests the DRB ports at the SS side is referred to the raw DRB ones. At the SS side, DRBs are initially configured with default modes and parameters. For the purpose of L2-testing the DRBs may be reconfigured later on as indicated in the subsequent test models (see below).

### 4.2.1.1 MAC test model

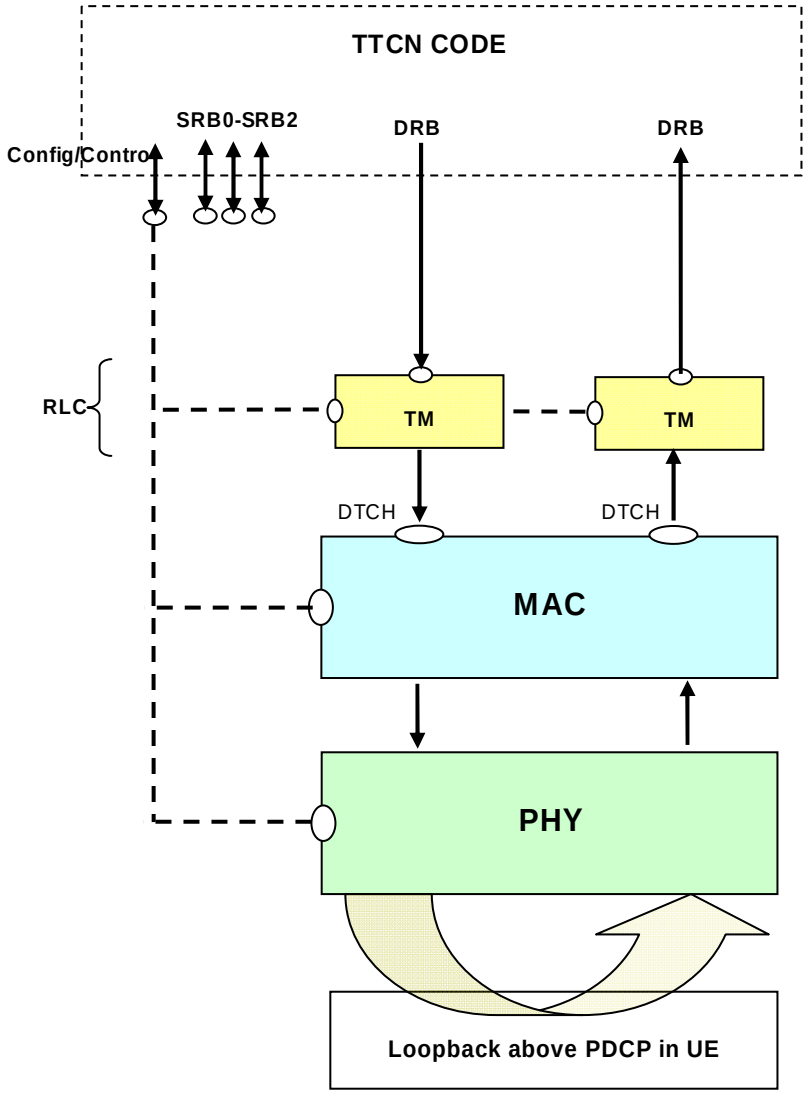


**Figure 4.2.1.1-1: Test model for MAC testing**

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled (since Mandatory) but with dummy ciphering algorithm, which is equivalent to not using ciphering. ROHC is not configured on UE Side.

On the SS Side, L1 is configured in the normal way. MAC is configured in a special mode, where it does not add any MAC headers in DL and not remove any MAC headers on UL directions respectively. In this case, the TTCN shall provide the final PDU, including padding. Except for this, the MAC layer shall perform all of its other functions.

The RLC is configured in transparent mode. Hence with this configuration PDU's out of SS RLC are same as the SDU's in it. There is no PDCP configured on SS Side. The ports are directly above RLC.

The PDU's exchanged between TTCN and SS, shall be the final MAC PDU's consisting of MAC, RLC and PDCP headers. TTCN code shall take care in DL of building MAC header, RLC headers and PDCP headers and in UL handle MAC, RLC and PDCP headers. TTCN code shall take care of maintaining sequence numbers and state variables for MAC, RLC and PDCP layers. During testing of Multiple DRBs on UE side, it shall still be possible to configure only one DRB on SS side with configuration in the figure 4.2.1.1-1. Other DRBs will not be configured, to facilitate routing UL TBSs. Multiplexing/de-multiplexing of PDU's meant/from different DRB's shall be performed in TTCN.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured. In a similar way the reception of RACH preambles is reported by SS over the same port.

### 4.2.1.2 RLC test model

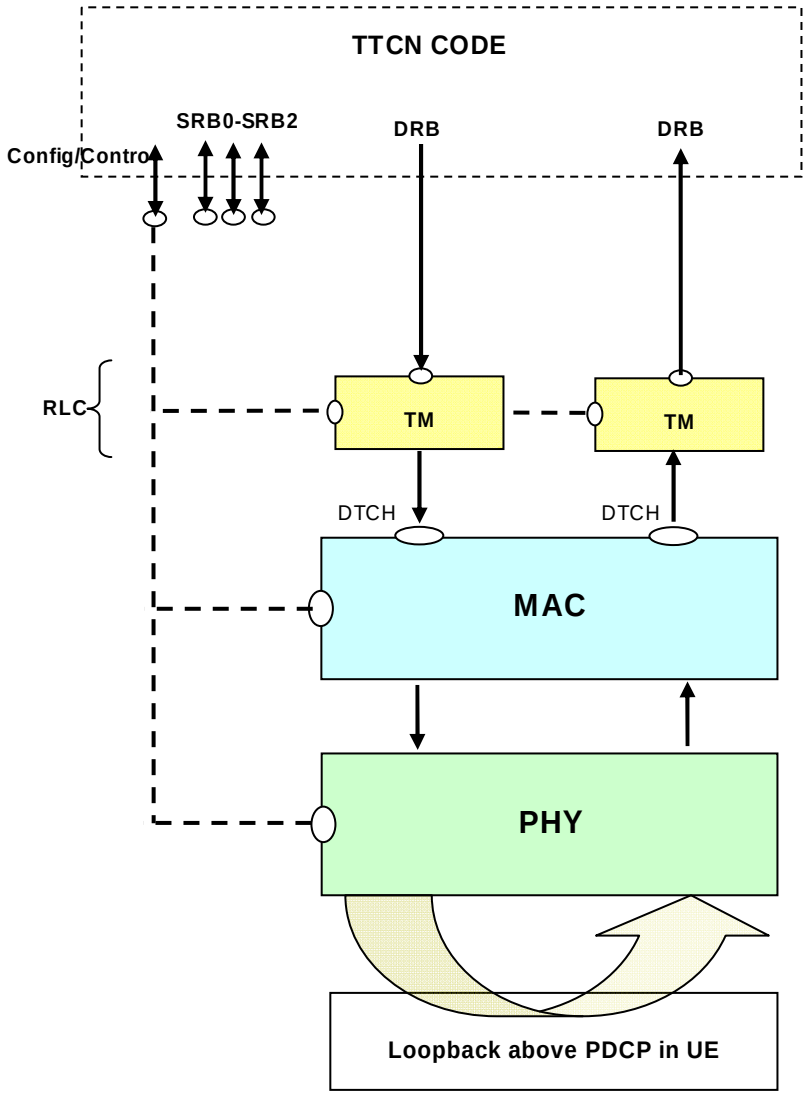


**Figure 4.2.1.2.3-1: Test model for RLC AM/UM testing**

This model is suitable for testing both UM/AM mode of operation of DRBs on UE side.

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled (since mandatory) but with dummy ciphering algorithm, which is equivalent to not using ciphering. ROHC is not configured on UE Side.

On the SS Side, L1 and MAC are configured in the normal way. The RLC is configured in transparent mode. Hence with this configuration PDUs out of SS RLC are same as the SDUs in it. There is no PDCP configured on SS Side. The ports are directly above RLC.

The PDUs exchanged between TTCN and SS, shall be the final RLC PDUs consisting of RLC and PDCP headers. TTCN code shall take care in DL of building RLC headers and PDCP headers and in UL handle RLC and PDCP headers. TTCN code shall take care of maintaining sequence numbers and state variables for RLC and PDCP layers. If RLC on UE side is in AM mode, TTCN shall take care of generating polls in DL and responding with RLC control PDUs on reception of UL Poll.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port.

### 4.2.1.3 PDCP test model

#### 4.2.1.3.1 PDCP ROHC test model

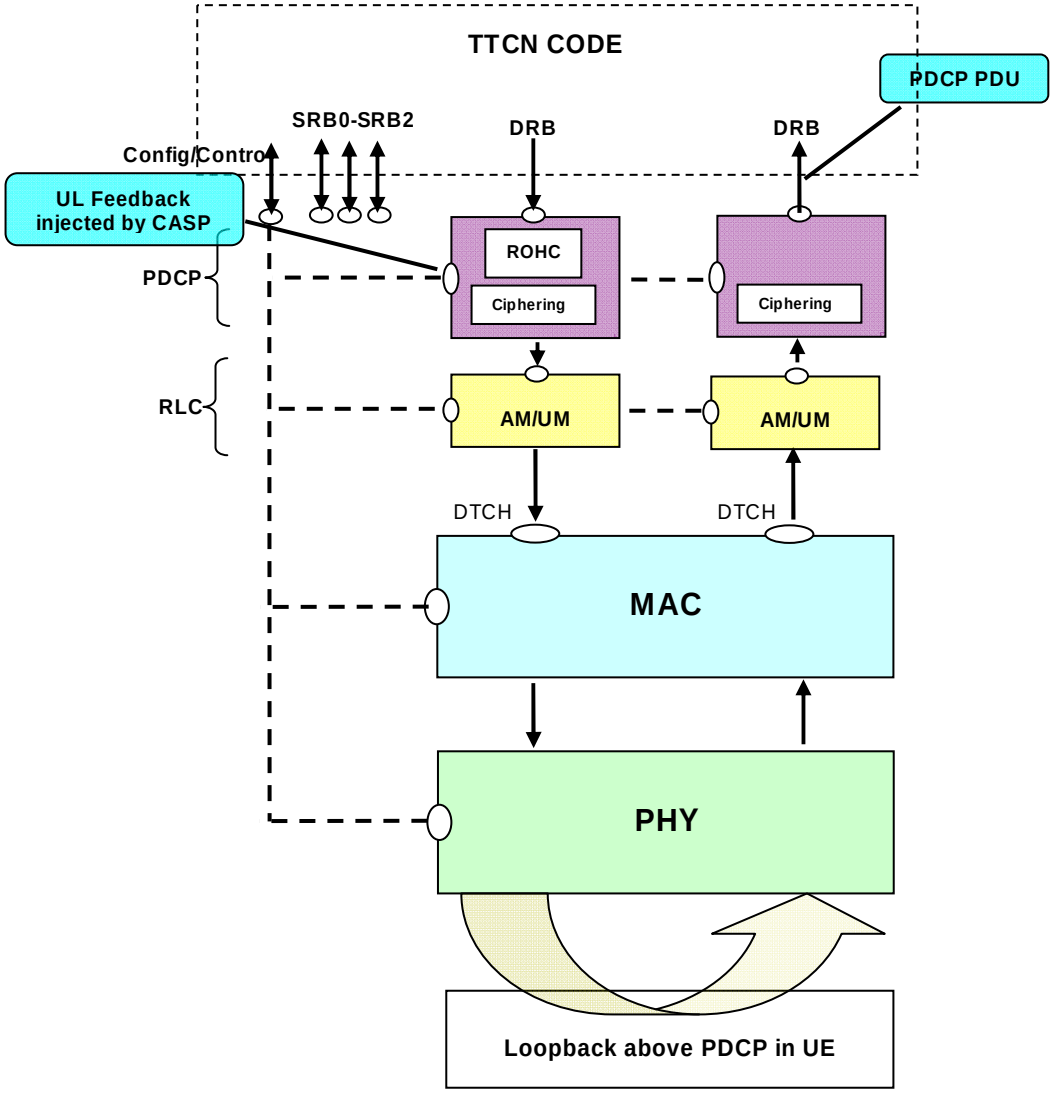


**Figure 4.2.1.3.1-1: Test model for PDCP ROHC testing**

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled and ROHC is configured.

On the SS Side L1, MAC and RLC are configured in normal way. They shall perform all of their functions. The ports are above PDCP.

The PDCP is configured in special mode, with no header manipulation. Ciphering is configured in both directions. ROHC is configured in DL direction only. UL ROHC feedback can be injected by control ASP. It shall be possible to configure 'no header manipulation' mode independently in UL and DL directions. When configured in special mode, SS shall not add PDCP header (DL) and remove PDCP Header (UL). PDCP state variables shall be maintained by SS PDCP layer. It shall be possible for SS PDCP to update state variables based on the PDU's in both directions, even though headers are not added/removed. Also, it shall be possible to read or set the PDCP internal state variables, by control primitives.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured.

#### 4.2.1.3.2 PDCP test model (Non ROHC)

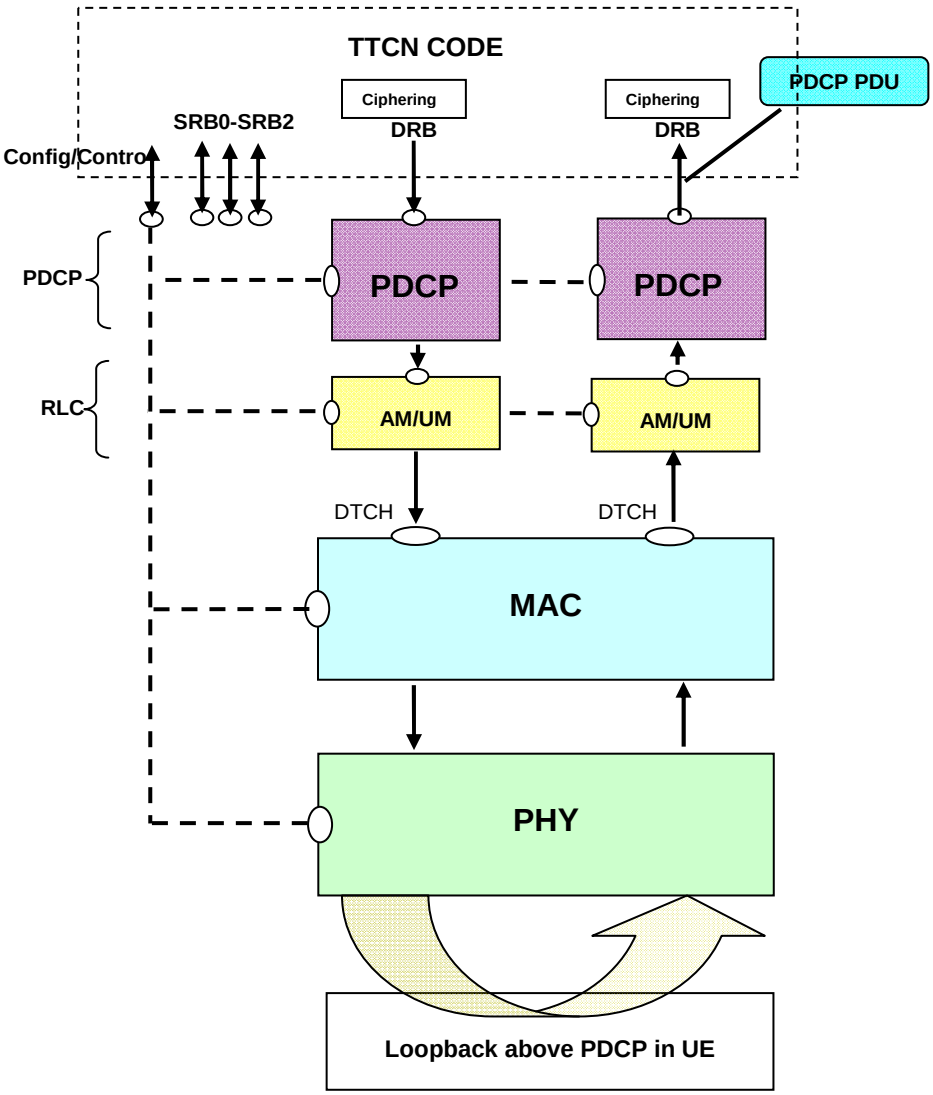


**Figure 4.2.1.3.2-1: Test model for PDCP (Non ROHC) testing**

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled and ROHC is not configured.

On the SS Side L1, MAC and RLC are configured in normal way. They shall perform all of their functions. The ports are above PDCP.

The PDCP is configured in a special mode, named transparent mode. In this mode, SS shall not add PDCP header (DL) and remove PDCP Header (UL). The TTCN maintains sequence numbers and state variables for the PDCP layer. The TTCN makes use of the AS ciphering functionality in both directions, employing the dummy ciphering algorithm. Ciphering/deciphering are performed using TTCN external functions. ROHC is not configured.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured.

## 4.2.2 RRC test model

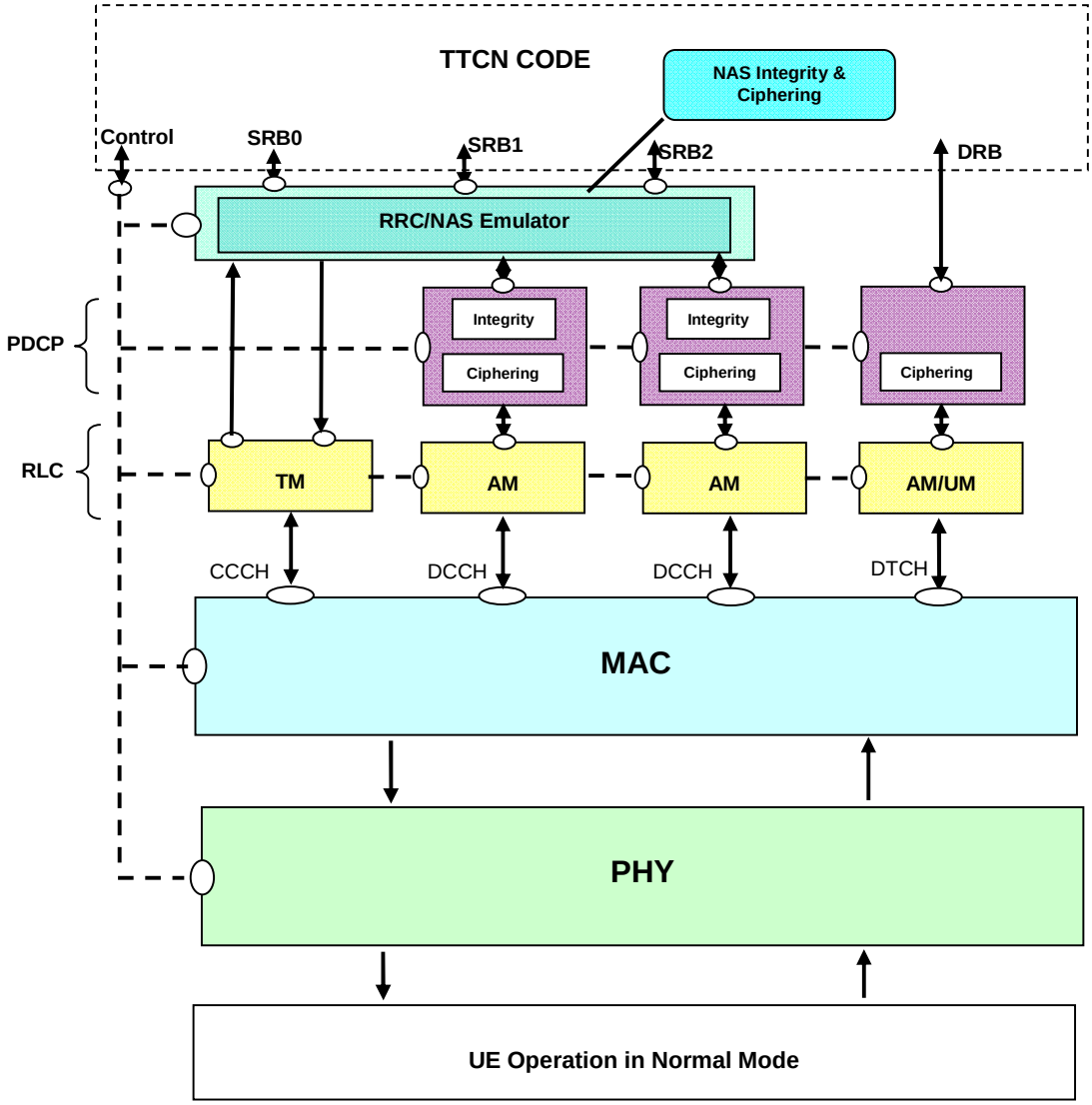


**Figure 4.2.2-1: Test model for RRC testing**

The UE is configured in normal mode. On UE side Ciphering/Integrity (PDCP and NAS) is enabled and ROHC is not configured.

On the SS Side L1, MAC, RLC and PDCP are configured in normal way. They shall perform all of their functions. For SRB0 the DL and UL port is above RLC. For SRB1 and SRB2 the port is above/below the RRC and NAS emulator, which may be implemented as a parallel test component. For DRB, the port is above PDCP. PDCP Ciphering/Integrity is enabled. NAS integrity/Ciphering is enabled.

The RRC/NAS emulator for SRB1 and SRB2 shall provide the Ciphering and integrity functionality for the NAS messages. In UL direction, SS shall report RRC messages, still containing (where appropriate) the secure and encoded

NAS message, to the RRC port . In DL, RRC and NAS messages with same timing information shall be embedded in one PDU after integrity and ciphering for NAS messages.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured.

### 4.2.3 DRB test model

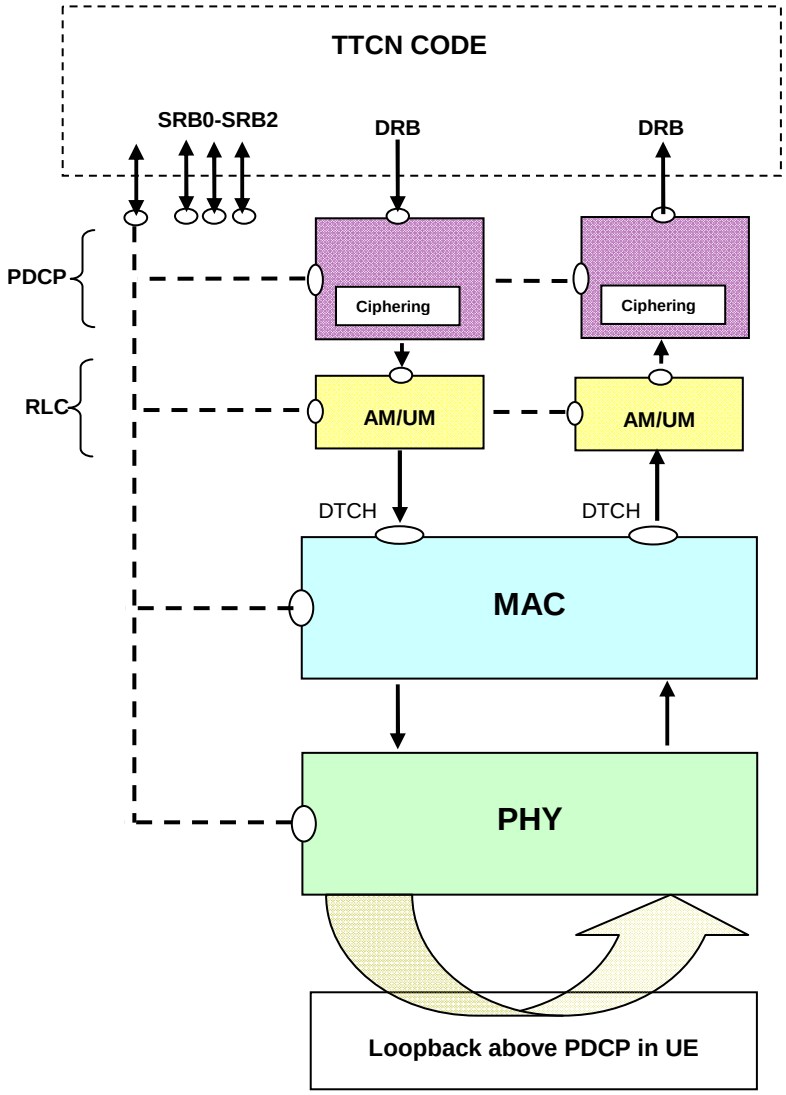


**Figure 4.2.3-1: Test model for DRB testing**

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. Ciphering is optionally configured on UE side. In TTCN the DRB data is considered as raw data and there is no IP handling while the UE is in loopback mode.

On the SS Side L1, MAC, RLC and PDCP are configured in normal way. They shall perform all of their functions. The ports are above PDCP. When test loop mode is used for the DRB, the ports at the SS side refer to the raw DRB ones. Ciphering is enabled and ROHC is not configured on SS Side.

SS shall send in DL all PDU's received from different RB's but with same timing control information in one MAC PDU and in one TTI.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured.

## 4.2.4 IP Test Model

Depending on different test scenarios user plane data can be distinguished in:

- Raw user data upon EUTRA PDCP (Raw mode);
- IP user data (IP mode).

The raw user data are applied for L2 or DRB tests, no IP protocols are involved. The UL user data is directly routed to the EUTRA_PTC.

The IP user data are applied when IP packets data are handled in TTCN. A DRB can have one or more Transport and Internet protocols configured.

Whether a DRB is in IP or in raw mode depends on the configuration of the routing table in the DBR-Mux. This is controlled by the IP_CTRL port and independent from the configuration of the IP connections (IP_SOCKET).

### 4.2.4.1 IP user data

To allow the usage of common protocol implementations at the system adaptor the related interfaces in TTCN-3 are based on the Sockets API.

There can be one or several sockets (server or client) for each DRB: TCP, UDP and ICMP.

Each socket can be clearly identified by the IP address, port number and the protocol (tcp|udp\icmp). It implies that a TCP socket can be either server or client.

It is assumed that:

- Different DRBs are not using the same sockets.
- The UE behaviour of a single IP-based protocol on a specific socket like DHCP can be included in conformance tests.
- Other protocols like ESP are not considered but can easily be introduced later, if necessary, by using the same socket approach.

The routing of IP packets from the IP stack to the DRBs in DL and from the DRBs either to the DRB port (E_DRB in case of EUTRA) or to the IP stack in UL is done by the DRB-Mux. This behaviour is controlled by the DRB-Mux's routing table.

The general architecture of the IP test model is shown in figure 4.2.4.1-1 (with a DHCP server as example for IP handling).

NOTE 1: In figure 4.2.4.1-1 DHCP is one example for a protocol above the IP stack; other protocols like DNS can also be implemented but this a pure TTCN implementation issue and independent from the system interface

NOTE 2: In general IMS can also be an application above the IP_PTC, but this is out of scope for this document.

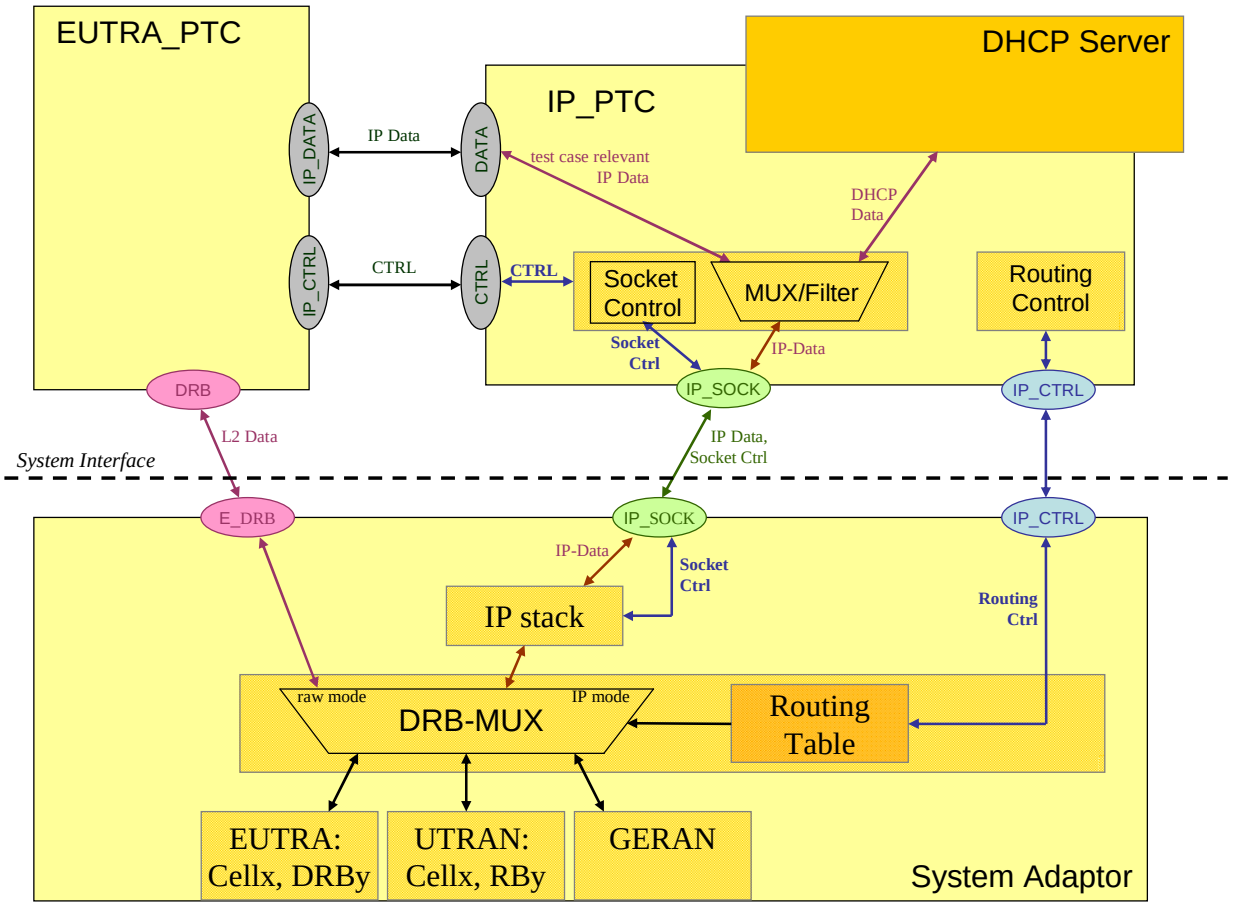


**Figure 4.2.4.1-1**

## 4.2.4.2 Configuration of Sockets

The following configurations are controlled by the IP_PTC (IP_SOCKET_REQ). The socket configuration and the sending/receiving of data are done with the same ASP on the system port IP_SOCK.

NOTE: Support and configuration of IPsec is FFS.

### 4.2.4.2.1 Socket Establishment

#### TCP server

TCP socket configured as server: the socket 'listens' to a 'connect' from the UE. The socket can be configured by using the following system calls of the Berkeley Sockets API:

- socket (AF_INET | AF_INET6, SOCK_STREAM, 0);
- setsockopt;
- bind (local IP address Port);
- listen.

NOTE: 'setsockopt' can be used e.g. in case of IPsec (FFS).

When the UE connects to the server the connection is accepted with the 'accept' system call.

TCP client

A TCP connection is established to an existing TCP server at the UE side. This can be done with the following system calls:

- socket (AF_INET|AF_INET6, SOCK_STREAM, 0);
- setsockopt;
- connect(remote Server Addr of the UE = IP-Addr + Port).

NOTE: 'setsockopt' can be used e.g. in case of IPsec (FFS).

UDP socket

A UDP socket can be established with the system calls

- socket (AF_INET|AF_INET6, SOCK_DGRAM, 0);
- setsockopt;
- bind (local IP address Port);
- connect.

NOTE 1: 'setsockopt' can be used to set the option SO_BROADCAST to allow broadcast messages (e.g. for DHCP).

NOTE 2: Usage of 'connect' depends on implementation of the system adaptor.

#### 4.2.4.2.2 Socket Release

A socket is released:

- in case of TCP when the remote entity closes the connection;
- when it is closed explicitly by the IP_PTC (system call 'close').

NOTE: In general the sockets are independent from the configuration of the DRBs. Especially in case of UDP or ICMP the sockets can exist even without any DRB being configured.

### 4.2.4.3 Handling of IP data

Sending and receiving of IP data is done by the same ASPs as the socket establishment on IP_SOCK. In TTCN the IP data are handled by a separate TTCN component: IP_PTC. This PTC can deal with the data according to the respective protocol, e.g. DHCP. In general, this is out of scope for the (signalling conformance) test case in terms of pass/fail assignment.

The IP_PTC will receive data from sockets being configured for the corresponding IP protocols. Any unrecognised IP packets are discarded by the IP stack in the system adaptor.

When the IP data is relevant for the test purpose, e.g. the test purpose is to test DHCP, the IP data are routed to the EUTRA_PTC. This allows generic protocol implementations for the common case, i.e. IP_PTC and DHCP server are independent from test case specific implementations.

The interface between EUTRA_PTC and IP_PTC is a pure TTCN implementation issue and independent of the system interface. Furthermore it is irrelevant for the system interface whether e.g. the DHCP server is part of the IP_PTC or implemented as a separate PTC.

- For TCP, the primitives to send and receive data correspond to the 'send' and 'recv' system calls.
- For UDP and ICMP, the primitives correspond to the 'sendto' and 'recvfrom' system calls.
- For both UDP and TCP the system adaptor may send ("in-band") error indications in case of system errors. That results in an assignment of inconc by the IP_PTC.

#### 4.2.4.4 Routing of IP Data

The routing of IP data is done in the DRB-Mux which gets a routing table configured. This table associates the address and protocol information of IP packets (protocol, local IP address, local port, remote IP address, remote port) with the radio bearer (RAT, cell, DRB id).

In UL a DRB is considered being in raw mode when there is no entry found in the routing table. It is considered being in IP mode when there is any entry regardless of the protocol and address information being stored (i.e. SS does not need to evaluate the IP header what would cause problems in case of loopback data).

In DL the IP packets of the IP stack are routed to the DRBs acc. to the routing information in the routing table (see annex D for details.

NOTE: Only the IP PTC can re-configure the Routing Table;
if that needs to be triggered by a RAT specific PTC, this is done by appropriate coordination messages but the RAT specific PTCs don't have a direct access to the routing tables.

## 4.3 SAE Test Model

### 4.3.1 NAS Test Model

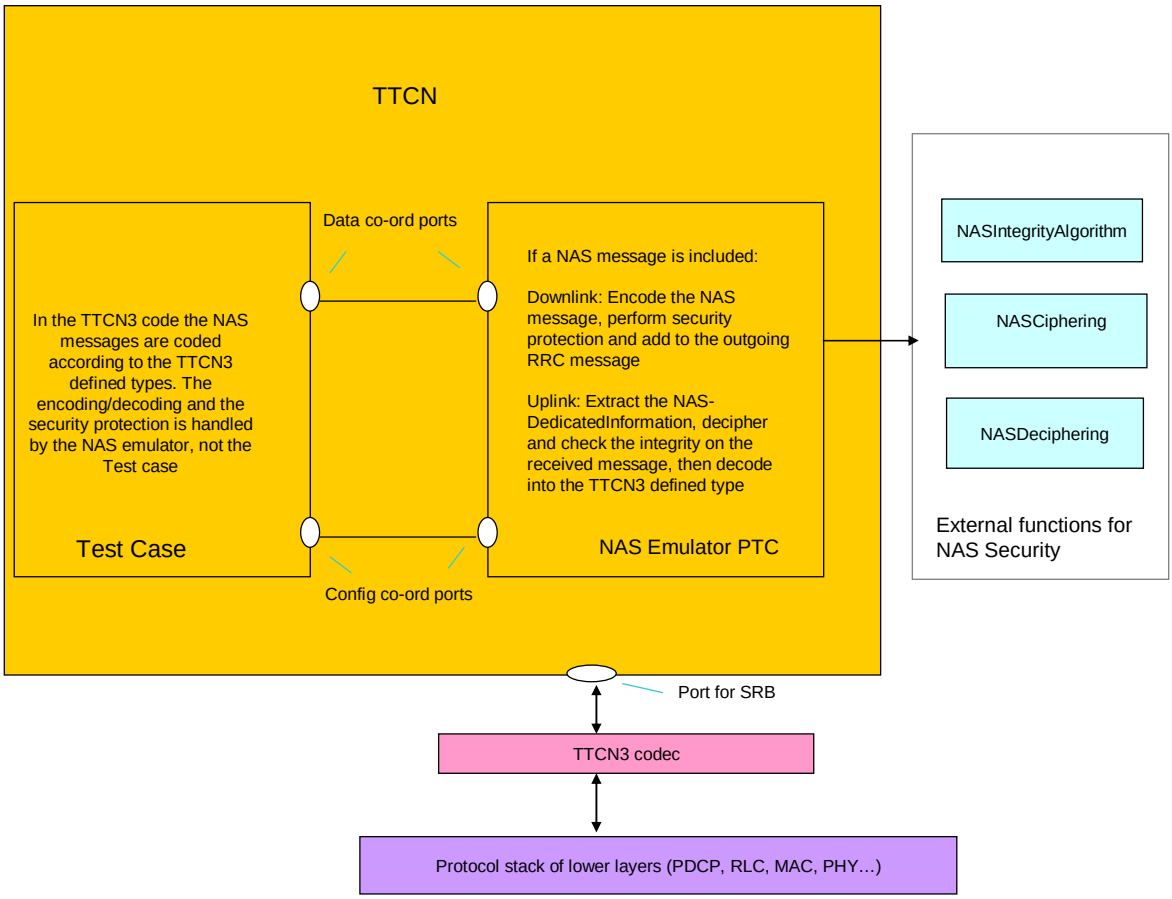


**Figure 4.3.1-1**

The NAS emulator is a parallel test component which handles NAS security, with the help of external functions to perform the integrity and (de)ciphering.

The interface between the emulator and the TTCN (co-ordination messages) handle data as TTCN-3 values. The interface between the emulator and the SS handles the RRC messages as TTCN-3 values, containing (where applicable) secure, encoded NAS messages.

The NAS emulator is not part of the test case in terms of verdict assignment (i.e. it does not check the correctness of any protocol message). Nevertheless, in case of fatal errors such as encode/decode errors, the NAS emulator sets the verdict to inconclusive and terminates immediately - which causes the test case to terminate. i.e. the NAS emulator does not resolve error situations.

## 4.4 Inter RAT Test Model

### 4.4.1 E-UTRAN-UTRAN Inter RAT Test Model

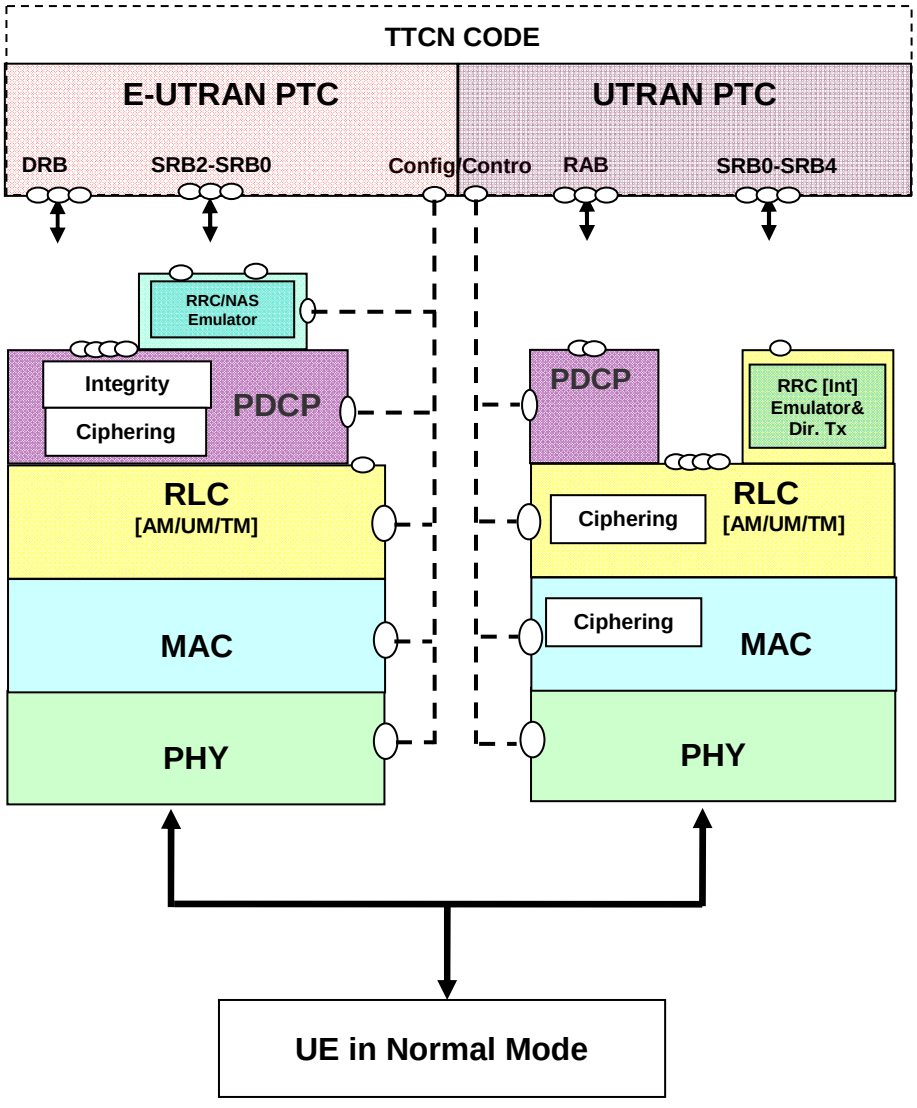


**Figure 4.4.1-1: Test model for Inter RAT E-UTRAN-UTRAN testing**

The model consists of dual protocol stack one for E-UTRAN and one for UTRAN. The TTCN implementation for E-UTRAN and UTRAN functionalities will be in separate Parallel Test Components. The SS E-UTRAN part is same as the model defined in clause 4.2.2 for RRC testing.

The SS UTRAN part consist of L1, MAC, RLC and PDCP (IF PS user RB established only), are configured in normal mode. They shall perform all of their functions normally. Ciphering is enabled and shall be performed in RLC (AM/UM) and MAC (TM RLC). Integrity is enabled, and SS shall provide RRC emulator for integrity protection calculation and checking and 'Direct transfer' adaptation. Ports are above RLC (CS RAB and SRB0), PDCP (PS RAB) and RRC Emulator (SRB1 to SRB4).

The UE is configured in normal mode. Ciphering/Integrity (PDCP and NAS) are enabled and ROHC is not configured in E-UTRAN. Ciphering is enabled in UTRAN.

## 4.4.2 E-UTRAN-GERAN Inter RAT Test Model

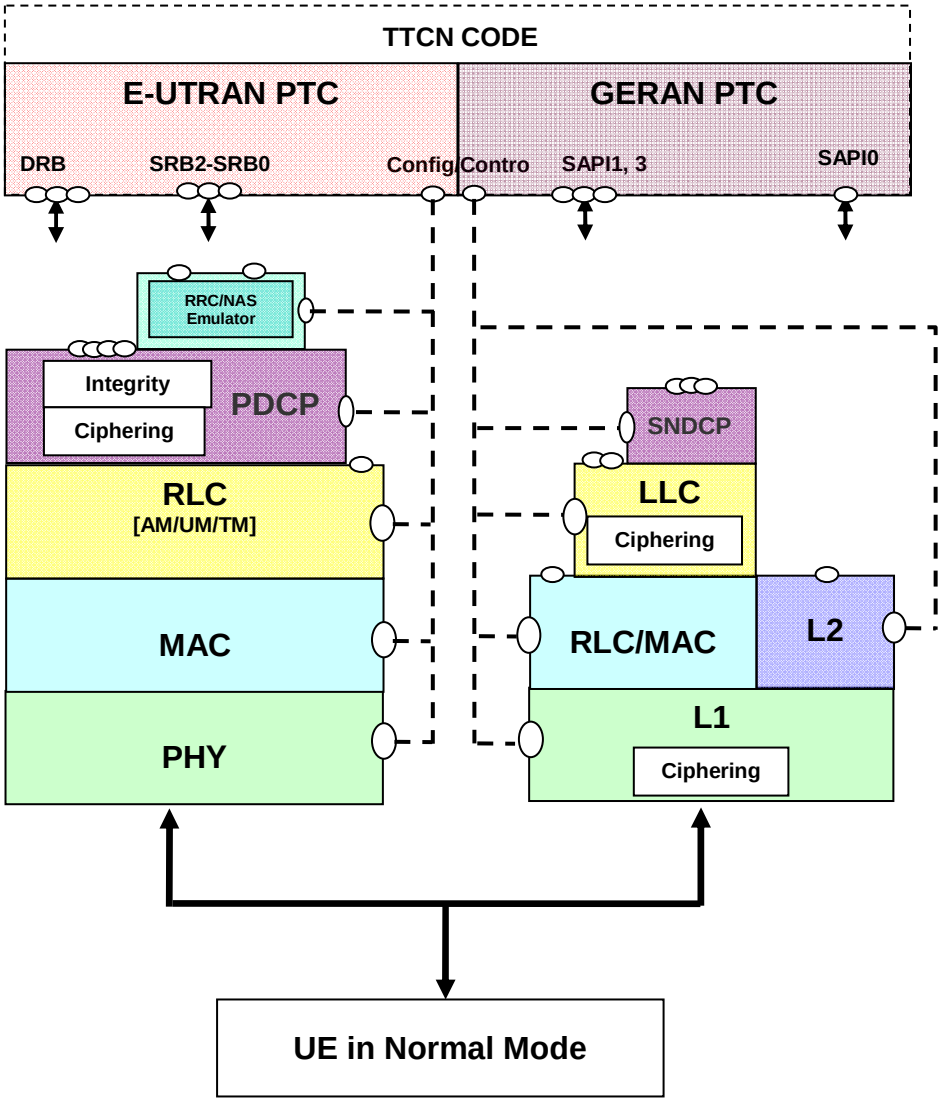


**Figure 4.4.2-1: Test model for Inter RAT E-UTRAN-GERAN testing**

The model consists of dual protocol stack one for E-UTRAN and one for GERAN. The TTCN implementation for E-UTRAN and GERAN functionalities will be in separate Parallel Test Components. The SS E-UTRAN part is the same as the model defined in clause 4.2.2 for RRC testing.

The SS GERAN model for GPRS consists of L1, MAC/ RLC and LLC, configured in normal mode. SNDCP may also be configured. They shall perform all of their functions normally. Ciphering is enabled and shall be performed in LLC. Ports are above RLC (GRR messages), LLC (NAS and Data) and SNDCP (User Data).

The SS GERAN model for GSM consists of L1, L2 (MAC/ RLC), configured in normal mode. They shall perform all of their functions normally. Ciphering is enabled and shall be performed in L1. Ports are above L2.

The UE is configured in normal mode. Ciphering/Integrity (PDCP and NAS) is enabled and ROHC is not configured in E-UTRAN. Ciphering is enabled in GERAN.

### 4.4.3 E-UTRAN-CDMA2000 Inter RAT Test Model

FFS.

### 4.4.4 E-UTRAN FDD-TDD Inter RAT Test Model

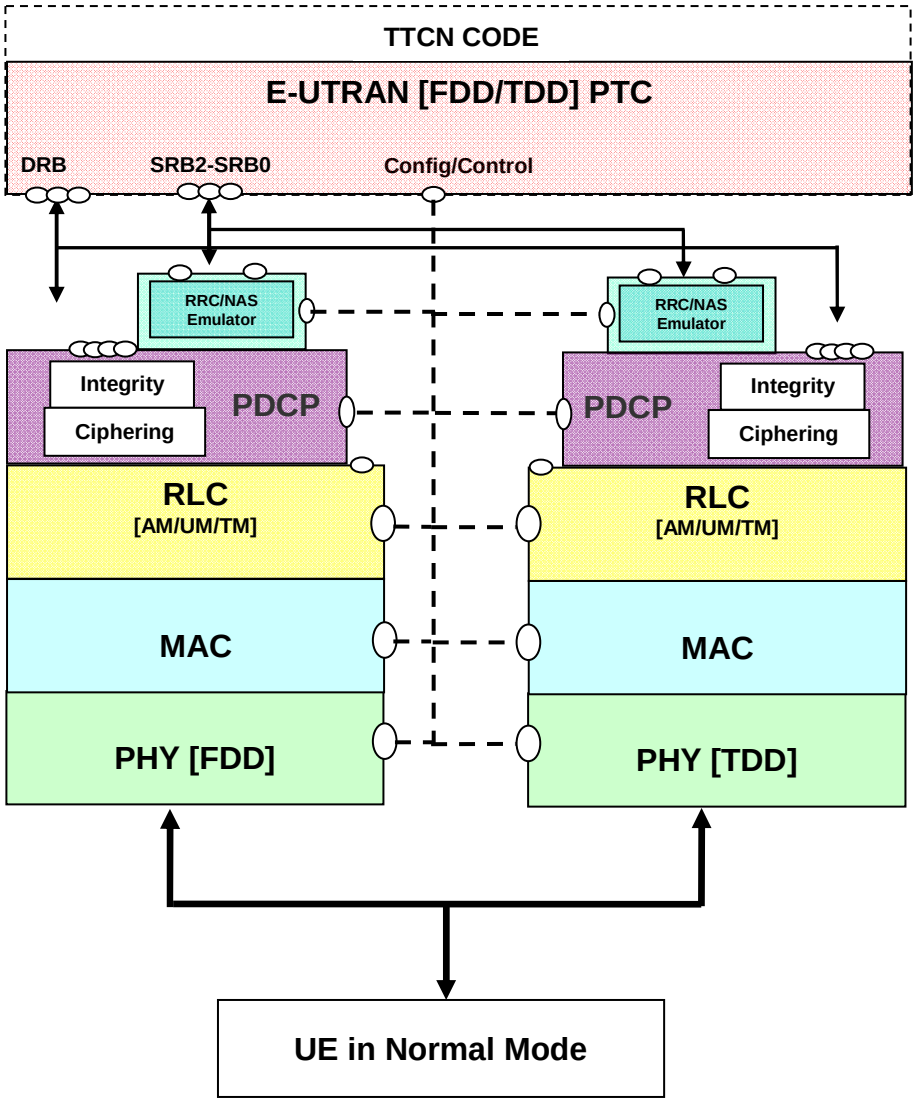


**Figure 4.4.4-1: Test model for Inter RAT E-UTRANFDD-TDD testing**

The model consists of dual protocol stack one for E-UTRANFDD and one for E-UTRANTDD. The TTCN implementation for E-UTRANFDD and TDD functionalities will be in the same Parallel Test Component. The SS E-UTRAN (both FDD and TDD) part is the same as the model defined in clause 4.2.2 for RRC testing. SS E-UTRANFDD and TDD shall be configured as separate cells.

The UE is configured in normal mode. Ciphering/Integrity (PDCP and NAS) are enabled and ROHC is not configured for both FDD and TDD.

### 4.4.5 E-UTRAN-UTRAN-GERAN Inter RAT Test Model

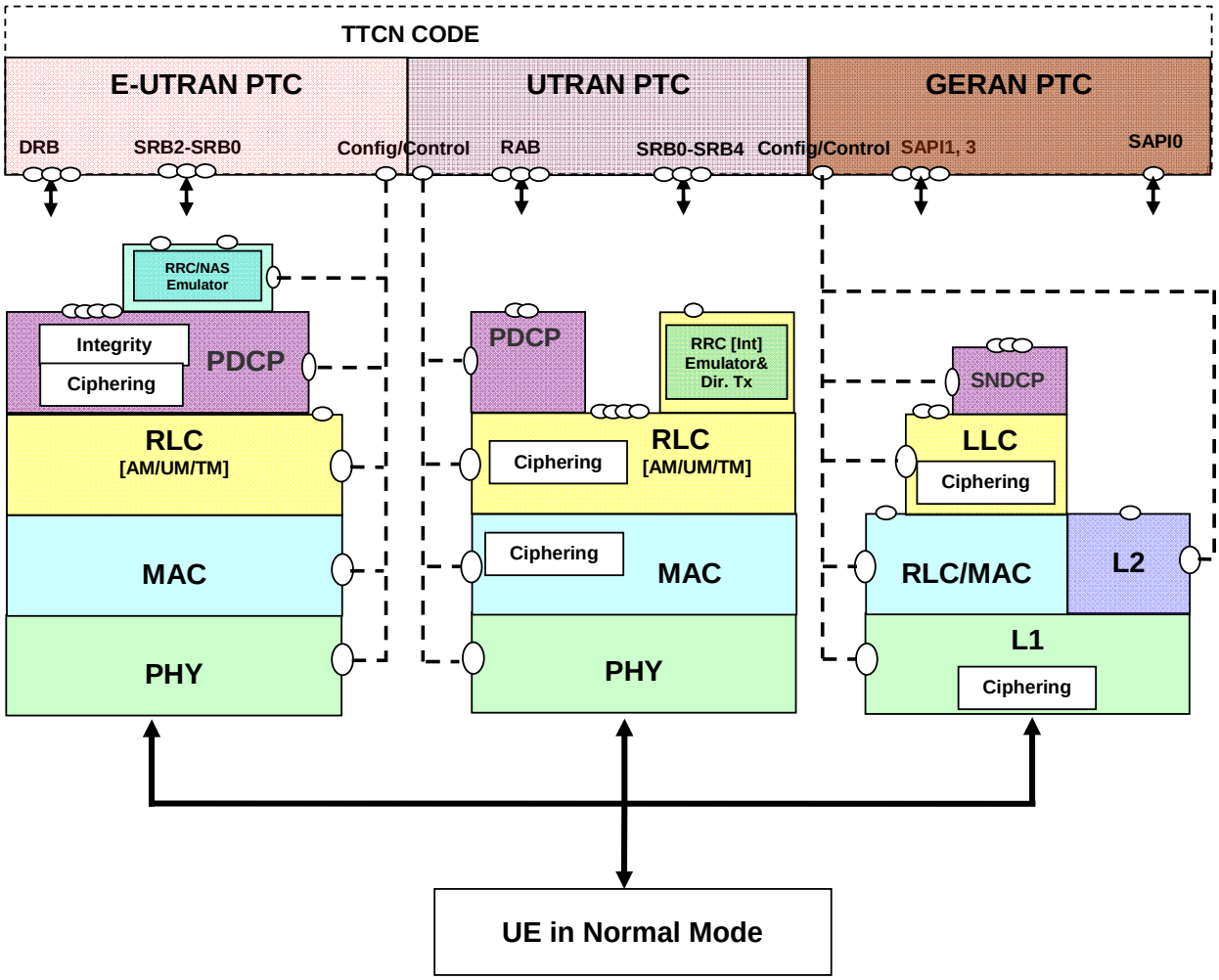


**Figure 4.4.5-1: Test model for Inter RAT E-UTRANFDD-TDD testing**

The model consists of integrated protocol stack supporting E-UTRAN, UTRAN and GERAN. The TTCN implementation for E-UTRAN, UTRAN and GERAN functionalities will be in separate Parallel Test Components. The SS E-UTRAN part is the same as the model defined in clause 4.2.2 for RRC testing. The SS UTRAN part is the same as the model defined in clause 4.4.1. The SS GERAN part is same as the model defined in clause 4.4.2.

The UE is configured in normal mode. Ciphering/Integrity (PDCP and NAS) are enabled and ROHC is not configured in E-UTRAN. Ciphering/Integrity are enabled in UTRAN. Ciphering is enabled in GERAN.

# 5 Upper Tester Interface

This clause describes the handling of AT commands and MMI Commands at the system interface. The internal handling of those commands in TTCN is out of scope.

In the TTCN, the Upper Tester is located at the MTC; therefore there is one interface to the system adaptor common for all RATs.

There is one primitive defined carrying either an MMI or an AT command to be sent to the system adaptor and one common confirmation primitive to be sent by the system adaptor.

| TTCN-3 ASP Definition | | | |
|---|---|---|---|
| **Type Name** | **UT_SYSTEM_REQ** | | |
| **TTCN-3 Type** | Record | | |
| **Cmd** | **TTCN-3 Type** | union | |
| AT | charstring carrying the AT command as defined in TS 27.007 [32], TS 27.005 [31] and TS 27.060 [33] | | |
| MMI | • Cmd (charstring)<br>• List of parameters:<br>o Name (charstring)<br>o Value (charstring) | | |
| **CnfRequired** | **TTCN-3 Type** | boolean | |
| | **true:** system adaptor shall reply with confirmation received from the UE<br>**false:** SS shall swallow any confirmation generated by the UE<br><br>**Note:** In the TTCN, a confirmation shall only be requested in cases when there is no signalling from the UE being triggered by the MMI/AT command | | |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **UT_COMMON_CNF** | |
| **TTCN-3 Type** | Record | |
| **Result** | **TTCN-3 Type** | boolean |
| | **true:** success<br>**false:** failure | |
| **ResultString** | **TTCN-3 Type** | charstring |
| | response by the UE for commands which request the UE to return a result, optional | |

All mandatory and optional AT commands are sent as AT command strings as defined above. If an optional AT command is not implemented in the UE, the system adaptor needs to parse the AT command and map it to an appropriate MMI command (which is out of scope for this document).

The following MMI commands are defined.

**Table 5-1: MMI commands**

| Command | Parameters | |
|---|---|---|
| | **Name** | **Value** |
| "SWITCH_ON" | (none) | |
| "SWITCH_OFF" | (none) | |
| "POWER_ON" | (none) | |
| "POWER_OFF" | (none) | |
| "INSERT_USIM" | (none) | |
| "REMOVE_USIM" | (none) | |
| "CHECK_PLMN" | "PLMN" | <PLMN ID> |
| "PLMN_MANUAL" | "PLMN" | <PLMN ID> |
| "PLMN_AUTOMATIC" | (none) | |
| PRE_CONFIGURE_FOR_EPS_ATTACH | (none) | |
| PRE_CONFIGURE_FOR_COMBINED_EPS_IMSI_ATTACH | (none) | |
| "CHECK_SMS_LENGTH_CONTENTS" | “Length” | <Length> |
| | “Msg” | <Msg> |

The following AT commands are applied in TTCN.

**Table 5-2: AT Commands**

| Command | Reference |
|---|---|
| ATD | 3GPP TS 27.007 |
| AT+CGEQOS | 3GPP TS 27.007 |
| AT+CGTFT | 3GPP TS 27.007 |
| AT+CGDSCONT | 3GPP TS 27.007 |
| AT+CGACT | 3GPP TS 27.007 |
| AT+CGCMOD | 3GPP TS 27.007 |
| AT+CGDCONT | 3GPP TS 27.007 |
| AT+CGDATA | 3GPP TS 27.007 |
| AT+CMGD | 3GPP TS 27.005 |
| AT+CSMS | 3GPP TS 27.005 |
| AT+CPMS | 3GPP TS 27.005 |
| AT+CMGF | 3GPP TS 27.005 |
| AT+CSCS | 3GPP TS 27.007 |
| AT+CSCA | 3GPP TS 27.005 |
| AT+CMGW | 3GPP TS 27.005 |
| AT+CMSS | 3GPP TS 27.005 |
| AT+CSMP | 3GPP TS 27.005 |
| AT+CGEQREQ | 3GPP TS 27.007 |
| AT+CCLK | 3GPP TS 27.007 |
| AT+COPS | 3GPP TS 27.007 |

AT commands are referred to TS 27.005 [31], TS 27.007 [32] and TS 27.060 [33].

# 6 ASP specifications

## 6.1 General Requirements and Assumptions

The following common requirements affect ASP definitions:

- The definition of ASPs shall have no impact on the common system architecture or on the performance.
- The codec implementation is out of scope of the present document.
- For peer-to-peer PDUs contained in an ASP encoding rules need to be considered acc. to the respective protocol:
  - ASN.1 BER and PER.
  - Tabular notation for NAS PDUs or layer 2 data PDUs.

There are no encoding rules being defined for top level ASP definitions and information exchanged between the test executable and the System Adaptor (SA) only. Instead encoding depends on implementation of the codec and the SA.

There are no encoding rules being defined for ASPs between TTCN-3 components. This is implementation dependent.

Info elements defined in the protocol specifications (e.g. RRC) shall be re-used in configuration ASPs as far as possible.

For optional fields within the configuration ASPs, the following rules will be applied:

- For ASN.1 fields - these will follow the same rules as defined in the RRC specification [19].
- For TTCN-3 fields - when the current configuration of an optional field is to be 'kept as it is' then the field will be set to omit.
- For TTCN-3 fields - when the current configuration of an optional field is to be released/deleted then a separate option is provided in a union.

# 6.2 E-UTRAN ASP Definitions

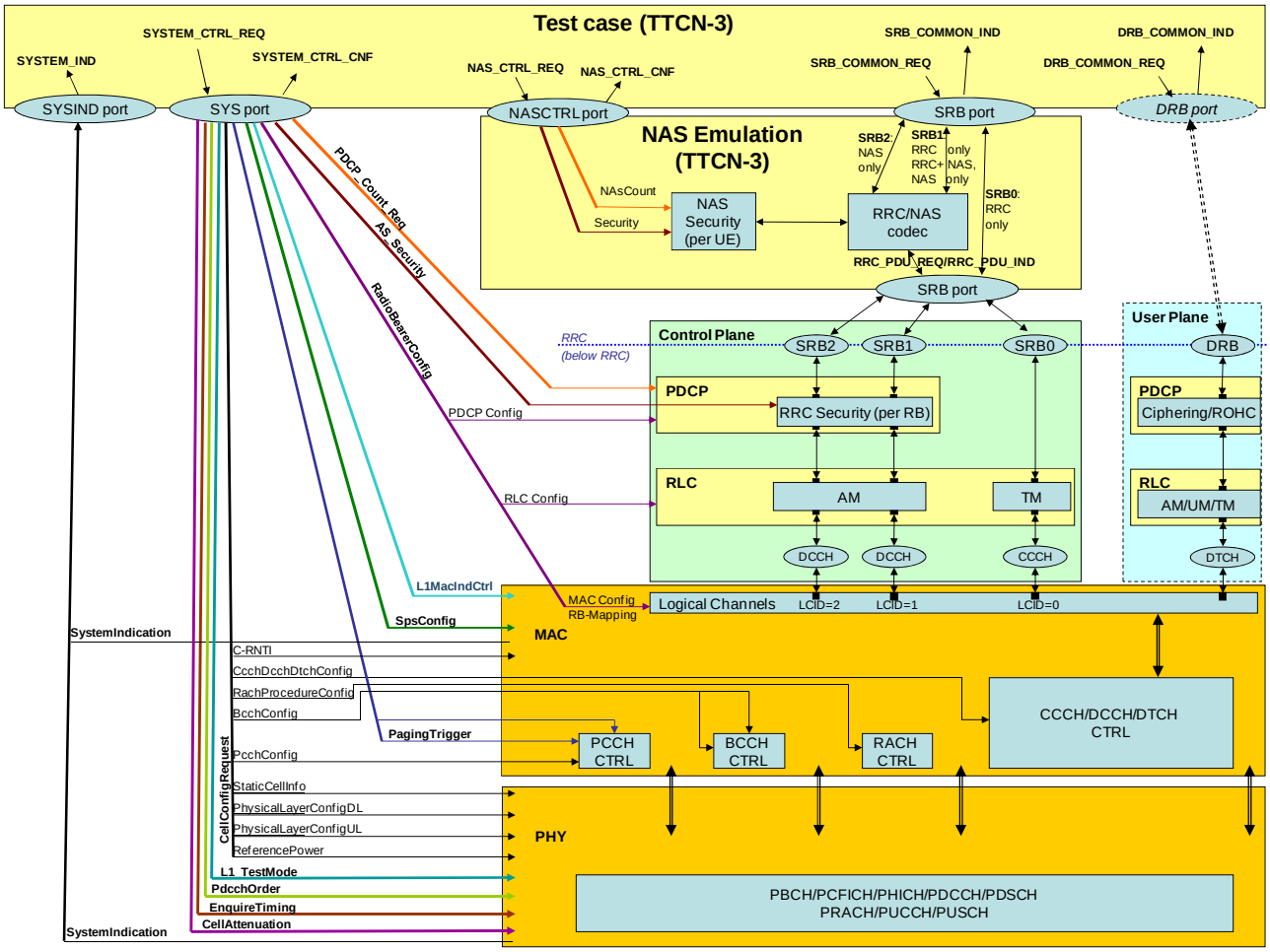


**Figure 6.2-1: E-UTRAN ASP Test Model**

## 6.2.1 Configuration Primitives

Annex D contains the ASP definitions for configurations.

## 6.2.2 Signalling Primitives

Annex D contains the ASP definitions for configurations.

## 6.2.3 Co-ordination Messages between NAS Emulation PTC and EUTRA PTC

| TTCN-3 ASP Definition | | | |
|---|---|---|---|
| **Type Name** | **SRB_COMMON_REQ** | | |
| TTCN-3 Type | Record | | |
| **Common Part** | | **TTCN-3 Type** | record |
| CellId | | cell id | |
| RoutingInfo | | SRB0, SRB1, SRB2 | |
| TimingInfo | | system frame number and sub-frame number or "Now" | |
| ControlInfo | | CnfFlag: (normally false)<br>FollowOnFlag:<br>**true:** Indicates that the message(s) to be sent on the same TTI will follow<br>NOTE: If the same TimingInfo is not used in the messages to be sent on the same TTI, the SS shall produce an error<br>**false:** Indicates that no more message(s) will follow. | |
| **Signalling Part** | | **TTCN-3 Type** | record |
| **Rrc** | | **TTCN-3 Type** | union |
| | | **omit:**<br>NAS message shall be present; NAS message shall be sent in DLInformationTransfer<br>**present, NAS message present:**<br>(piggybacked) NAS PDU shall be security protected (if necessary) and inserted in RRC PDU's NAS_DedicatedInformation<br>**present, NAS message omit:**<br>(RRC message does not contain NAS information) | |
| Ccch | | DL_CCCH_Message as define in TS 36.331 [19], clause 6.2.1 | |
| Dcch | | DL_DCCH_Message as define in TS 36.331 [19], clause 6.2.1 | |
| **Nas** | | **TTCN-3 Type** | record |
| | | **omit:**<br>RRC message shall be present; RRC message does not contain (piggybacked) NAS PDU<br>**present, RRC message omit:**<br>NAS message shall be sent embedded in DLInformationTransfer<br>**present, RRC message present:**<br>NAS message is piggybacked in RRC message<br>NOTE: In case of RRC message being sent on CCCH or does not have IE NAS_DedicatedInformation NAS message shall be omitted. | |
| SecurityProtectionInfo | | security status (if protected with integrity and/or ciphering, if at all) | |
| NAS message | | union of all NAS messages define for DL except SECURITY PROTECTED NAS MESSAGE | |

| TTCN-3 ASP Definition | | | |
|---|---|---|---|
| **Type Name** | **SRB_COMMON_IND** | | |
| TTCN-3 Type | Record | | |
| **Common Part** | | **TTCN-3 Type** | record |
| CellId | | cell id | |
| RoutingInfo | | SRB0, SRB1, SRB2 | |
| TimingInfo | | system frame number; sub-frame number when PDU has been received | |
| **Signalling Part** | | **TTCN-3 Type** | record |
| **Rrc** | | **TTCN-3 Type** | union |
| | | **omit:**<br>NAS message shall be present; NAS message is received in ULInformationTransfer<br>**present, NAS message present:**<br>NAS_DedicatedInformation contains unstructured and security protected NAS PDU and the NAS message contains the deciphered message in structured format<br>**present, NAS message omit:**<br>(RRC message does not contain NAS information) | |
| Ccch | | UL_CCCH_Message as define in TS 36.331 [19], clause 6.2.1 | |
| Dcch | | UL_DCCH_Message as define in TS 36.331 [19], clause 6.2.1 | |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Nas** | **TTCN-3 Type** | record |
| | **omit**<br>RRC message shall be present; RRC message does not contain (piggybacked) NAS PDU<br>**present, RRC message omit**<br>NAS message has been received in ULInformationTransfer<br>**present, RRC message present**<br>NAS message is piggybacked in RRC message | |
| SecurityProtectionInfo | security status (if protected with integrity and/or ciphering, if at all), nas count | |
| NAS message | union of all NAS messages define for UL except SECURITY PROTECTED NAS MESSAGE | |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **NAS_CTRL_REQ** | |
| TTCN-3 Type | Record | |
| **Common Part** | **TTCN-3 Type** | record |
| CellId | cell id | |
| RoutingInfo | (not used for configuration) | |
| TimingInfo | current system frame number; sub-frame number<br>(always provided by the SS) | |
| Result | Success or error<br>(in case of error an SS specific error code shall be provided; this will not be evaluated by TTCN but may be useful for validation) | |
| **Primitive specific Part** | **TTCN-3 Type** | union |
| Security | Start/Restart<br>Integrity<br>Ciphering<br>NasCountReset<br>Release | |
| NAS Count | get<br>set | |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **NAS_CTRL_CNF** | |
| **TTCN-3 Type** | Record | |
| **Common Part** | **TTCN-3 Type** | record |
| CellId | cell id | |
| RoutingInfo | (not used for configuration) | |
| TimingInfo | current system frame number; sub-frame number<br>(always provided by the SS) | |
| Result | Success or error<br>(in case of error an SS specific error code shall be provided; this will not be evaluated by TTCN but may be useful for validation) | |
| **Primitive specific Part** | **TTCN-3 Type** | union |
| Security | (contains no further information) | |
| NAS Count | get<br>set | |

# 6.3 UTRAN ASP Definitions

## 6.3.1 ASPs for Control Primitive Transmission

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **U_CPHY_ CONFIG_REQ** |
| **TTCN-3 Type** | union |
| **Port** | UTRAN_CPHY |
| CPHY_RL_Setup_FDD_REQ | TS 34.123-3, clause 7.3.2.2.11 |
| CPHY_RL_Setup_TDD_REQ | TS 34.123-3, clause 7.3.2.3.1 |
| CPHY_RL_Modify_FDD_REQ | TS 34.123-3, clause 7.3.2.2.9 |
| CPHY_RL_Modify_TDD_REQ | TS 34.123-3, clause 7.3.2.3.1 |
| CPHY_RL_Release_REQ | TS 34.123-3, clause 7.3.2.2.10 |
| CPHY_TrCH_Config_FDD_REQ | TS 34.123-3, clause 7.3.2.2.13 |
| CPHY_TrCH_Config_TDD_REQ | TS 34.123-3, clause 7.3.2.2.13 |
| CPHY_TrCH_Release_REQ | TS 34.123-3, clause 7.3.2.2.14 |
| CPHY_Cell_Config_FDD_REQ | TS 34.123-3, clause 7.3.2.2.2 |
| CPHY_Cell_Config_TDD_REQ | TS 34.123-3, clause 7.3.2.3.1 |
| CPHY_Cell_Release_REQ | TS 34.123-3, clause 7.3.2.2.3 |
| CPHY_Ini_REQ | TS 34.123-3, clause 7.3.2.2.4 |
| CPHY_Cell_TxPower_Modify_REQ | TS 34.123-3, clause 7.3.2.2.5 |
| CPHY_Frame_Number_REQ | TS 34.123-3, clause 7.3.2.2.6 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **U_CPHY_ CONFIG_CNF** |
| **TTCN-3 Type** | union |
| **Port** | UTRAN_CPHY |
| CPHY_RL_Setup_CNF | TS 34.123-3, clause 7.3.2.2.11 |
| CPHY_RL_Modify_CNF | TS 34.123-3, clause 7.3.2.2.9 |
| CPHY_RL_Release_CNF | TS 34.123-3, clause 7.3.2.2.10 |
| CPHY_TrCH_Config_CNF | TS 34.123-3, clause 7.3.2.2.13 |
| CPHY_TrCH_Release_CNF | TS 34.123-3, clause 7.3.2.2.14 |
| CPHY_Cell_Config_CNF | TS 34.123-3, clause 7.3.2.2.2 |
| CPHY_Cell_Release_CNF | TS 34.123-3, clause 7.3.2.2.3 |
| CPHY_Ini_CNF | TS 34.123-3, clause 7.3.2.2.4 |
| CPHY_Cell_TxPower_Modify_CNF | TS 34.123-3, clause 7.3.2.2.5 |
| CPHY_Frame_Number_CNF | TS 34.123-3, clause 7.3.2.2.6 |
| CPHY_Sync_IND | TS 34.123-3, clause 7.3.2.2.12 |
| CPHY_Out_of_Sync_IND | TS 34.123-3, clause 7.3.2.2.7 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **U_CMAC_ CONFIG_REQ** |
| **TTCN-3 Type** | union |
| **Port** | UTRAN_CMAC |
| CMAC_Config_FDD_REQ | TS 34.123-3, clause 7.3.2.2.17 |
| CMAC_Config_TDD_REQ | TS 34.123-3, clause 7.3.2.2.17 |
| CMAC_SYSINFO_Config_REQ | TS 34.123-3, clause 7.3.2.2.22 |
| CMAC_SecurityMode_Config_REQ | TS 34.123-3, clause 7.3.2.2.20 |
| CMAC_Ciphering_Activate_REQ | TS 34.123-3, clause 7.3.2.2.16 |
| CMAC_PAGING_Config_FDD_REQ | TS 34.123-3, clause 7.3.2.2.18 |
| CMAC_PAGING_Config_TDD_REQ | TS 34.123-3, clause 7.3.2.2.18 |
| CMAC_MACes_Config_REQ | TS 34.123-3, clause 7.3.2.2.17d |
| CMAC_MACe_Config_FDD_REQ | TS 34.123-3, clause 7.3.2.2.17b |
| CMAC_MACe_Config_TDD_REQ | TS 34.123-3, clause 7.3.2.2.17b |
| CMAC_MACe_NodeB_CellMapping_REQ | TS 34.123-3, clause 7.3.2.2.17c |
| CMAC_MAChs_MACehs_TFRCconfigure_FDD_REQ | TS 34.123-3, clause 7.3.2.2.17a |
| CMAC_MAChs_MACehs_TFRCconfigure_TDD_REQ | TS 34.123-3, clause 7.3.2.3.1 |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **U_CMAC_ CONFIG_CNF** | |
| **TTCN-3 Type** | union | |
| **Port** | UTRAN_CMAC | |
| CMAC_Config_CNF | | TS 34.123-3, clause 7.3.2.2.17 |
| CMAC_SYSINFO_Config_CNF | | TS 34.123-3, clause 7.3.2.2.22 |
| CMAC_SecurityMode_Config_CNF | | TS 34.123-3, clause 7.3.2.2.20 |
| CMAC_Ciphering_Activate_CNF | | TS 34.123-3, clause 7.3.2.2.16 |
| CMAC_PAGING_Config_CNF | | TS 34.123-3, clause 7.3.2.2.18 |
| CMAC_MACes_Config_CNF | | TS 34.123-3, clause 7.3.2.2.17d |
| CMAC_MACe_Config_CNF | | TS 34.123-3, clause 7.3.2.2.17b |
| CMAC_MACe_NodeB_CellMapping_CNF | | TS 34.123-3, clause 7.3.2.2.17c |
| CMAC_MAChs_MACehs_TFRCconfigure_CNF | | TS 34.123-3, clause 7.3.2.2.17a |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **U_CRLC_ CONFIG_REQ** | |
| **TTCN-3 Type** | union | |
| **Port** | UTRAN_CRLC | |
| CRLC_Config_REQ | | TS 34.123-3, clause 7.3.2.2.24 |
| CRLC_Sequence_Number_REQ | | TS 34.123-3, clause 7.3.2.2.29 |
| CRLC_SecurityMode_Config_REQ | | TS 34.123-3, clause 7.3.2.2.28 |
| CRLC_Ciphering_Activate_REQ | | TS 34.123-3, clause 7.3.2.2.23 |
| CRLC_Integrity_Activate_REQ | | TS 34.123-3, clause 7.3.2.2.25 |
| CRLC_SetRRC_MessageSN_REQ | | TS 34.123-3, clause 7.3.2.2.28a |
| CRLC_RRC_MessageSN_REQ | | TS 34.123-3, clause 7.3.2.2.27a |
| CRLC_Resume_REQ | | TS 34.123-3, clause 7.3.2.2.27 |
| CRLC_Suspend_REQ | | TS 34.123-3, clause 7.3.2.2.31 |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **U_CRLC_ CONFIG_CNF** | |
| **TTCN-3 Type** | union | |
| **Port** | UTRAN_CRLC | |
| CRLC_Config_CNF | | TS 34.123-3, clause 7.3.2.2.24 |
| CRLC_Sequence_Number_CNF | | TS 34.123-3, clause 7.3.2.2.29 |
| CRLC_SecurityMode_Config_CNF | | TS 34.123-3, clause 7.3.2.2.28 |
| CRLC_Ciphering_Activate_CNF | | TS 34.123-3, clause 7.3.2.2.23 |
| CRLC_integrity_Activate_CNF | | TS 34.123-3, clause 7.3.2.2.25 |
| CRLC_Integrity_Failure_IND | | TS 34.123-3, clause 7.3.2.2.26 |
| CRLC_SetRRC_MessageSN_CNF | | TS 34.123-3, clause 7.3.2.2.28a |
| CRLC_RRC_MessageSN_CNF | | TS 34.123-3, clause 7.3.2.2.27a |
| CRLC_Resume_CNF | | TS 34.123-3, clause 7.3.2.2.27 |
| CRLC_Suspend_CNF | | TS 34.123-3, clause 7.3.2.2.31 |

## 6.3.2 ASPs for Data Transmission and Reception

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | U_RLC_AM_REQ | |
| **TTCN-3 Type** | union | |
| **Port** | UTRAN_AM | |
| RLC_AM_DATA_REQ | | TS 34.123-3, clause 7.3.2.2.34 |
| RLC_AM_TestDataReq | | TS 34.123-3, clause 7.3.3.1 |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | U_RLC_AM_IND | |
| **TTCN-3 Type** | union | |
| **Port** | UTRAN_AM | |
| RLC_AM_DATA_CNF | | TS 34.123-3, clause 7.3.2.2.34 |
| RLC_AM_DATA_IND | | TS 34.123-3, clause 7.3.2.2.34 |
| RLC_AM_TestDataInd | | TS 34.123-3, clause 7.3.3.1 |

| TTCN-3 ASP Definition | Port | Defined in |
|---|---|---|
| UTRAN_RLC_AM_REQ | UTRAN_AM | TS 34.123-3, clause 7.3.2.2.34 |
| UTRAN_RLC_AM_IND | UTRAN_AM | TS 34.123-3, clause 7.3.2.2.34 |
| UTRAN_RLC_TR_REQ | UTRAN_TM | TS 34.123-3, clause 7.3.2.2.33 |
| UTRAN_RLC_TR_IND | UTRAN_TM | TS 34.123-3, clause 7.3.2.2.33 |
| UTRAN_RLC_UM_REQ | UTRAN_UM | TS 34.123-3, clause 7.3.2.2.35 |
| UTRAN_RLC_UM_IND | UTRAN_UM | TS 34.123-3, clause 7.3.2.2.35 |
| RRC_DataReq | UTRAN_Dc | TS 34.123-3, clause 7.1.2 |
| RRC_DataReqInd | UTRAN_Dc | TS 34.123-3, clause 7.1.2 |

# 6.4 GERAN ASP Definitions

## 6.4.1 ASPs for Control Primitive Transmission

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G__CPHY_ CONFIG_REQ** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_CL1 |
| G_CL1_CreateCell_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_DeleteCell_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_CreateBasicPhyCh_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_CreateMultiSlotConfig_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_DeleteChannel_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_ChangePowerLevel_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_CipheringControl_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_CipherModeModify_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_ChModeModify_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL1_ComingFN_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL2_HoldPhyInfo_REQ | TS 34.123-3, clause 7.3.4.3.2.2 |
| G_CL1_L1Header_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |
| G_CL2_MeasRptControl_REQ | TS 34.123-3, clause 7.3.4.3.2.2 |
| G_CL2_NoUAforSABM_REQ | TS 34.123-3, clause 7.3.4.3.2.2 |
| G_CL2_ResumeUAforSABM_REQ | TS 34.123-3, clause 7.3.4.3.2.2 |
| G_CL2_Release_REQ | TS 34.123-3, clause 7.3.4.3.2.2 |
| G_CL1_SetNewKey_REQ | TS 34.123-3, clause 7.3.4.3.2.1 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G_CPHY_CONFIG_CNF** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_CL1 |
| ComingFN | RFN |
| L1Header | L1Header |
| None | This choice used when neither of the other choices are selected |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G_CRLC_ CONFIG_REQ** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_CRLC |
| G_CRLC_CreateRLC_MAC_REQ | TS 34.123-3, clause 7.3.4.3.2.3 |
| G_CRLC_DeleteRLC_MAC_REQ | TS 34.123-3, clause 7.3.4.3.2.3 |
| G_CRLC_DL_TBF_Config_REQ | TS 34.123-3, clause 7.3.4.3.2.3 |
| G_CRLC_UL_TBF_Config_REQ | TS 34.123-3, clause 7.3.4.3.2.3 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G_CRLC_ CONFIG CNF** |
| **TTCN-3 Type** | empty record |
| **Port** | GERAN_CRLC |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | G_CLLC_ CONFIG_REQ |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_CLLC |
| G_CLLC_Assign_REQ | TS 34.123-3, clause 7.3.4.3.2.4 |
| G_CLLC_Reassign_REQ | TS 34.123-3, clause 7.3.4.3.2.4 |
| G_CLLC_CreateLLE_REQ | TS 34.123-3, clause 7.3.4.3.2.4 |
| G_CLLC_DeleteLLE_REQ | TS 34.123-3, clause 7.3.4.3.2.4 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G_CLLC_ CONFIG_CNF** |
| **TTCN-3 Type** | empty record |
| **Port** | GERAN_CLLC |

## 6.4.2 ASPs for Data Transmission and Reception

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G__L2_DATAMESSAGE_REQ** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_L2 |
| G_L2_UNITDATA_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_Release_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_SYSINFO_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_Paging_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_PagingGPRS_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_DATA_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_GTTP_REQ | TS 34.123-3, clause 7.3.4.3.1.1 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G__L2_DATAMESSAGE_IND** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_L2 |
| G_L2_UNITDATA_IND | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_Release_CNF | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_Release_IND | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_Estab_IND | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_GTTP_IND | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_DATA_IND | TS 34.123-3, clause 7.3.4.3.1.1 |
| G_L2_ACCESS_IND | TS 34.123-3, clause 7.3.4.3.1.1 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G__RLC_ DATAMESSAGE_REQ** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_RLC |
| G__RLC_ControlMsg_REQ | TS 34.123-3, clause 7.3.4.3.1.2 |

| TTCN-3 ASP Definition | |
|---|---|
| **Type Name** | **G__RLC_ DATAMESSAGE_IND** |
| **TTCN-3 Type** | Union |
| **Port** | GERAN_RLC |
| G__RLC_ControlMsg_IND | TS 34.123-3, clause 7.3.4.3.1.2 |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **G__LLC_ DATAMESSAGE_REQ** | |
| **TTCN-3 Type** | Union | |
| **Port** | GERAN_LLC | |
| G_LLC_UNITDATA_REQ | | TS 34.123-3, clause 7.3.4.3.1.3 |
| G_LLC_XID_RES | | TS 34.123-3, clause 7.3.4.3.1.3 |

| TTCN-3 ASP Definition | | |
|---|---|---|
| **Type Name** | **G__LLC_ DATAMESSAGE_IND** | |
| **TTCN-3 Type** | Union | |
| **Port** | GERAN_LLC | |
| G_LLC_UNITDATA_IND | | TS 34.123-3, clause 7.3.4.3.1.3 |
| G_LLC_XID_IND | | TS 34.123-3, clause 7.3.4.3.1.3 |

# 7 Test Methods and Design Considerations

## 7.1 Channel Mapping

Figure 7.1 shows the channel type mapping that is used for the configuration of the SS. In layer 2 test cases non default channel mapping can be applied on SS, as explained in clause 4.2.1.

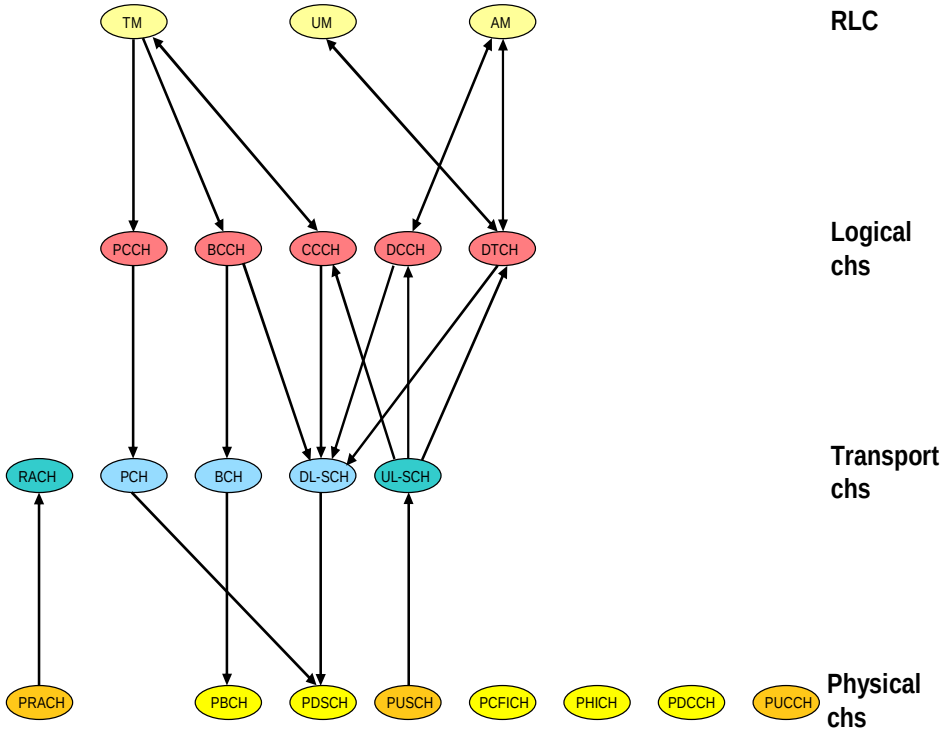


**Figure 7.1-1: Channel type mapping for the default configuration of the SS**

### 7.1.1 PDCCH Candidate Selection

In this clause following abbreviations are used:

- Common search Space Aggregation: CS_Agr.
- UE-Specific Search Space Aggregation: UE_Agr.
- Total number of CCEs available in a subframe: Max_CCE.

SS shall apply defined rules below in a DL subframe for PDCCH candidates selection.

- Scheduled transmissions on SI-RNTI / P-RNTI / RA-RNTI, use Common Search Space. UL and DL Scheduled transmissions on C-RNTI/ SPS C-RNTI, and DL Scheduled transmissions on Temp. C-RNTI, use UE-Specific

Search Space. Transmissions on TPC-PUCCH-RNTI / TPC-PUSCH-RNTI and UL Scheduled transmissions on Temp. C-RNTI are not considered for default CCE management.

- If a transmission on SI-RNTI is scheduled, PDCCH candidate corresponding to CCEs between 0..(CS_Agr-1) is used. This PDCCH candidate is reserved for SI-RNTI, and left vacant if no SI-RNTI transmission is scheduled.

- PDCCH candidates corresponding to CCEs between CS_Agr..(2*CS_Agr-1) can be used either for the transmission on P-RNTI or RA-RNTI. In conformance test cases with single UE, there is no requirement for transmissions scheduled for both P-RNTI and RA-RNTI in one DL subframe.

- For DL transmission for C-RNTI/SPS-RNTI/Temp C-RNTI the lowest value of m =m' which has a PDCCH available from CCEs between 2*CS_Agr .. (Max_CCE-1) shall be used. 'm' is defined in TS 36.213 [30], clause 9.1.1.

- For UL transmission for C-RNTI/SPS-RNTI the lowest value of m =m">m'which has a PDCCH available from CCEs between 2*CS_Agr .. (Max_CCE-1) shall be used, irrespective of PDCCH candidate corresponding to m' is used or not.

NOTE: If m' or m" cannot be allocated in any TTI, it is a TTCN error due to X-RNTI not properly allocated. The error shall be reported to TTCN. The TTCN will exit the test case assigning an inconclusive verdict.

### 7.1.1.1 FDD candidates selection

Table 7.1.1.1-1 gives the CCE resources utilized for m' and m" for default values of common search space aggregation level =4, UE-specific search space aggregation L=2 resulting in 6 PDCCH candidates m=0..5 and channel Bandwidth of 5 MHz. This give Max_CCE =20 for FDD. The table also gives the corresponding CCE start indices of PDCCH candidates for m' and m".

**Table 7.1.1.1-1: CCE Start indices(m' & m'' to be used for various C-RNTIs (5 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 0 | 1 | 0 | 0 | 0 | 3 | 4 | 0 | 0 | 0 |
| | | CCE_St_Ind' | 12 | 8 | 14 | 8 | 12 | 8 | 8 | 8 | 14 | 10 |
| | | m'' | 1 | 2 | 1 | 1 | 1 | 4 | 5 | 1 | 1 | 1 |
| | | CCE_St_Ind'' | 14 | 10 | 16 | 10 | 14 | 10 | 10 | 10 | 16 | 12 |
| tsc_C_RNTI_Def2 | '1034'H 4148 | m' | 0 | 0 | 2 | 0 | 0 | 4 | 4 | 1 | 0 | 0 |
| | | CCE_St_Ind' | 12 | 16 | 8 | 14 | 10 | 8 | 8 | 8 | 18 | 16 |
| | | m'' | 1 | 1 | 3 | 1 | 1 | 5 | 5 | 2 | 5 | 1 |
| | | CCE_St_Ind'' | 14 | 18 | 10 | 16 | 12 | 10 | 10 | 10 | 8 | 18 |
| tsc_C_RNTI_Def3 | '1111'H 4369 | m' | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 4 |
| | | CCE_St_Ind' | 16 | 10 | 14 | 8 | 8 | 10 | 14 | 8 | 18 | 8 |
| | | m'' | 1 | 1 | 1 | 3 | 4 | 1 | 1 | 1 | 5 | 5 |
| | | CCE_St_Ind'' | 18 | 12 | 16 | 10 | 10 | 12 | 16 | 10 | 8 | 10 |
| tsc_C_RNTI_Def4 | '1FF1'H 8177 | m' | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 4 |
| | | CCE_St_Ind' | 12 | 12 | 18 | 16 | 8 | 18 | 18 | 18 | 8 | 8 |
| | | m'' | 1 | 1 | 5 | 1 | 4 | 5 | 5 | 5 | 3 | 5 |
| | | CCE_St_Ind'' | 14 | 14 | 8 | 18 | 10 | 8 | 8 | 8 | 10 | 10 |
| tsc_C_RNTI_Def5 | '04D2'H 1234 | m' | 0 | 2 | 0 | 4 | 0 | 2 | 3 | 0 | 1 | 0 |
| | | CCE_St_Ind' | 10 | 8 | 10 | 8 | 14 | 8 | 8 | 14 | 8 | 10 |
| | | m'' | 1 | 3 | 1 | 5 | 1 | 3 | 4 | 1 | 2 | 1 |
| | | CCE_St_Ind'' | 12 | 10 | 12 | 10 | 16 | 10 | 10 | 16 | 10 | 12 |
| tsc_C_RNTI_Def6 | '0929'H 2345 | m' | 4 | 0 | 4 | 0 | 0 | 1 | 3 | 3 | 4 | 2 |
| | | CCE_St_Ind' | 8 | 10 | 8 | 12 | 14 | 8 | 8 | 8 | 8 | 8 |
| | | m'' | 5 | 1 | 5 | 1 | 1 | 2 | 4 | 4 | 5 | 3 |
| | | CCE_St_Ind'' | 10 | 12 | 10 | 14 | 16 | 10 | 10 | 10 | 10 | 10 |
| tsc_C_RNTI_Def7 | '0D80'H 3456 | m' | 2 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 2 |
| | | CCE_St_Ind' | 8 | 16 | 8 | 18 | 14 | 14 | 8 | 16 | 14 | 8 |
| | | m'' | 3 | 1 | 3 | 5 | 1 | 1 | 4 | 1 | 1 | 3 |
| | | CCE_St_Ind'' | 10 | 18 | 10 | 8 | 16 | 16 | 10 | 18 | 16 | 10 |
| tsc_C_RNTI_Def8 | '11D7'H 4567 | m' | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 2 | 0 | 2 |
| | | CCE_St_Ind' | 8 | 16 | 8 | 8 | 14 | 16 | 8 | 8 | 8 | 8 |
| | | m'' | 1 | 1 | 1 | 3 | 1 | 1 | 4 | 3 | 1 | 3 |
| | | CCE_St_Ind'' | 10 | 18 | 10 | 10 | 16 | 18 | 10 | 10 | 10 | 10 |
| tsc_C_RNTI_Def9 | '162E'H 5678 | m' | 0 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 3 | 2 |
| | | CCE_St_Ind' | 12 | 8 | 12 | 16 | 8 | 8 | 16 | 18 | 8 | 8 |
| | | m'' | 1 | 4 | 1 | 1 | 1 | 3 | 1 | 5 | 4 | 3 |
| | | CCE_St_Ind'' | 14 | 10 | 14 | 18 | 10 | 10 | 18 | 8 | 10 | 10 |
| tsc_C_RNTI_Def10 | '1A85'H 6789 | m' | 0 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 3 | 2 |
| | | CCE_St_Ind' | 16 | 8 | 16 | 8 | 8 | 8 | 16 | 8 | 8 | 8 |
| | | m'' | 1 | 1 | 1 | 4 | 1 | 2 | 1 | 2 | 4 | 3 |
| | | CCE_St_Ind'' | 18 | 10 | 18 | 10 | 10 | 10 | 18 | 10 | 10 | 10 |

Tables 7.1.1.1-2, 7.1.1.1-3, 7.1.1.1-4 give the CCE resources utilized for m' and m'' for default values of common search space aggregation level =4, UE-specific search space aggregation L=2 resulting in 6 PDCCH candidates m=0..5 and bandwidths of 10/15/20 MHz respectively. This gives Max_CCE =25(10 MHz)/37(15 MHz)/50(20 MHz) for FDD. The tables also give the corresponding CCE start indices of PDCCH candidates for m' and m''. These are in general to be applied in MAC Transport block size test cases defined in clause 7.1.7 of 36.523-1 [1].

**Table 7.1.1.1-2: CCE Start indices (m' & m'') to be used for default C-RNTI (10 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | CCE_St_Ind' | 12 | 8 | 8 | 20 | 16 | 18 | 16 | 8 | 14 | 18 |
| | | m'' | 1 | 4 | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | CCE_St_Ind'' | 14 | 10 | 10 | 22 | 18 | 20 | 18 | 10 | 16 | 20 |
| tsc_C_RNTI_Def2 | '1034'H 4148 | m' | 0 | 4 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| | | CCE_St_Ind' | 8 | 8 | 20 | 10 | 14 | 8 | 20 | 22 | 18 | 8 |
| | | m'' | 1 | 5 | 1 | 1 | 1 | 5 | 1 | 5 | 1 | 1 |
| | | CCE_St_Ind'' | 10 | 10 | 22 | 12 | 16 | 10 | 22 | 8 | 20 | 10 |
| tsc_C_RNTI_Def3 | '1111'H 4369 | m' | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 0 |
| | | CCE_St_Ind' | 16 | 10 | 10 | 8 | 22 | 22 | 22 | 8 | 10 | 16 |
| | | m'' | 1 | 1 | 1 | 5 | 5 | 5 | 5 | 3 | 1 | 1 |
| | | CCE_St_Ind'' | 18 | 12 | 12 | 10 | 8 | 8 | 8 | 10 | 12 | 18 |
| tsc_C_RNTI_Def4 | '1FF1'H 8177 | m' | 2 | 0 | 0 | 4 | 0 | 0 | 3 | 0 | 2 | 0 |
| | | CCE_St_Ind' | 8 | 20 | 14 | 8 | 10 | 18 | 8 | 22 | 8 | 12 |
| | | m'' | 3 | 1 | 1 | 5 | 1 | 1 | 4 | 5 | 3 | 1 |
| | | CCE_St_Ind'' | 10 | 22 | 16 | 10 | 12 | 20 | 10 | 8 | 10 | 14 |
| tsc_C_RNTI_Def5 | '04D2'H 1234 | m' | 3 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 1 | 0 |
| | | CCE_St_Ind' | 8 | 16 | 22 | 12 | 22 | 8 | 8 | 8 | 8 | 22 |
| | | m'' | 4 | 1 | 5 | 1 | 5 | 3 | 4 | 4 | 2 | 5 |
| | | CCE_St_Ind'' | 10 | 18 | 8 | 14 | 8 | 10 | 10 | 10 | 10 | 8 |
| tsc_C_RNTI_Def6 | '0929'H 2345 | m' | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 2 |
| | | CCE_St_Ind' | 20 | 18 | 8 | 8 | 18 | 8 | 18 | 22 | 12 | 8 |
| | | m'' | 1 | 1 | 3 | 3 | 1 | 2 | 1 | 5 | 1 | 3 |
| | | CCE_St_Ind'' | 22 | 20 | 10 | 10 | 20 | 10 | 20 | 8 | 14 | 10 |
| tsc_C_RNTI_Def7 | '0D80'H 3456 | m' | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| | | CCE_St_Ind' | 8 | 20 | 20 | 8 | 14 | 22 | 10 | 8 | 18 | 8 |
| | | m'' | 5 | 1 | 1 | 2 | 1 | 5 | 1 | 1 | 1 | 5 |
| | | CCE_St_Ind'' | 10 | 22 | 22 | 10 | 16 | 8 | 12 | 10 | 20 | 10 |
| tsc_C_RNTI_Def8 | '11D7'H 4567 | m' | 2 | 0 | 0 | 0 | 0 | 4 | 3 | 2 | 4 | 0 |
| | | CCE_St_Ind' | 8 | 8 | 12 | 8 | 10 | 8 | 8 | 8 | 8 | 20 |
| | | m'' | 3 | 1 | 1 | 1 | 1 | 5 | 4 | 3 | 5 | 1 |
| | | CCE_St_Ind'' | 10 | 10 | 14 | 10 | 12 | 10 | 10 | 10 | 10 | 22 |
| tsc_C_RNTI_Def9 | '162E'H 5678 | m' | 0 | 0 | 2 | 4 | 0 | 0 | 2 | 0 | 1 | 0 |
| | | CCE_St_Ind' | 8 | 10 | 8 | 8 | 16 | 16 | 8 | 14 | 8 | 16 |
| | | m'' | 1 | 1 | 3 | 5 | 1 | 1 | 3 | 1 | 2 | 1 |
| | | CCE_St_Ind'' | 10 | 12 | 10 | 10 | 18 | 18 | 10 | 16 | 10 | 18 |
| tsc_C_RNTI_Def10 | '1A85'H 6789 | m' | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 0 |
| | | CCE_St_Ind' | 12 | 12 | 20 | 8 | 12 | 18 | 20 | 10 | 8 | 12 |
| | | m'' | 1 | 1 | 1 | 4 | 1 | 1 | 1 | 1 | 4 | 1 |
| | | CCE_St_Ind'' | 14 | 14 | 22 | 10 | 14 | 20 | 22 | 12 | 10 | 14 |

**Table 7.1.1.1-3: CCE Start indices (m' & m'') to be used for default C-RNTI (15 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | CCE_St_Ind' | 8 | 14 | 14 | 20 | 16 | 18 | 28 | 20 | 26 | 30 |
| | | m'' | 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | CCE_St_Ind'' | 10 | 16 | 16 | 22 | 18 | 20 | 30 | 22 | 28 | 32 |

**Table 7.1.1.1-4: CCE Start indices (m' & m'') to be used for default C-RNTI (20 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| | | CCE_St_Ind' | 8 | 36 | 34 | 38 | 42 | 22 | 10 | 8 | 8 | 20 |
| | | m'' | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 |
| | | CCE_St_Ind'' | 10 | 38 | 36 | 40 | 44 | 24 | 12 | 10 | 10 | 22 |

### 7.1.1.2 TDD candidates selection

The default TDD subframe configuration 1 is applied to this clause.

Considering that each TDD subframe having different PHICH group number, and only two symbols being present for PDCCH in the special subframes 1 and 6 for bandwidth of 5 MHz, two symbols for PDCCH in all subframes for bandwidth of 10/15/20 MHz [3], each subframe has, therefore, different number of MAX_CCE.

Table 7.1.1.2-1 gives the PDCCH candidates of m' and m" for default values of common search space aggregation level =4, UE-specific search space aggregation L=2 resulting in 6 PDCCH candidates m=0..5 and the corresponding CCE start indices for channel bandwidth of 5MHz. SF0 and SF5 cannot be used for UL grant. SF1 and SF6 are not used for DL assignment. SF2, SF3, SF7 and SF8 are not applicable to PDCCH CCE allocation since they are uplink subframes.

**Table 7.1.1.2-1: CCE Start indices (m' & m'') to be used for various C-RNTIs (5 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max_CCE | 21 | 12 | - | - | 20 | 21 | 12 | - | - | 20 |
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 0 | - | - | - | 0 | 3 | - | - | - | 0 |
| | | CCE_St_Ind' | 12 | - | - | - | 12 | 8 | - | - | - | 10 |
| | | m" | - | 4 | - | - | 1 | - | 3 | - | - | 1 |
| | | CCE_St_Ind" | - | 10 | - | - | 14 | - | 10 | - | - | 12 |
| tsc_C_RNTI_Def2 | '1034'H 4148 | m' | 0 | - | - | - | 0 | 4 | - | - | - | 0 |
| | | CCE_St_Ind' | 12 | - | - | - | 10 | 8 | - | - | - | 16 |
| | | m" | - | 5 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind" | - | 10 | - | - | 12 | - | 10 | - | - | 18 |
| tsc_C_RNTI_Def3 | '1111'H 4369 | m' | 0 | - | - | - | 3 | 0 | - | - | - | 4 |
| | | CCE_St_Ind' | 16 | - | - | - | 8 | 10 | - | - | - | 8 |
| | | m" | - | 0 | - | - | 4 | - | 5 | - | - | 5 |
| | | CCE_St_Ind" | - | 10 | - | - | 10 | - | 8 | - | - | 10 |
| tsc_C_RNTI_Def4 | '1FF1'H 8177 | m' | 0 | - | - | - | 3 | 0 | - | - | - | 4 |
| | | CCE_St_Ind' | 12 | - | - | - | 8 | 18 | - | - | - | 8 |
| | | m" | - | 1 | - | - | 4 | - | 4 | - | - | 5 |
| | | CCE_St_Ind" | - | 10 | - | - | 10 | - | 10 | - | - | 10 |
| tsc_C_RNTI_Def5 | '04D2'H 1234 | m' | 0 | - | - | - | 0 | 2 | - | - | - | 0 |
| | | CCE_St_Ind' | 10 | - | - | - | 14 | 8 | - | - | - | 10 |
| | | m" | - | 3 | - | - | 1 | - | 4 | - | - | 1 |
| | | CCE_St_Ind" | - | 10 | - | - | 16 | - | 10 | - | - | 12 |
| tsc_C_RNTI_Def6 | '0929'H 2345 | m' | 4 | - | - | - | 0 | 1 | - | - | - | 2 |
| | | CCE_St_Ind' | 8 | - | - | - | 14 | 8 | - | - | - | 8 |
| | | m" | - | 2 | - | - | 2 | - | 1 | - | - | 3 |
| | | CCE_St_Ind" | - | 10 | - | - | 16 | - | 10 | - | - | 10 |
| tsc_C_RNTI_Def7 | '0D80'H 3456 | m' | 2 | - | - | - | 0 | 0 | - | - | - | 2 |
| | | CCE_St_Ind' | 8 | - | - | - | 14 | 14 | - | - | - | 8 |
| | | m" | - | 1 | - | - | 1 | - | 5 | - | - | 3 |
| | | CCE_St_Ind" | - | 10 | - | - | 16 | - | 8 | - | - | 11 |
| tsc_C_RNTI_Def8 | '11D7'H 4567 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 2 |
| | | CCE_St_Ind' | 8 | - | - | - | 14 | 16 | - | - | - | 8 |
| | | m" | - | 0 | - | - | 1 | - | 4 | - | - | 3 |
| | | CCE_St_Ind" | - | 10 | - | - | 16 | - | 10 | - | - | 10 |
| tsc_C_RNTI_Def9 | '162E'H 5678 | m' | 0 | - | - | - | 0 | 2 | - | - | - | 2 |
| | | CCE_St_Ind' | 12 | - | - | - | 8 | 8 | - | - | - | 8 |
| | | m" | - | 5 | - | - | 1 | - | 3 | - | - | 3 |
| | | CCE_St_Ind" | - | 8 | - | - | 10 | - | 10 | - | - | 10 |
| tsc_C_RNTI_Def10 | '1A85'H 6789 | m' | 0 | - | - | - | 0 | 1 | - | - | - | 2 |
| | | CCE_St_Ind' | 16 | - | - | - | 8 | 8 | - | - | - | 8 |
| | | m" | - | 5 | - | - | 1 | - | 1 | - | - | 3 |
| | | CCE_St_Ind" | - | 10 | - | - | 10 | - | 10 | - | - | 10 |

Tables 7.1.1.2-2, 7.1.1.2-3, 7.1.1.2-4 give the PDCCH candidates of m' and m" for default values of common search space aggregation level =4, UE-specific search space aggregation L=2 resulting in 6 PDCCH candidates m=0..5 and the corresponding CCE start indices for bandwidths of 10/15/20 MHz respectively, with the different Max_CCE number for each subframe.

**Table 7.1.1.2-2: CCE Start indices (m' & m'') to be used for default C-RNTI (10 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max_CCE | 27 | 25 | - | - | 25 | 27 | 25 | - | - | 25 |
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 0 | - | - | - | 0 | 2 | - | - | - | 0 |
| | | CCE_St_Ind' | 10 | - | - | - | 16 | 8 | - | - | - | 18 |
| | | m'' | - | 4 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 10 | - | - | 18 | - | 18 | - | - | 20 |

**Table 7.1.1.2-3: CCE Start indices (m' & m'') to be used for default C-RNTI (15 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max_CCE | 41 | 37 | - | - | 37 | 41 | 37 | - | - | 37 |
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 0 | - | - | - | 0 | 3 | - | - | - | 0 |
| | | CCE_St_Ind' | 12 | - | - | - | 16 | 8 | - | - | - | 30 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 16 | - | - | 18 | - | 30 | - | - | 32 |

**Table 7.1.1.2-4: CCE Start indices (m' & m'') to be used for default C-RNTI (20 MHz)**

| C-RNTI | Value | | SF0 | SF1 | SF2 | SF3 | SF4 | SF5 | SF6 | SF7 | SF8 | SF9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max_CCE | 55 | 50 | - | - | 50 | 55 | 50 | - | - | 50 |
| tsc_C_RNTI_Def | '1001'H 4097 | m' | 4 | - | - | - | 0 | 4 | | - | - | 0 |
| | | CCE_St_Ind' | 8 | - | - | - | 42 | 8 | | - | - | 20 |
| | | m'' | - | 1 | - | - | 1 | | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 38 | - | - | 44 | | 12 | - | - | 22 |
| tsc_C_RNTI_Def 2 | '1034'H 4148 | m' | 0 | - | - | - | 0 | 4 | - | - | - | 1 |
| | | CCE_St_Ind' | 32 | - | - | - | 20 | 8 | - | - | - | 8 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 2 |
| | | CCE_St_Ind'' | - | 48 | - | - | 22 | - | 12 | - | - | 10 |
| tsc_C_RNTI_Def 3 | '1111'H 4369 | m' | 0 | - | - | - | 3 | 2 | - | - | - | 0 |
| | | CCE_St_Ind' | 52 | - | - | - | 8 | 8 | - | - | - | 20 |
| | | m'' | - | 1 | - | - | 4 | - | 3 | - | - | 1 |
| | | CCE_St_Ind'' | - | 22 | - | - | 10 | - | 10 | - | - | 22 |
| tsc_C_RNTI_Def 4 | '1FF1'H 8177 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 22 | - | - | - | 42 | 18 | - | - | - | 20 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 14 | - | - | 44 | - | 30 | - | - | 22 |
| tsc_C_RNTI_Def 5 | '04D2'H 1234 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 26 | - | - | - | 44 | 10 | - | - | - | 20 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 36 | - | - | 46 | - | 14 | - | - | 22 |
| tsc_C_RNTI_Def 6 | '0929'H 2345 | m' | 0 | - | - | - | 0 | 4 | - | - | - | 2 |
| | | CCE_St_Ind' | 26 | - | - | - | 14 | 8 | - | - | - | 8 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 3 |
| | | CCE_St_Ind'' | - | 22 | - | - | 16 | - | 24 | - | - | 10 |
| tsc_C_RNTI_Def 7 | '0D80'H 3456 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 42 | - | - | - | 34 | 28 | - | - | - | 14 |
| | | m'' | - | 2 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 10 | - | - | 36 | - | 34 | - | - | 16 |
| tsc_C_RNTI_Def 8 | '11D7'H 4567 | m' | 2 | - | - | - | 2 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 8 | - | - | - | 8 | 18 | - | - | - | 24 |
| | | m'' | - | 1 | - | - | 3 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 18 | - | - | 10 | - | 44 | - | - | 26 |
| tsc_C_RNTI_Def 9 | '162E'H 5678 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 20 | - | - | - | 48 | 46 | - | - | - | 34 |
| | | m'' | - | 4 | - | - | 5 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 10 | - | - | 8 | - | 28 | - | - | 36 |
| tsc_C_RNTI_Def 10 | '1A85'H 6789 | m' | 0 | - | - | - | 0 | 0 | - | - | - | 0 |
| | | CCE_St_Ind' | 36 | - | - | - | 18 | 36 | - | - | - | 44 |
| | | m'' | - | 1 | - | - | 1 | - | 1 | - | - | 1 |
| | | CCE_St_Ind'' | - | 40 | - | - | 20 | - | 38 | - | - | 46 |

# 7.2 Uplink Grant

The Network/SS informs the UE if it is allowed to make Uplink Data transmission by transmitting 'DCI format 0' on PDCCH. The UE shall transmit (4 TTI later for FDD or variable for TDD) a Transport block of exactly the same size as specified in DCI format 0. The UE has no control of its own on TB size, and has to merely follow the network, even if that means lots of MAC padding or resource starving.

The UE has the following means to communicate if it has UL data ready for transmission and subsequently the estimate of quantity of data to be transmitted.

RACH procedure: UE in idle mode, handed over to a new cell or connected mode but PUCCH is unsynchronized (sometimes referred to as PUCCH is not configured) will trigger RACH procedure on data ready for transmission in UL.

Scheduling Request: UE in connected mode, no grant configured, PUCCH is synchronized and has data ready for transmission in UL, will transmit a scheduling request on PUCCH.

Buffer Status Reports: UE in connected mode, PUCCH synchronized, has a configured grant for current TTI, but grant is not sufficient to transmit all the data will include MAC control element BSR in the UL MAC PDU.

RACH and SR indicate on data availability and BSR provides an estimate of data available for transmission.

Hence to determine the exact need of the grant requirement of the UE a network/SS needs to act on all three of the above. This eventually complicates the SS implementation and hence the grant allocation procedure is simplified such that SS needs only to react on reception of SR.

The SS, if configured for maintaining PUCCH synchronization at UE, shall periodically transmit automatically MAC PDUs containing the MAC control element 'Timing Advance'. The period as configured by the TTCN is set to 80 % of the 'Time Alignment Timer' defaul value (750 ms) configured at UE. In case of Layer 2 UM test the period configured as 150 ms (Note), i.e. 20% of the 'Time Alignment Timer' default value. This guarantees that UE will remain PUCCH synchronized as long as SS transmits Timing Advance control elements. This prevents the UE from performing the RACH procedure for the grant request.

NOTE: 150 ms is 75% of the DRX inactivity time, 200 ms, at the Layer 2 UM test.

Additionally the SS can be configured to automatically transmit a 'configured' UL grant at every reception of a Scheduling Request. This grant should be selected under the following restrictions:

- All UE categories can handle this i.e. (TBS < 5160).
- It is sufficiently large that most of uplink signalling messages can be transmitted. In case the grant is not sufficient to fit the whole UL data, the UE will have to wait for the expiry of RETX_BSR_TIMER and retransmit a SR. And hence the procedure is repeated.

The following 4 types of grant allocation configurations are possible. Grant allocation Types 1 to 3 are applicable, when the UE is in connected state. Grant allocation Type 4 is applicable when UE is establishing the RRC Connection.

Grant Allocation Type 1:

- SS is configured to maintain PUCCH Synch.
- SS is configured to send an automatically 'configured Grant' (in terms of $I_{MCS}$ and $N_{PRB}$) to the UE on every reception of a Scheduling Request, within 10 subframes. The default configured grant is $I_{MCS}$ = 9 and $N_{PRB}$ = 25, unless explicitly specified in test cases.
- By default this type of grant allocation is applied. The majority of Idle mode, RRC and NAS test cases, the preambles and postambles of all tests and a few Layer 2 tests use this type of grant.

Grant Allocation Type 2:

- Configure SS to maintain PUCCH Synch.
- Configure SS to periodically transmit a grant ($I_{MCS}$ and $N_{PRB}$). Number of grants (1 or more) and period configured by TTCN. First grant transmitted as specified in timing information.

- This type of grant allocation is applicable to the majority of RLC, PDCP and a few MAC test cases.
- No additional grant is allocated on reception of any SRs.

Grant Allocation Type 3:

- SS may or may not be configured to maintain PUCCH Synch.
- Configure SS to transmit a one time grant ($I_{MCS}$ and $N_{PRB}$) in the time requested by TTCN. The one time transmission is achieved by setting Number of grants=1 and period =Only once
- This type of grant allocation is suitable for MAC and DRB tests when UE is in UL Synchronised state

Grant Allocation Type 4 (RACH configuration):

- In addition to the 3 types of UL grant allocations, a fourth type of grant allocation during the RACH procedure is also possible, where the SS behaves as per the RACH procedure configured and allocates the configured grant during the RACH procedure. This UL Grant type is used in the configuration for the preamble in many situations, basically in MAC test cases.

All the UL grant allocation methods define grant allocation in terms of $I_{MCS}$ and $N_{PRB}$ to be used. The SS shall allocate RBs corresponding to PRB indices 0..($N_{PRB}$-1).

## 7.2.1 Exception TC list

This clause contains the exception test case list where the explicit uplink grant types other than UL grant type 1 are specifiied.

**Table 7.2.1-1: Exception test case list with explicit uplink grant types other than UL grant type 1**

| Group | Test Case | Uplink Grant Type 2 | Uplink Grant Type 3 |
|---|---|---|---|
| **RLC** | 7.2.2.6 | X | |
| | 7.2.2.7 | X | |
| | 7.2.3.1 | | X |
| | 7.2.3.2 | X | |
| | 7.2.3.4 | | X |
| | 7.2.3.5 | | X |
| | 7.2.3.6 | X | |
| | 7.2.3.7 | X | |
| | 7.2.3.9 | X | |
| | 7.2.3.10 | X | X |
| | 7.2.3.13 | X | X |
| | 7.2.3.15 | X | |
| | 7.2.3.17 | X | |
| | 7.2.3.18 | | X |
| **MAC** | 7.1.4.1 | X | |
| | 7.1.4.2 | | X |
| | 7.1.4.3 | X | |
| | 7.1.4.4 | | X |
| | 7.1.4.6 | | X |
| | 7.1.4.7 | | X |
| | 7.1.4.8 | X | X |
| | 7.1.4.10 | | X |
| | 7.1.4.11 | | X |
| | 7.1.4.14 | | X |
| | 7.1.4.15 | X | |
| | 7.1.4.16 | X | |
| | 7.1.6.1 | | X |
| **DRB** | 12.1.1 | | X |

# 7.3 Downlink Resource Allocation

The DL resource allocation is an SS emulation function. In order to ensure similar DL behaviours (within defined tolerances) on the different SS platforms in the timing stringent requirements, all downlink resource allocation schemes specified in the present clause shall be supported by the SS.

When the DL data is to be sent with a specific scheduling requirement, for instance, in a TTI in advance rather than "now", the TTCN shall ensure that the data is scheduled 100 ms in advance. The 100 ms time covers all time delays, from the time DL data is sent by the TTCN to the completion of the transmission at the SS (TTCN delays, codec delays, adaptor delays and SS processing delays at various protocol Layers).

NOTE: The DL data means DL signalling and/or data in the present clause.

## 7.3.1 PDCCH DCI default formats

Two types of DCI combinations are identified as default formats for the signalling and protocol test.

DCI combination 1 uses:

- DCI format 1A, resource allocation type 2 localised, for all DL scheduling types.

DCI combination 2 uses:

- DCI format 1C, resource allocation type 2 distributed, for scheduling of PCCH/BCCH/RAR; and
- DCI format 1 resource allocation type 0, for UE dedicated scheduling.

## 7.3.2 Radio parameters configured

The SS shall support DL QPSK, 16QAM and 64QAM modulation schemes. The configured radio parameters, including DCI format, resource allocation types, maximum allowed modulation scheme, first virtual / physical resource block to be used, maximum available resource blocks and redundancy version, are provided to the SS.

In the normal signalling test condition, DL RLC and HARQ retransmissions are rare. The redundancy version is provided to allow the occasional HARQ retransmissions.

## 7.3.3 General DL scheduling scheme

The rules in the present clause, unless particularly specified, are applied to both default DCI combinations.

The bandwidth of 5/10/20 MHz makes 25/50/100 available physical resource blocks respectively. The 25/50/100 resource blocks are divided into three distinct sets. Exact set sizes and the elements contained in the individual sets depend upon the DCI combination to be applied.

- The first set is reserved for BCCH mapped to DL-SCH (SI-RNTI).
- The second set is reserved for PCCH mapped to DL-SCH (P-RNTI).
- The third set is used for one of mutually exclusive transmissions of:
  - 'Random Access Response' mapped to DL-SCH (RA-RNTI); or
  - UE-dedicated scheduling mapped to DL-SCH (C-RNTI/ SPS C-RNTI/ Temp C-RNTI).

For each subframe for which data of one or more types is scheduled, the SS shall select a Transport Block Size (TBS), independently for each type of data scheduled, such that:

- All the scheduled data is transmitted respecting the timing information. More details on the timing informationcan be found in clause 7.8.
- .- Not more than MaxRbCnt resource blocks are used, for DCI format 1C, $N_{PRB}$ = MaxRbCnt.
- Minimum MAC Padding is performed.

- If all scheduled Data cannot be transmitted in the indicated subframe, for example due to TDD and half duplex configuration, it shall be transmitted in the next available subframe.

### 7.3.3.1 Additional rules for BCCH scheduling scheme

This scheme is applicable for Data transmission on logical channel BCCH mapped to DL-SCH, PDCCH scrambled by SI-RNTI. For both DCI combinations 4 physical resource blocks are reserved for BCCH transmission. The maximum modulation scheme is restricted to QPSK.

Following additional rules are applied for TBS selection:

- The Max TBS, the maximum TBS allowed for the scheduling scheme, is restricted to 600. (nearest value achievable for $I_{TBS}$ = 9 and $N_{\mathrm{PRB}}$ = 4, as per table 7.1.7.2.1-1 of TS 36.213 [30]).

- If the scheduled Data cannot fit into a TBS smaller or equal to Max TBS, SS generates an error (it's a TTCN error). TTCN should gracefully exit the test case as a fatal error, assigning inconclusive verdict.

- Rules in clause 7.3.3.1.1 for DCI combination 1 and in clause 7.3.3.1.2 for DCI combination 2 shall be applied.

#### 7.3.3.1.1 BCCH with DCI combination 1

TS 36.213 [30], table 7.1.7.2.1-1, rows with $I_{TBS}$ =0..26 and columns with $N_{\mathrm{PRB}}$ =2 (corresponding to TPC LSB =0) and $N_{\mathrm{PRB}}$ =3 (corresponding to TPC LSB =1), TBS <=Max TBS are applicable.

Distinct TBSs and all (TPC LSB, $I_{TBS}$) combinations for each distinct TBS are listed in the sheet.

If a TBS can have two (TPC LSB, $I_{TBS}$) combinations, the combination with TPC LSB =0 is selected.

RIV indicates 4 PRBs with index 0..3 allocated.

#### 7.3.3.1.2 BCCH with DCI combination 2

TS 36.213 [30], table 7.1.7.2.3-1 , $I_{TBS}$ =0..17 with TBS <=Max TBS are applicable.

RIV indicates 4 virtual RBs with index 0..3 allocated. These virtual RBs correspond to the physical RBs

- with index 0, 6, 12, 18 in even slots and 12, 18, 0, 6 in odd slots for 5 MHz bandwidth,

- with index 0, 12, 27, 39 in even slots and 27, 39, 0, 12 in odd slots for 10 MHz bandwidth,

- with index 0, 24, 48, 72 in even slots and 48, 72, 0, 24 in odd slots for 20 MHz bandwidth.

### 7.3.3.2 Additional rules for PCCH specific scheduling scheme

This scheme is applicable for Data transmission on logical channel PCCH mapped to DL-SCH, PDCCH scrambled by P-RNTI. For DCI combination 1, one physical resource block is reserved. For DCI combination 2, two physical resource blocks are reserved for 5 MHz bandwidth, and four physical resource blocks are reserved for 10 or 20 MHz bandwidth. The maximum modulation scheme is restricted to QPSK.

Following additional rules are applied for TBS selection:

- If the scheduled Data cannot fit into Max TBS, SS generates an error (it's a TTCN error). TTCN should gracefully exit the test case as a fatal error, assigning inconclusive verdict.

- Rules in clause 7.3.3.2.1 for DCI combination 1 and clause 7.3.3.2.2 for DCI combination 2 shall be applied.

#### 7.3.3.2.1 PCCH with DCI combination 1

TS 36.213 [30], table 7.1.7.2.1-1, rows with $I_{TBS}$ =0..26 and columns with $N_{\mathrm{PRB}}$ =2 (corresponding to TPC LSB =0) and $N_{\mathrm{PRB}}$ =3 (corresponding to TPC LSB =1) TBS < =Max TBS are applicable.

The Max TBS is restricted to 120 (nearest value achievable for $I_{TBS}$ = 9 and $N_{PRB}$ =1, as per table 7.1.7.2.1-1 of TS 36.213 [30]).

Distinct TBSs and all (TPC LSB, $I_{TBS}$) combinations for each distinct TBS are listed in the sheet.

If a TBS can have two (TPC LSB, $I_{TBS}$) combinations, the combination with TPC LSB =0 is selected.

RIV indicates 1 PRBs with index 4 allocated.

#### 7.3.3.2.2 PCCH with DCI combination 2

TS 36.213 [30], table 7.1.7.2.3-1, $I_{TBS}$ =0..11 for 5 MHz/ $I_{TBS}$ =0..17 for 10 or 20 MHz with TBS <= Max TBS are applicable.

The Max TBS is restricted to

296 bits (nearest value achievable for $I_{TBS}$ = 9 and $N_{PRB}$ =2) for 5 MHz bandwidth,

600 bits (nearest value achievable for $I_{TBS}$ = 9 and $N_{PRB}$ = 4) for 10 or 20 MHz bandwidth.

RIV indicates either two virtual RBs with index 4 and 5 allocated, or four virtual RBs with index 4 to 7 allocated. These virtual RBs correspond to physical RBs:

with index 1 and 7 in even slots and 13 and 19 in odd slots for 5 MHz bandwidth,

with index 1, 13, 28, 40 in even slots and 28, 40, 1, 13in odd slots for 10 MHz bandwidth,

with index 1, 25, 49, 73 in even slots and 49, 73, 1, 25 in odd slots for 20 MHz bandwidth.

### 7.3.3.3 Additional rules for RAR specific scheduling scheme

This scheme is applicable for transmission of Random Access Response mapped to DL-SCH, PDCCH scrambled by RA-RNTI. For both DCI combinations four physical resource blocks are reserved. The maximum modulation scheme is restricted to QPSK.

Following additional rules are applied for TBS selection:

- The Max TBS is restricted to 600 bits (nearest value achievable for $I_{TBS}$ = 9 and $N_{PRB}$ =4, as per table 7.1.7.2.1-1 of TS 36.213 [30]).
- If the scheduled Data cannot fit into Max TBS, SS generates an error (it's a TTCN error). TTCN should gracefully exit the test case as a fatal error, assigning inconclusive verdict.
- Rules in clause 7.3.3.3.1 for DCI combination 1 and clause 7.3.3.3.2 for DCI combination 2 shall be applied.

#### 7.3.3.3.1 RAR with DCI combination 1

TS 36.213 [30], table 7.1.7.2.1-1, rows with $I_{TBS}$ = 0..26 and columns with $N_{PRB}$ = 2 (corresponding to TPC LSB = 0) and 3 (corresponding to TPC LSB = 1) TBS < =Max TBS are applicable

Distinct TBSs and all (TPC LSB, $I_{TBS}$ ) combinations for each distinct TBS are listed in the sheet.

If a TBS can have two (TPC LSB, $I_{TBS}$ ) combinations, the combination with TPC LSB =0 is selected.

RIV indicates 4 PRBs with index 5..8 allocated.

#### 7.3.3.3.2 RAR with DCI combination 2

TS 36.213 [30], table 7.1.7.2.3-1 , $I_{TBS}$ = 0..17 with TBS <= Max TBS are applicable.

RIV indicates 4 virtual RBs are allocated. These corresponds to physical RB

with index 13, 19, 2, 8 in even slots and 1, 7, 14, 20 in odd slots for 5 MHz bandwidth,

with index 2, 14, 29, 41 in even slots and 29, 41, 2, 14 in odd slots for 10 MHz bandwidth,

with index 2, 26, 50, 74 in even slots and 50, 74, 2, 26 in odd slots for 20 MHz bandwidth.

#### 7.3.3.4 Additional rules for UE-dedicated scheduling scheme in normal mode

The UE-dedicated DL scheduling can work in the normal mode or in the explicit mode. The two resource allocation schemes shall be reconfigurable from each other when the UE and SS are not sending and receiving data, for instance, at end of the test preamble and before the beginning of the test body.

The present clause is specified for the use of the normal mode. The explicit mode is referred to clause 7.3.3.6.

The scheme specified in the present clause is applicable for transmission of data dedicated to a UE, mapped to DL-SCH, PDCCH scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI when spatial multiplexing MIMO mode is not configured. The maximum modulation scheme is restricted to 64QAM. For the DCI combination 1, 20 physical resource blocks (5 to 24), and for the DCI combination 2, 17 physical resource blocks are reserved. In the case when three intra frequency cells are applied to the test in the DCI combination 1, for the purpose of interference reduction, only 9 PRBs (16 to 24) are reserved.

The following additional rules are applied for TBS selection:

- Multiple ASPs can also carry same explicit timing information; indicating different ASP payloads, eventually needs to be transmitted in 1 TTI.
- The Max TBS is restricted to 10296 bits (Max supported by UE category type 1).

For 5 MHz bandwidth and the DCI combination 1 with 20 PRBs or DCI combination 2, the TBS 8248, 8760, and 9528 are blocked as they result in coding rates higher than 0.93.

For 5 MHz bandwidth and special DCI combination 1 with 9 PRBs, the TBS 2216, 5992 and 6712 are blocked as they result in coding rates higher than 0.93.

For 10 and 20 MHz bandwidths none of TBSs are blocked as no TBS combination result in coding rates higher than 0.93.

The blocked TBS are considered to be not available for selection.

- Data pending for transmission in a given sub-frame consists of (listed in transmission priority order):
  - MAC Control Elements that the SS needs to send.
  - AMD STATUS PDU(s) that the SS needs to send.
  - Data not sent in previous subframe(s).
  - Fresh Data scheduled for transmission in this subframe for all logical channels.
- Distinct TBSs and all ($N_{PRB}$, $I_{TBS}$) combinations for each distinct TBS are listed in the sheet.
- If a TBS size can be achieved with more than one combination of $I_{MCS}$ ($I_{TBS}$) and $N_{PRB}$:
  - Select combination with lowest delta between $N_{PRB}$ and $I_{MCS}$.
  - If still more than one combination remain, select combination with highest $N_{PRB}$.
- Not more than one RLC Data PDU shall be placed in a MAC PDU per logical channel (i.e. minimize RLC segmentation).
- In a subframe, in case there is data pending for transmission from more than one logical channel, for each type of data pending for transmission as defined above, priority shall be given to the logical channel with the lowest logical channel priority value. In case of more than one logical channel with the same logical channel priority value, these logical channels should be served equally. Data pending for transmission from more than one logical channel will rarely happen for the signalling and protocol test.

- Data not transmitted within a subframe is scheduled as pending for transmission in the next available subframe according to the priorities given above. Pending data for transmission will rarely happen for the signalling and protocol test.

- TBS selected in a context by various platforms shall be within an allowed deterministic tolerance of:

  - 2 bytes for potential Timing Advance Command MAC Control Element (1 byte data + 1 byte MAC sub header).

  - 4 bytes each for AMD STATUS PDU (2 bytes data + 2 bytes MAC subheader).

  - Therefore in the worst case the SS may add up to (2 + 4 x $N_{AMRB}$ ) bytes to the data scheduled for transmission in a certain subframe, where $N_{AMRB}$ is the number of AM radio bearers (SRB or DRB) actively sending DL data in the test, in any subframe.

- For DCI combination 1 RIV is calculated based on physical resource blocks corresponding to $N_{PRB}$ of the selected TBS and ($N_{PRB}$, $I_{TBS}$) combination. The physical resource blocks that can be allocated are the first $N_{PRB}$ resources of index range

  5..24 for 5 MHz bandwidth,

  28..49 for 10 MHz bandwidth,

  9..30 for 20 MHz bandwidth.

- For DCI combination 2, RBG assignment is calculated based on physical resource blocks corresponding to $N_{PRB}$ of the selected TBS and ($N_{PRB}$, $I_{TBS}$) combination. The size of RBG is 2 for 5 MHz, 3 for 10 MHz and 4 for 20 MHz. The available physical resource blocks for allocation are:

  For 5 MHz bandwidth, RBG1(2,3), RBG2(4,5), RBG4(8,9), RBG5(10,11), RBG7(14,15), RBG8(16,17), RBG10(20,21), RBG11(22,23) and RBG12(24). If $N_{PRB}$ is even, the first $N_{PRB}$ /2 available RBGs are allocated. If $N_{PRB}$ is odd, then first ($N_{PRB}$ -1)/2 RBGs and RBG 12 are allocated.

  For 10 MHz bandwidth, RBG1(3,4,5), RBG2(6,7,8), RBG3(9,10,11), RBG5(15,16,17), RBG6(18,19,20), RBG10(30,31,32), RBG11(33,34,35), RBG12(36,37,38) and RBG16(48,49). If $N_{PRB}$ mod 3 is 0, the first $N_{PRB}$ /3 RBGs are allocated. If mod 3 is 2, then first ($N_{PRB}$ -2)/3 available RBGs and RBG 16 are allocated.

  For 20 MHz bandwidth, RBG1(4,5,6,7), RBG2(8,9,10,11), RBG3(12,13,14,15), RBG4(16,17,18,19), RBG5(20,21,22,23), RBG7(28,29,30,31), RBG8(32,33,34,35), RBG9(36,37,38,39), RBG10(40,41,42,43), RBG14(56,57,58,59), RBG15(60,61,62,63), RBG16(64,65,66,67), RBG17(68,69,70,71), RBG19(76.77.78.79) and RBG20(80,81,82,83). The first $N_{PRB}$ /4 RBGs are allocated.

## 7.3.3.5 DL Resource allocation bitmaps

### 7.3.3.5.1 DCI combination 1

**Table 7.3.3.5.1-1: Physical resource allocation bitmap for DCI combination 1 (5 MHz) with 20 PRBs**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | | | | | | | | | | | | | | | | |
| PCCH | | | | | | | | | | | | | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | | | | | | | | | | | | | |
| UE-Dedicated | | | | | | | | | | | | | | | | | | | | | | | | | |

**Table 7.3.3.5.1-2: Physical resource allocation bitmap for DCI combination 1 (5 MHz) with 9 PRBs**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | | | | | | | | | | | | | | | | |
| PCCH | | | | | | | | | | | | | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | | | | | | | | | | | | | |
| UE-Dedicated | | | | | | | | | | | | | | | | | | | | | | | | | |

**Table 7.3.3.5.1-3 (columns 0–34): Physical resource allocation bitmap for DCI combination 1 (10 MHz)**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9..22 | 23..27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | Not Used | Used for PBCH and other common signals | | | | | | | |
| PCCH | | | | | | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | | | | | | |
| UE-Specific | | | | | | | | | | | | | | | | | | |

**Table 7.3.3.5.1-3 (columns 35–49): Physical resource allocation bitmap for DCI combination 1 (10 MHz)**

| $N_{PRB}$ | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | | | | | | |
| PCCH | | | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | | | |
| UE-Specific | | | | | | | | | | | | | | | |

**Table 7.3.3.5.1-4 (columns 0–20): Physical resource allocation bitmap for DCI combination 1 (20 MHz)**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | | | | | | | | | | | | |
| PCCH | | | | | | | | | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | | | | | | | | | |
| UE-Specific | | | | | | | | | | | | | | | | | | | | | |

**Table 7.3.3.5.1-4 (columns 21–30): Physical resource allocation bitmap for DCI combination 1 (20 MHz)**

| $N_{PRB}$ | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31..46 | 47..52 | 53..99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH | | | | | | | | | | | Not Used | Used for PBCH and other common signals | Not Used |
| PCCH | | | | | | | | | | | | | |
| RAR | | | | | | | | | | | | | |
| UE-Specific | | | | | | | | | | | | | |

## 7.3.3.5.2 DCI combination 2

**Table 7.3.3.5.2-1: Physical resource allocation bitmap for DCI combination 2 (5 MHz)**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | 0 | | | | | | 1 | | | | | | 2 | | | | | | 3 | | | | | | |
| BCCH-Odd | 2 | | | | | | 3 | | | | | | 0 | | | | | | 1 | | | | | | |
| PCCH-Even | | 4 | | | | | | 5 | | | | | | | | | | | | | | | | | |
| PCCH-Odd | | | | | | | | | | | | | | 4 | | | | | | 5 | | | | | |
| RAR-Even | | | 8 | | | | | | 9 | | | | | 6 | | | | | | 7 | | | | | |
| RAR-Odd | | 6 | | | | | | 7 | | | | | | | 8 | | | | | | 9 | | | | |
| UE-Dedicated | | | | | | | | | | | | | | | | | | | | | | | | | |

**Table 7.3.3.5.2-2 (columns 0-20): Physical resource allocation bitmap for DCI combination 2 (10 MHz)**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | 0 | | | | | | | | | | | | 1 | | | | | | | | |
| BCCH-Odd | 2 | | | | | | | | | | | | 3 | | | | | | | | |
| PCCH-Even | | 4 | | | | | | | | | | | | 5 | | | | | | | |
| PCCH-Odd | | 6 | | | | | | | | | | | | 7 | | | | | | | |
| RAR-Even | | | 8 | | | | | | | | | | | | 9 | | | | | | |
| RAR-Odd | | | 10 | | | | | | | | | | | | 11 | | | | | | |
| UE-Specific | x | x | | | | | | | | | | | x | x | | | | | | | |
| RBGs | 0 | | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | 6 | | |

**Table 7.3.3.5.2-2 (columns 21-41): Physical resource allocation bitmap for DCI combination 2 (10 MHz)**

| $N_{PRB}$ | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | | | 2 | | | | | | | | | | | | 3 | | |
| BCCH-Odd | | | | | | | 0 | | | | | | | | | | | | 1 | | |
| PCCH-Even | | | | | | | | 6 | | | | | | | | | | | | 7 | |
| PCCH-Odd | | | | | | | | 4 | | | | | | | | | | | | 5 | |
| RAR-Even | | | | | | | | | 10 | | | | | | | | | | | | 11 |
| RAR-Odd | | | | | | | | | 8 | | | | | | | | | | | | 9 |
| UE-Specific | | x | x | x | x | x | x | x | | | | | | | | | | | x | x | |
| RBGs | 7 | | | 8 | | | 9 | | | 10 | | | 11 | | | 12 | | | 13 | | |

**Table 7.3.3.5.2-2 (columns 42-49): Physical resource allocation bitmap for DCI combination 2 (10 MHz)**

| $N_{PRB}$ | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | Not Used | | | |
| BCCH-Odd | | | | | | | | |
| PCCH-Even | | | | | | | | |
| PCCH-Odd | | | | | | | | |
| RAR-Even | | | | | | | | |
| RAR-Odd | | | | | | | | |
| UE-Specific | | | | | | | | |
| RBG's | 14 | | | 15 | | | 16 | |

**Table 7.3.3.5.2-3 (columns 0-19): Physical resource allocation bitmap for DCI combination 2 (20 MHz)**

| $N_{PRB}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | 0 | | | | | | | | | | | | | | | | | | | |
| BCCH-Odd | 2 | | | | | | | | | | | | | | | | | | | |
| PCCH-Even | | 4 | | | | | | | | | | | | | | | | | | |
| PCCH-Odd | | 6 | | | | | | | | | | | | | | | | | | |
| RAR-Even | | | 8 | | | | | | | | | | | | | | | | | |
| RAR-Odd | | | 10 | | | | | | | | | | | | | | | | | |
| UE-Specific | x | x | | | | | | | | | | | | | | | | | | |
| RBGs | 0 | | | | 1 | | | | 2 | | | | 3 | | | | 4 | | | |

**Table 7.3.3.5.2-3 (columns 20-39): Physical resource allocation bitmap for DCI combination 2 (20 MHz)**

| $N_{PRB}$ | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | 1 | | | | | | | | | | | | | | | |
| BCCH-Odd | | | | | 3 | | | | | | | | | | | | | | | |
| PCCH-Even | | | | | | 5 | | | | | | | | | | | | | | |
| PCCH-Odd | | | | | | 7 | | | | | | | | | | | | | | |
| RAR-Even | | | | | | | 9 | | | | | | | | | | | | | |
| RAR-Odd | | | | | | | 11 | | | | | | | | | | | | | |
| UE-Specific | | | | | x | x | | | | | | | | | | | | | | |
| RBGs | 5 | | | | 6 | | | | 7 | | | | 8 | | | | 9 | | | |

**Table 7.3.3.5.2-3 (columns 40-59): Physical resource allocation bitmap for DCI combination 2 (20 MHz)**

| $N_{PRB}$ | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | | | | | 2 | | | | | | | | | | | |
| BCCH-Odd | | | | | | | | | 0 | | | | | | | | | | | |
| PCCH-Even | | | | | | | | | | 6 | | | | | | | | | | |
| PCCH-Odd | | | | | | | | | | 4 | | | | | | | | | | |
| RAR-Even | | | | | | | | | | | 10 | | | | | | | | | |
| RAR-Odd | | | | | | | | | | | 8 | | | | | | | | | |
| UE-Specific | | | | | | | | | x | x | x | | | | | | | | | |
| RBG's | 10 | | | | 11 | | | | 12 | | | | 13 | | | | 14 | | | |

**Table 7.3.3.5.2-3 (columns 60-79): Physical resource allocation bitmap for DCI combination 2 (20 MHz)**

| $N_{PRB}$ | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | | | | | | | | | 3 | | | | | | | |
| BCCH-Odd | | | | | | | | | | | | | 1 | | | | | | | |
| PCCH-Even | | | | | | | | | | | | | | 7 | | | | | | |
| PCCH-Odd | | | | | | | | | | | | | | 5 | | | | | | |
| RAR-Even | | | | | | | | | | | | | | | 11 | | | | | |
| RAR-Odd | | | | | | | | | | | | | | | 9 | | | | | |
| UE-Specific | | | | | | | | | | | | | x | x | | | | | | |
| RBGs | 15 | | | | 16 | | | | 17 | | | | 18 | | | | 19 | | | |

**Table 7.3.3.5.2-3 (columns 80-99): Physical resource allocation bitmap for DCI combination 2 (20 MHz)**

| $N_{PRB}$ | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BCCH-Even | | | | | | | | | | | | | | | | | Not Used | | | |
| BCCH-Odd | | | | | | | | | | | | | | | | | | | | |
| PCCH-Even | | | | | | | | | | | | | | | | | | | | |
| PCCH-Odd | | | | | | | | | | | | | | | | | | | | |
| RAR-Even | | | | | | | | | | | | | | | | | | | | |
| RAR-Odd | | | | | | | | | | | | | | | | | | | | |
| UE-Specific | | | | | | | | | | | | | | | | | | | | |
| RBGs | 20 | | | | 21 | | | | 22 | | | | 23 | | | | 24 | | | |

NOTE: Odd and even refer to slots.

### 7.3.3.6 UE-dedicated scheduling scheme in explicit mode

This scheme applies to MIMO configurations or to non-MIMO configuration where the normal mode scheduling scheme is inappropriate.

SS is configured with an exact TBS (modulation and coding scheme, $I_{mcs}$, and number of resource blocks, $N_{prb}$) to use.

Other parameters, such as the HARQ process number and redundancy version to use for each transmission, are also configured by the TTCN.

All data scheduled for a certain subframe shall be transmitted in the single indicated subframe, using configured parameters. The TTCN shall ensure that the configured parameters are consistent, in particular that the scheduled data size and the configured TBS match each other.

It is **FFS** how the SS shall handle scheduled transmissions colliding with MAC Control Elements or AMD STATUS PDUs, scheduled independently by the SS.

#### 7.3.3.6.1 DL Scheduling in Transport Block Size Selection Test Cases

The MAC transport block size selection test cases defined in clause 7.1.7 of 36.523-1 [1], use bandwidths of 10/15/20MHz. For the preamble and post amble in these tests, the default scheduling rules defined in clauses 7.3.3.1 to 7.3.3.4 for 10/10/20 MHz and DCI combination 1A are applied respectively. During the test body, when the actual TB sizes with appropriate DCI and resource allocation formats needed are to be tested, the SS is configured in explicit mode for UE-dedicated scheduling.

### 7.3.3.7 Resource allocation sheets

Attached with this Technical Specification, the DL resource allocation tables can be found, providing physical resource allocations for various transport block sizes, developed as per rules specified in clause 7.3.3, in Microsoft Excel format. Each individual sheet in the workbook represents various scheduling schemes as per table 7.3.3.7-1.

**Table 7.3.3.7-1: DL resource allocation sheets**

| S. No | Sheet Name | Description |
|---|---|---|
| 1 | DCI-1A-PCCH | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by P-RNTI (5, 10 & 20 MHz) |
| 2 | DCI-1A-BCCH | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by SI-RNTI (5, 10 & 20 MHz) |
| 3 | DCI-1A-RAR | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by RA-RNTI (5, 10 & 20 MHz) |
| 4 | DCI-1A-UE-Specific | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (5 MHz) |
| 5 | DCI-1A-3-IntraFreq-UE-Specific | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI and three Intra Freq cells are configured (5 MHz) |
| 6 | DCI-1A-UE-Specific-10MHz | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (10 MHz) |
| 7 | DCI-1A-UE-Specific-20MHz | DL Resource scheduling for DCI format 1A and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (20 MHz) |
| 8 | DCI-1C-PCCH | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by P-RNTI (5 MHz) |
| 9 | DCI-1C-BCCH | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by SI-RNTI (5 MHz) |
| 10 | DCI-1C-RAR | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by RA-RNTI (5 MHz) |
| 11 | DCI-1-UE-Specific | DL Resource scheduling for DCI format 1, Resource allocation 0 and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (5 MHz) |
| 12 | DCI-1C-PCCH-10MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by P-RNTI (10 MHz) |
| 13 | DCI-1C-BCCH-10MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by SI-RNTI (10 MHz) |
| 14 | DCI-1C-RAR-10MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by RA-RNTI (10 MHz) |
| 15 | DCI-1-UE-Specific-10MHz-Gap1 | DL Resource scheduling for DCI format 1, Resource allocation 0 and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (10 MHz) |
| 16 | DCI-1C-PCCH-20MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by P-RNTI (20 MHz) |
| 17 | DCI-1C-BCCH-20MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by SI-RNTI (20 MHz) |
| 18 | DCI-1C-RAR-20MHz-Gap1 | DL Resource scheduling for DCI format 1C and PDCCH is scrambled by RA-RNTI (20 MHz) |
| 19 | DCI-1-UE-Specific-20MHz-Gap1 | DL Resource scheduling for DCI format 1, Resource allocation 0 and PDCCH is scrambled by C-RNTI/ SPS C-RNTI/ Temp C-RNTI (20 MHz) |
| 20 | MAC-TBS-DCI-1-RA0 | DL Resource scheduling for DCI format 1, Resource allocation 0 and PDCCH is scrambled by C-RNT |
| 21 | MAC-TBS-DCI-1-RA1 | DL Resource scheduling for DCI format 1, Resource allocation 1 and PDCCH is scrambled by C-RNTI |
| 22 | MAC-TBS-DCI1A | DL Resource scheduling for DCI format 1A, Resource allocation 2(localised & distributed) and PDCCH is scrambled by C-RNTI |

# 7.4 Cell Configurations

## 7.4.1 Cell Configuration Types

Three cell configurations are defined in 3GPP TS 36.508 [3] clause 6.3.3: Full Cell, Minimum Uplink Cell and Broadcast Only Cell; however the TTCN always considers all cells as Full Cells, and thus always provides the complete cell configuration parameters.

The SS may:

- always configure a cell as a 'Full Cell' based on the complete information; or

- configure the cell based on the 'CellConfig_Type' flag taking only the required configuration parameters and ignoring the others.

For a given value of the 'CellConfig_Type' flag, the TTCN shall:

- For Full Cell Configuration:
  - expect normal SS behaviour.
- For Minimum Uplink Cell Configuration:
  - Configure the SS to report Preamble detection.
  - Assign verdicts based on the PRACH Preamble Indications.
  - Consume any uplink SRB0 messages (if the SS is configured as a Full Cell).
- For Broadcast Only Cell Configuration:
  - Not configure the SS to report Preamble detection.
  - Consume any uplink SRB0 messages (if the SS is configured as a Full Cell).

## 7.4.2 Cell Power Change

To set and adjust the cell power at the two test ports, Reference Power and Attenuation, are provided in the record Reference Power.

The field Reference Power is only set when the cell is created and is not updated during the test case execution. The SS applies the Reference Power when the cell is fully configured.

To adjust the power level in the test case, the field Attenuation is used. After intitial configuration of a cell the attenuation corresponds to the value "off". Power attenuation of one or several cells can be configured at the same time according to the time instances for power level changes specified in TS 36.523-1 [1]. Power level changes shall be done within a maximum of 100 ms (10 frames).

When adjusting the power level in the test case, separate templates will be used in order to improve code readability.

The SS shall ensure the power level at the test ports conform to the required downlink signal levels specified in clause 6.2.2.1 of TS 36.508 [3].

## 7.4.3 E-UTRAN cell identity

### 7.4.3.1 Timing parameters of cells

For RRC and Idle mode test, the timing parameters in table 7.4.3.1-1 is applied. The specification of Cell 1 - Cell 23 can be found in TS 36.508 [3].

**Table 7.4.3.1-1: Timing parameters of simulated cells**

| cell ID | SFN offset | FDD Tcell (*Ts*) | TDD Tcell (*Ts*) |
|---|---|---|---|
| Cell 1 | 0 | 0 | 0 |
| Cell 2 | 124 | 30720 | 155792 |
| Cell 3 | 257 | 150897 | 0 |
| Cell 4 | 1000 | 61440 | 157984 |
| Cell 6 | 657 | 524 | 0 |
| Cell 10 | 129 | 43658 | 0 |
| Cell 11 | 957 | 92160 | 155792 |
| Cell 12 | 1015 | 181617 | 155792 |
| Cell 13 | 890 | 31244 | 155792 |
| Cell 14 | 680 | 300501 | 0 |
| Cell 23 | 383 | 212337 | 155792 |

Table 7.4.3.1-2 is applied to the NAS test when more than one PLMN exists in a test case. Further cell parameters can be found in table 7.4.4-1.

**Table 7.4.3.1-2: Timing parameters of simulated cells for NAS TCs in different PLMNs**

| cell ID | SFN offset | FDD Tcell (*Ts*) | TDD Tcell (*Ts*) |
|---|---|---|---|
| Cell A | 0 | 0 | 0 |
| Cell B | 124 | 30720 | 155792 |
| Cell C | 257 | 61400 | 157984 |
| Cell D | 1000 | 92160 | 155792 |
| Cell E | 752 | 32047 | 0 |
| Cell F | NA | NA | NA |
| Cell G | 957 | 631 | 0 |
| Cell H | 1015 | 31351 | 155792 |
| Cell I | 890 | 127200 | 0 |
| Cell J | 680 | 1327 | 0 |
| Cell K | 383 | 157920 | 155792 |
| Cell L | 562 | 188640 | 157984 |
| Cell M | 471 | 122880 | 157984 |

Figure 7.4.3.1-1 illustrates shifting DL transmission timing offset by Tcell = 1 subframe, between multiple NAS FDD cells on the same frequency (table 7.4.3.1-2) in the same PLMN.

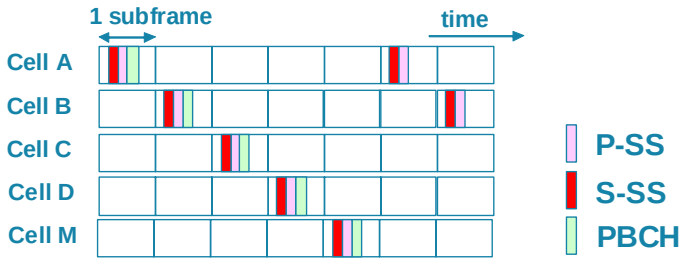


**Figure 7.4.3.1-1: Timing offset between FDD cells on the same frequency**

Figure 7.4.3.1-2 illustrates shifting DL transmission timing offset for three TDD cells operated on the same frequency (table 7.4.3.1-1) in the same PLMN.

Timing shift between Cell 0 and Cell 1: Tcell = 5 subframes + 2192 Ts

Timing shift between Cell 0 and Cell 2: Tcell = 5 subframes + 4384 Ts

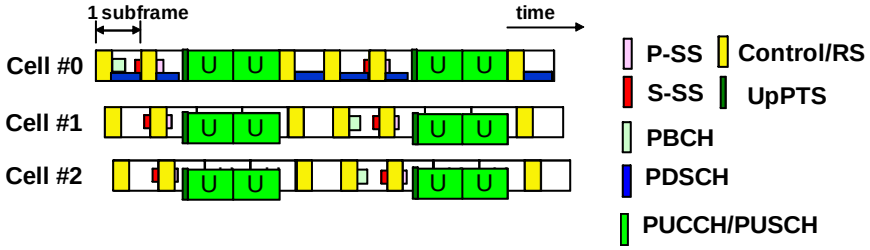


**Figure 7.4.3.1-2: Timing offset between TDD cells on the same frequency**

Table 7.4.3.1-3 is applied to the NAS test when all NAS cells in a test case belong to the same PLMN. Further cell parameters can be found in table 7.4.4-2.

**Table 7.4.3.1-3: Timing parameters of simulated cells for NAS TCs in same PLMN**

| cell ID | SFN offset | FDD Tcell (*Ts*) | TDD Tcell (*Ts*) |
|---|---|---|---|
| Cell A | 0 | 0 | 0 |
| Cell B | 124 | 30720 | 155792 |
| Cell C | 257 | 150897 | 0 |
| Cell D | 1000 | 61440 | 157984 |
| Cell E | NA | NA | NA |
| Cell F | NA | NA | NA |
| Cell G | NA | NA | NA |
| Cell H | NA | NA | NA |
| Cell I | NA | NA | NA |
| Cell J | NA | NA | NA |
| Cell K | NA | NA | NA |
| Cell L | NA | NA | NA |
| Cell M | 471 | 31244 | 155792 |

Shifting radio frame transmission timing can eliminate the following interference between intra frequency cells:

- P-SS/S-SS to P-SS/S-SS, RS, PBCH, PCFICH, PDCCH and PHICH.
- PBCH to PBCH.
- PBCH to PCFICH, PDCCH and PHICH.
- PDSCH to PCFICH, PDCCH, PHICH.

As TDD UL and DL are on same frequency, to avoid interference between DL and UL, the Random Access Response Timing Advance (RAR TA) is related to the Tcell:

```
RAR TA = [Tcell -[30720 * 5]] / 16      where 30720 * 5 is time period of a 5 sub frames in Ts
For example for cell 2, RAR TA=[155792-153600]/16=137
```

NOTE: TDD default combination periodicity is 5 sub frames; sub frame 6 in cell 1 can correspond to SF 6+5 mod 10= SF 1 in cell 2.

For FDD, the Random Access Response Timing Advance is set to 0.

## 7.4.4 Cell configurations for NAS test cases

The default cell identifiers for NAS cells are defined in 36.508[3] clause 6.3.2.2.

The allocation of Physical layer cell identifiers to the individual cells is according to (*PCI mode 6*) being differential for the cells working on the same radio frequency. The way of PCI allocation can reduce the interference between the intra-frequency cells for reference signal to reference signal, PCFICH to PCFICH and PHICH to PHICH. The definition of Cell A - Cell M can be found in TS 36.508 [3].

## 7.4.5 Configuration of Multi-Cell Environment

When there is more than one EUTRA cell in a test case the following rules are applied in TTCN:

- At the beginning of the preamble, before initial attachment of the UE, all EUTRA cells are configured but switched off.
- In the preamble only the serving cell is switched on; all other cells remain switched off.
- At the end of the preamble the cells are configured according to the initial power level settings (T0) of the test case.

The mapping of cells to physical resources and management of the physical resources are out of TTCN scope. The following principles can be applied to the system simulator:

- Cells being switched off need not to be mapped to physical resources.

- When a cell is switched off mapping to a physical resource may be kept and reused when the cell is switched on again.
- When a cell is switched on it can either already been mapped to a physical resource or it needs to be mapped to a free resource.
- When there are less physical resources than cells it is up to SS implementation to find strategies to dynamically map the cells to the resources.

Independent from the strategies being used the system simulator shall obey timing restrictions for changing power-levels of one or several cells as stated in clause 7.4.2.

# 7.5 TDD Considerations

LTE options of FDD and TDD will be contained in the same common FDD and TDD test cases, similar to the prose in TS 36.523-1 [1].

The TDD Uplink-downlink configuration 1 in 3GPP TS 36.211 [35], Table 4.2-2 is applied.

## 7.5.1 FDD vs. TDD implementation

FDD/TDD differences are introduced in the common FDD and TDD test cases using branches at a low level in the test case. The branches are used either:

- to assign a variable;
- to implement a different behaviour;
- to change an FDD or TDD parameter in a template sent to the UE or SS.

The mode under test (FDD or TDD) is based on the value of the bands under test.

# 7.6 Special RLC Modes

## 7.6.1 Suppression of RLC Acknowledgements

Two different modes, both applicable per radio bearer, are defined as:

- General suppression:
  - If this mode is activated, no RLC acknowledgements will be generated by the SS. This mode can be switched on and will persist until it is switched off. Afterwards the SS will continue handling the RLC acknowledgements as normal.
- One time suppression
  - If this mode is activated, no RLC acknowledgement will be generated by SS for the next RLC message data PDU received. Once this has been done, the SS continues handling RLC acknowledgements as normal.

In case of a handover the modes continue to be active.

## 7.6.2 Modification of VT(S)

This mode allows to manipulate the RLC state variable VT(S) so that the SS can generate an RLC sequence number as needed during a test. The input to the special test mode is an integer (0..1023) as value of ModifyVTS, The SS shall set variable VT(S) as follows:

VT(S) := ModifyVTS.

The purpose of this special test mode is to force an incorrect RLC sequence number to be used by the SS. Once VT(S) has been modified in the RLC entity at the SS side, this RLC entity will be inconsistent. One possibility to bring the

RLC entity back to normal is to re-establish the RLC peer connection. This is done in the only use case of this special RLC test mode by performing an RRC Connection reconfiguration immediately after the test mode has been applied.

Users of this test mode should ensure that the RLC AM PDU carrying the incorrect sequence number will reach the peer RLC entity. It is therefore recommended to activate the RRC Connection reconfiguration only after some delay. This delay shall be short enough to ensure that the UE will not yet request the retransmission of the RLC PDU corresponding to the skipped sequence numbers.

# 7.7 System information

## 7.7.1 System information broadcasting

The rules for the transmission of BCCH messages are specified in 3GPP TS 36.331 [19], clause 5.2. The current clause provides the implementation guidelines.

The ASPs SYSTEM_CTRL_REQ and SYSTEM_CTRL_CNF are used as interface to SS; the following rules apply:

- The complete system information are provided to SS by using a single ASP.
- SS starts scheduling all system information from the same SFN.
- The scheduling information sent to SS is the same as the scheduling information sent to the UE. For each SI message, the subframeOffset in SYSTEM_CTRL_REQ indicates the exact point in time in the SI window at which SS shall start the transmission of the related SI.
- SS shall set the systemFrameNumber in the MIB to the 8 most significant bits of the SFN. A dummy value is provided by TTCN.
- The system information is sent to SS using the asn.1 types, SS shall encode in unaligned PER and add the necessary padding bits as specified in TS 36.331 [19] clause 9.1.1.1.

## 7.7.2 Scheduling information

The maximum number of resource blocks as defined in table 7.7.2-1 are used to broadcast the system information.

**Table 7.7.2-1: Maximum number of resource blocks**

| | Maximum number of resource blocks assigned |
|---|---|
| SIB1 | 4 |
| for all SIs | 4 |

The subframe offset values used for SI messages are according to table 7.7.2-2.

**Table 7.7.2-2: SubframeOffset values**

| Scheduling Information No. Acc to TS 36.508 [3], clause 4.4.3.1.2 | subframeOffset (FDD) | subframeOffset (TDD) |
|---|---|---|
| SI1 | 1 | 4 |
| SI2 | 1 | 4 |
| SI3 | 3 | 9 |
| SI4 | 7 | 9 |

All System Information messages are sent only once within the SI-window.

Table 7.7.2-3 (FDD) and 7.7.2-4(TDD) give the SFN's and subframe numbers in which the MIB, SI1, SI2, SI3 & SI4 are actually scheduled as per default parameters for si-WindowLength(20sf), periodicity for SI1(16), SI2(32), SI3(64) and SI4(64) for bandwidths 5/10/15/20 MHz defined in 36.508 [3]:

**Table 7.7.2-3: System Information Scheduling (FDD)**

| SFN\SUBFrame | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | MIB | SI1 | | | | SIB1 | | | | |
| 1 | MIB | | | | | | | | | |
| 2 | MIB | SI2 | | | | SIB1 | | | | |
| 3 | MIB | | | | | | | | | |
| 4 | MIB | | | SI3 | | SIB1 | | | | |
| 5 | MIB | | | | | | | | | |
| 6 | MIB | | | | | SIB1 | | SI4 | | |
| 7 | MIB | | | | | | | | | |
| 8 | MIB | | | | | SIB1 | | | | |
| 9 | MIB | | | | | | | | | |
| 10 | MIB | | | | | SIB1 | | | | |
| 11 | MIB | | | | | | | | | |
| 12 | MIB | | | | | SIB1 | | | | |
| 13 | MIB | | | | | | | | | |
| 14 | MIB | | | | | SIB1 | | | | |
| 15 | MIB | | | | | | | | | |
| 16 | MIB | SI1 | | | | SIB1 | | | | |
| 17 | MIB | | | | | | | | | |
| 18 | MIB | | | | | SIB1 | | | | |
| 19 | MIB | | | | | | | | | |
| 20 | MIB | | | | | SIB1 | | | | |
| 21 | MIB | | | | | | | | | |
| 22 | MIB | | | | | SIB1 | | | | |
| 23 | MIB | | | | | | | | | |
| 24 | MIB | | | | | SIB1 | | | | |
| 25 | MIB | | | | | | | | | |
| 26 | MIB | | | | | SIB1 | | | | |
| 27 | MIB | | | | | | | | | |
| 28 | MIB | | | | | SIB1 | | | | |
| 29 | MIB | | | | | | | | | |
| 30 | MIB | | | | | SIB1 | | | | |
| 31 | MIB | | | | | | | | | |
| 32 | MIB | SI1 | | | | SIB1 | | | | |
| 33 | MIB | | | | | | | | | |
| 34 | MIB | SI2 | | | | SIB1 | | | | |
| 35 | MIB | | | | | | | | | |
| 36 | MIB | | | | | SIB1 | | | | |
| 37 | MIB | | | | | | | | | |
| 38 | MIB | | | | | SIB1 | | | | |
| 39 | MIB | | | | | | | | | |
| 40 | MIB | | | | | SIB1 | | | | |
| 41 | MIB | | | | | | | | | |
| 42 | MIB | | | | | SIB1 | | | | |
| 43 | MIB | | | | | | | | | |
| 44 | MIB | | | | | SIB1 | | | | |
| 45 | MIB | | | | | | | | | |
| 46 | MIB | | | | | SIB1 | | | | |
| 47 | MIB | | | | | | | | | |
| 48 | MIB | SI1 | | | | SIB1 | | | | |
| 49 | MIB | | | | | | | | | |
| 50 | MIB | | | | | SIB1 | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 51 | MIB | | | | | | | | | |
| 52 | MIB | | | | | SIB1 | | | | |
| 53 | MIB | | | | | | | | | |
| 54 | MIB | | | | | SIB1 | | | | |
| 55 | MIB | | | | | | | | | |
| 56 | MIB | | | | | SIB1 | | | | |
| 57 | MIB | | | | | | | | | |
| 58 | MIB | | | | | SIB1 | | | | |
| 59 | MIB | | | | | | | | | |
| 60 | MIB | | | | | SIB1 | | | | |
| 61 | MIB | | | | | | | | | |
| 62 | MIB | | | | | SIB1 | | | | |
| 63 | MIB | | | | | | | | | |
| 64 | MIB | SI1 | | | | SIB1 | | | | |
| 65 | MIB | | | | | | | | | |
| 66 | MIB | SI2 | | | | SIB1 | | | | |
| 67 | MIB | | | | | | | | | |
| 68 | MIB | | | SI3 | | SIB1 | | | | |
| 69 | MIB | | | | | | | | | |
| 70 | MIB | | | | | SIB1 | | SI4 | | |
| 71 | MIB | | | | | | | | | |
| 72 | MIB | | | | | SIB1 | | | | |

**Table 7.7.2-4: System Information Scheduling (TDD)**

| SFN\SUBFrame | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | MIB | | | | SI1 | SIB1 | | | | |
| 1 | MIB | | | | | | | | | |
| 2 | MIB | | | | SI2 | SIB1 | | | | |
| 3 | MIB | | | | | | | | | |
| 4 | MIB | | | | | SIB1 | | | | SI3 |
| 5 | MIB | | | | | | | | | |
| 6 | MIB | | | | | SIB1 | | | | |
| 7 | MIB | | | | | | | | | SI4 |
| 8 | MIB | | | | | SIB1 | | | | |
| 9 | MIB | | | | | | | | | |
| 10 | MIB | | | | | SIB1 | | | | |
| 11 | MIB | | | | | | | | | |
| 12 | MIB | | | | | SIB1 | | | | |
| 13 | MIB | | | | | | | | | |
| 14 | MIB | | | | | SIB1 | | | | |
| 15 | MIB | | | | | | | | | |
| 16 | MIB | | | | SI1 | SIB1 | | | | |
| 17 | MIB | | | | | | | | | |
| 18 | MIB | | | | | SIB1 | | | | |
| 19 | MIB | | | | | | | | | |
| 20 | MIB | | | | | SIB1 | | | | |
| 21 | MIB | | | | | | | | | |
| 22 | MIB | | | | | SIB1 | | | | |
| 23 | MIB | | | | | | | | | |
| 24 | MIB | | | | | SIB1 | | | | |
| 25 | MIB | | | | | | | | | |
| 26 | MIB | | | | | SIB1 | | | | |
| 27 | MIB | | | | | | | | | |
| 28 | MIB | | | | | SIB1 | | | | |
| 29 | MIB | | | | | | | | | |
| 30 | MIB | | | | | SIB1 | | | | |
| 31 | MIB | | | | | | | | | |
| 32 | MIB | | | | SI1 | SIB1 | | | | |
| 33 | MIB | | | | | | | | | |
| 34 | MIB | | | | SI2 | SIB1 | | | | |
| 35 | MIB | | | | | | | | | |
| 36 | MIB | | | | | SIB1 | | | | |
| 37 | MIB | | | | | | | | | |
| 38 | MIB | | | | | SIB1 | | | | |
| 39 | MIB | | | | | | | | | |
| 40 | MIB | | | | | SIB1 | | | | |
| 41 | MIB | | | | | | | | | |
| 42 | MIB | | | | | SIB1 | | | | |
| 43 | MIB | | | | | | | | | |
| 44 | MIB | | | | | SIB1 | | | | |
| 45 | MIB | | | | | | | | | |
| 46 | MIB | | | | | SIB1 | | | | |
| 47 | MIB | | | | | | | | | |
| 48 | MIB | | | | SI1 | SIB1 | | | | |
| 49 | MIB | | | | | | | | | |
| 50 | MIB | | | | | SIB1 | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 51 | MIB | | | | | | | | | |
| 52 | MIB | | | | | SIB1 | | | | |
| 53 | MIB | | | | | | | | | |
| 54 | MIB | | | | | SIB1 | | | | |
| 55 | MIB | | | | | | | | | |
| 56 | MIB | | | | | SIB1 | | | | |
| 57 | MIB | | | | | | | | | |
| 58 | MIB | | | | | SIB1 | | | | |
| 59 | MIB | | | | | | | | | |
| 60 | MIB | | | | | SIB1 | | | | |
| 61 | MIB | | | | | | | | | |
| 62 | MIB | | | | | SIB1 | | | | |
| 63 | MIB | | | | | | | | | |
| 64 | MIB | | | | SI1 | SIB1 | | | | |
| 65 | MIB | | | | | | | | | |
| 66 | MIB | | | | SI2 | SIB1 | | | | |
| 67 | MIB | | | | | | | | | |
| 68 | MIB | | | | | SIB1 | | | | SI3 |
| 69 | MIB | | | | | | | | | |
| 70 | MIB | | | | | SIB1 | | | | |
| 71 | MIB | | | | | | | | | SI4 |
| 72 | MIB | | | | | SIB1 | | | | |

### 7.7.3 System information modification

For system information modification, the same rules as defined in clause 7.7.1 are applied.

The SFN for the start of modification period is calculated by TTCN. The modified system information and the calculated SFN are provided in the ASP SYSTEM_CTRL_REQ.

## 7.8 Timers and Timing Restrictions

A timer is set at the beginning of each test case to guard against system failure. Behaviour on expiry of this guard timer shall be consistent for all test cases.

A watchdog timer can be specified for receive statements in order to reduce blocking time when a test case has already failed. Watchdog timers are a kind of TTCN auxiliary timer. When a watchdog timer is used to control a receive event, its expiry does not need to be handled explicitly in the test case, but will lead to a fail or inconclusive verdict due to handling in the default behaviour

In idle mode operations, an idle mode generic timer is specified for receive statements if the test case specification does not explicitly specify a wait time for the specific test step or test purpose. The expiry of this idle mode generic timer is at least 6 minutes to safely cover most test scenarios.

The watchdog timer and the idle mode generic timer are only to be used inside the test case test body; if the timer expires a fail verdict is applied.

It is the TTCN responsibility to ensure that appropriate timer values are being used.

Tolerances (as described in TS 36.508 [3]) are not applicable to guard timers, idle mode generic timers and watchdog timers.

In general timers of less than 500ms shall not be implemented by TTCN timers but controlled by usage of the timing information provided by the SS (This is based on an estimate of the system delay). To achieve this, there will be cases when a DL message is scheduled at a specific point in time. This shall be done by adding at least 100ms to the current time.

If Timing is 'now' the SS shall schedule the data transmission or the (re)configuration in the next available sub-frame, but will ensure that this period is less than 80ms.

### 7.8.1 Auxiliary timers

For practical reasons, the TTCN can include timers that are not specified as part of the expected sequence. These timers are documented below.

RLC and PDCP watchdog timer,

## 7.9 Error Indication

There are several situations on lower layer in which SS shall raise an error rather than trying to resolve the problem. This is done by sending a SystemIndication.Error to the test case. SS shall raise an error in the following cases:

- Paging, System information exceeds max. number of resource blocks.
- Configuration: max. number of resource blocks specified for a channel exceeds system bandwidth.
- When in User-Plane a DL PDCP PDU or SDU not fitting into one TTI is sent with Harq Process being explicitly specified
- SS gets invalid TimingInfo for TDD from the test case
- SS detects contradiction of periodic UL grants and TDD configuration
- Data scheduled for the same TTI does not fit into an available transport block

Further error conditions are specified in annex D.

## 7.10 Race Conditions

When 2 uplink messages are sent from the UE within a very small amount of time, they may be received in either order in the TTCN if they are received on different ports. This may cause a race condition which is due to the snapshot mechanism in TTCN. In these cases, the TTCN will accept the messages in either order and then compare the timestamps of both messages to ensure they were sent in the correct order.

## 7.11 Radio Link Failure

A radio link failure shall be triggered by switching the downlink power level of the source cell to the value for non-suitable "Off" for the time period of least T310 + time it takes to receive N310 consecutive out-of-sync indications from lower layers (non-suitable "Off" is defined in 36.508 [3], whereas T310 and N310 are defined in 36,331 [19]).

If the RRC re-establishment procedure is used in a radio link failure context, it shall be realised by using two cells.

## 7.12 Test method for RRC signalling latency

Test cases testing RRC signalling latency will need special test method. The PUCCH synchronisation state of UE influences the test method. Following 2 different ways in which the UE's completeness of procedure can be probed are considered:

1. UE is still PUCCH synchronized and can respond to uplink grants
2. UE needs a RACH procedure and hence RACH procedural delays add upon the actual procedure delay.

### 7.12.1 Procedure delays in PUCCH synchronized state

Figure 7.12.1-1 demonstrates the latency check procedure that will be applied when UE is in PUCCH synchronized state and can respond to uplink grants.

SS is configured to report ACK/NACK received from UE, to TTCN.

By default SS is configured to retransmit any DL MAC PDU max 4 times (1 transmission and 4 retransmissions).

Round trip time (RTT) is considered as (Note)

8 subframes for FDD,

10 or 11 subframes for TDD.

Let N be the max allowed delay for procedure.

TTCN schedules at time T1 a DL message to the UE. This is achieved using Time stamps in sending ASPs.

TTCN is configured to send UL grants continuously every UL subframe from T1+N-1,

for 4 RTT (32) subframes for FDD,

4maxRTT (44) subframes for [TDD], where maxRTT=11.

The time difference between the received ACK and the reception of UL PDU will be checked against N. the test is passed when (Y-X) <= N + Δ, where Δ is considered as possible UL subframe uncertainty.

Δ = 0 for FDD,

Δ = 3TTI for TDD.

NOTE: RTT here is meant, on reception of a NACK, SS shall schedule the retransmission at 4th FDD TTI for FDD or 6$^{th}$ TTI for TDD since reception of NACK.

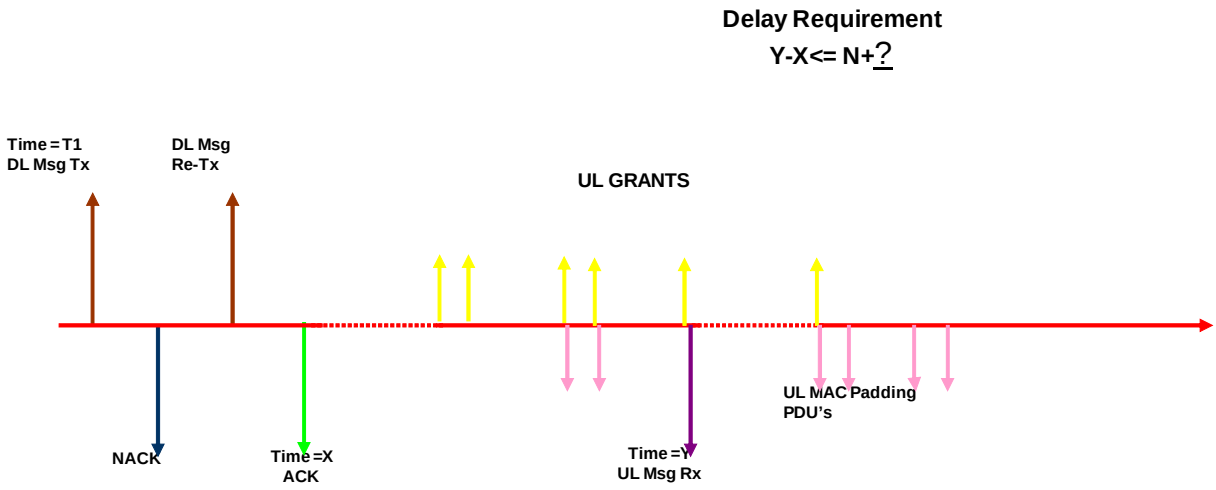


**Figure 7.12.1-1: Delays in PUCCH synchronized state**

**Table 7.12.1-1: TDD configuration 1**

| Subframe | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Configuration 1 | D | S | U | U | D | D | S | U | U | D |
| Delay from DL to Ack/Nack [TTIs] | | | 6,7 | 4 | | | | 6,7 | 4 | |
| Delay from NCK to re tx [TTIs] | | | 4 | 6 | | | | 4 | 6 | |
| RTT | 11 | 10 | | | 10 | 11 | 10 | | | 10 |

## 7.12.2 Procedure delays when RACH procedure required

Figure 7.12.2-1 demonstrates the latency check procedure that will be applied when UE is not PUCCH synchronized state needs RACH procedure.

PRACH configuration index is set as 14 for FDD, 12 for TDD which allows UE to send Preamble in any frame at any subframe.

SS is configured to report ACK/NACK, PRACH preambles received from UE.

By default SS is configured to retransmit any DL MAC PDU max 4 times [ 1 Transmission and 4 Retransmission].

Let N be the max allowed delay for procedure.

TTCN schedules at time T1, DL message to the UE. This is achieved using Time stamps in send ASP's.

The time difference between the ACK and the reception of PRACH preamble will be checked against N plus any Interruption time (TS 36.133 [37]) and verdict is assigned, when (Y-X) <= N + Tinterrupt + Δ

Δ = 0 for FDD,

Δ = 3TTI for TDD, where 3TTI is UL subframe uncertainty.

If cell change occurs, cell timing differences, Frame number offsets need to be included for procedural delay evaluations.

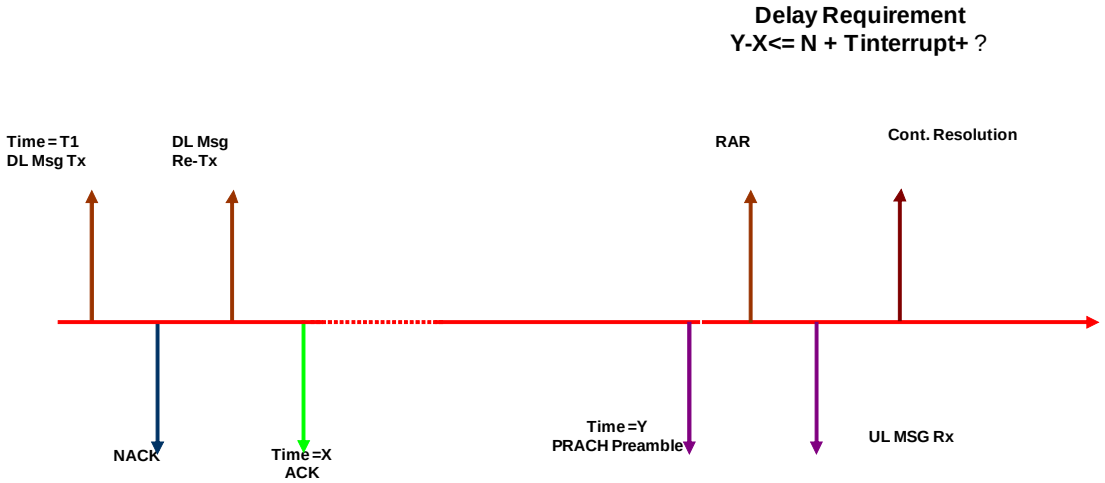


**Figure 7.12.2-1: Delays when RACH procedure needed**

# 7.13 RLC test method for scheduled data

The test loop mode is applied to the RLC tests. The allowed SS delay for sending data (< 80 ms) is comparable to the default values of the RLC timers. In order to ensure a unique TTCN implementation of the RLC test cases and the deterministic test result, independent from the SS platforms and UEs, scheduled data method can be applied to the test.

The scheduled data method is suitable to the RLC test if

Receiving multiple UL RLC SDUs is expected in the test; the UE may send a STATUS PDU in addition,

Time measurement is required for the looped back RLC SDUs,

DL RLC PDUs are sent on consecutive TTIs; the subframe numbers to be applied are relevant in TDD.

The table 7.13-1 illustrates the data scheduling in the RLC test.

**Table 7.13-1: Scheduled RLC test events**

| **Scheduled timing** | | **t0 (Note 1)** | **t1 (Note 1)** | **t2** |
|---|---|---|---|---|
| **Test event descriptions** | Multiple SDUs | Obtain the reference time | Send DL data | Provide UL grant (Note 2) |
| | Time measurement | | Send DL data | Receive UL data |
| | DL data in TDD | | Send 1st DL data | Send subsequent data (Note 3) |
| Note 1: (t1-t0) ≥ 100 ms which is greater than the allowed SS max. delay time, 80ms.<br>Note 2: (t2-t1) = 60 ms, this duration will allow the UE transmitting max. 3 scheduling requests (every 20 ms once) after the UL data to be looped back being available at the UE without going onto PRACH.<br>Note 3: The applied TDD subframe numbers 4, 5, 9, 10, 14, 15, 19, 20, 24, 25, ... | | | | |

If the test case prose does not indicate timely restrictions for the scheduling, sequential sending events are scheduled in consecutive TTIs.

NOTE 1: For TDD configuration 1, the subframes 0, 4, 5 and 9 are considered as consecutive.

NOTE 2: Scheduling may imply to execute the test steps in the TTCN in an order different from the order given in the test case prose. However, the sequence of the events over the air follows the prose description.

# 7.14 IP packets for Loopback Mode

## 7.14.1 IP packets used for Loopback Mode A

It is irelevant which kind of data is used in loopback mode A. Some PDCP test cases however specify to use IP packets. In these cases, an ICMPv4 ECHO REPLY shall be used with a valid IP header checksum and valid ICMP checksum.

## 7.14.2 IP packets used for Loopback Mode B

According to TS 36.509 [4], the UE performs loopback mode B above the UL TFT entity. Therefore IP packets need to match the packet filters signalled to the UE according to TS 36.508 clause 6.6.2 [3]:

When the UE gets configured via NAS signalling with packet filter #1 and #2 according to TS 36.508 clause 6.6.2 the IP packets shall fulfil the following requirements:

Protocol:
UDP referred to packet filter #1 and #2

IP addresses:
Referred to TS 36.508 Table 6.6.2-3 Note 1 source and destination IP address are the same.

Ports:
packet filter #1 specifies DL filter ⇒ IP packet's source port shall match remote port of packet filter #1
packet filter #2 specifies UL filter ⇒ IP packet's destination port shall match remote port of packet filter #2

To summarize, on dedicated bearers for loopback mode B, UDP packets used shall match the packet filters configured at the UE side. The UDP packets, having no specific content, shall have the correct header checksum and UDP

checksum. On the default bearer, any other packets can be used, as an example, ICMPv4 ECHO REPLY similar as for loopback mode A.

# 8 External Function Definitions

The following external functions are required to be implemented by the SS:

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_KeyDerivationFunction** | |
| **Description** | Hashing function for Hashing algorithms as defined in TS 33.401 [24]<br>SHA-256 encoding algorithm is used as KEY Description Function | |
| **Parameters** | KDF | KDF_HMAC_SHA_256 (no other KDF defined yet) |
| | Key | 256 bit key |
| | String | string being constructed acc. to TS 33.401 [24], annex A |
| **Return Value** | 256 bit derived key | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_NasIntegrityAlgorithm** | |
| **Description** | Apply integrity protection algorithm on a given octetstring | |
| **Parameters** | NAS PDU | octetstring according to TS 24.301 [21], clause 4.4.3.3 this shall include octet 6 to n of the security protected NAS message, i.e. the sequence number IE and the NAS message IE |
| | Integrity Algorithm | 3 bits as defined in TS 24.301 [21], clause 9.9.3.23 |
| | $KNAS_{int}$ | Integrity key |
| | NAS COUNT | as documented in TS 24.301 |
| | BEARER Id | fix value ('00000'B) acc. TS 33.401 [24], clause 8.1 |
| | Direction | UL: 0<br>DL: 1<br>(acc. to TS 33.401 [24], Annex B.1) |
| **Return Value** | Message Authentication Code (4 octets) | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_NasCiphering** | |
| **Description** | Apply ciphering on a given octetstring | |
| **Parameters** | NAS PDU | octetstring |
| | Ciphering Algorithm | 3 bits as defined in TS 24.301 [21], clause 9.9.3.23 |
| | $KNAS_{enc}$ | Ciphering Key |
| | NAS COUNT | as documented in TS 24.301 |
| | BEARER Id | fixed value ('00000'B) acc. TS 33.401 [24], clause 8.1 |
| **Return Value** | ciphered octet string | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_NasDeciphering** | |
| **Description** | Apply deciphering on a given octetstring | |
| **Parameters** | ciphered NAS PDU | octetstring |
| | Ciphering Algorithm | 3 bits as defined in TS 24.301 [21], clause 9.9.3.23 |
| | $KNAS_{enc}$ | Ciphering Key |
| | NAS COUNT | as documented in TS 24.301 [21] |
| | BEARER Id | fixed value ('00000'B) acc. TS 33.401 [24], clause 8.1 |
| **Return Value** | deciphered octet string | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_GetCurrentTestcaseName** | |
| **Description** | external function giving back the name of the test case currently running | |
| **Parameters** | None | |
| **Return Value** | char string | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_AsIntegrityAlgorithm** | |
| **Description** | Apply integrity protection algorithm on a given octetstring | |
| **Parameters** | PDCP PDU | octetstring |
| | Integrity Algorithm | 3 bits as defined in TS 33.401 [24] |
| | $KRRC_{int}$ | Integrity key |
| | PDCP COUNT | octetstring, length 4 |
| | BEARER Id | the value of the DRB identity minus one |
| | Direction | UL: 0<br>DL: 1<br>(acc. to TS 33.401 [24], Annex B.2) |
| **Return Value** | Message Authentication Code (4 octets) | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_AsCiphering** | |
| **Description** | Apply ciphering on a given octetstring | |
| **Parameters** | SDU | octetstring |
| | Ciphering Algorithm | 3 bits as defined in TS 33.401 [24] |
| | $KRRC_{enc}$ | Ciphering Key |
| | PDCP COUNT | octetstring, length 4 |
| | BEARER Id | the value of the DRB identity minus one |
| **Return Value** | ciphered octet string | |

| TTCN-3 External Function | | |
|---|---|---|
| **Name** | **fx_AsDeciphering** | |
| **Description** | Apply deciphering on a given octetstring | |
| **Parameters** | ciphered SDU | octetstring |
| | Ciphering Algorithm | 3 bits as defined in TS 33.401 [24] |
| | $KRRC_{enc}$ | Ciphering Key |
| | PDCP COUNT | octetstring, length 4 |
| | BEARER Id | the value of the DRB identity minus one |
| **Return Value** | deciphered octet string | |

# 9 IXIT Proforma

This partial IXIT proforma contained in the present document is provided for completion, when the related Abstract Test Suite is to be used against the Implementation Under Test (IUT).

Text in *italics* is a comment for guidance for the production of an IXIT, and is not to be included in the actual IXIT.

The completed partial IXIT will normally be used in conjunction with the completed ICS, as it adds precision to the information provided by the ICS.

## 9.1 E-UTRAN PIXIT

**Table 9.1-1 E-UTRAN PIXIT**

| Parameter Name | Parameter Type | Default Value | Supported Values | Description |
|---|---|---|---|---|
| px_AccessPointName | octetstring | | | Access Point Name, as defined in 23.003 and used in 24.008, section 10.5.6.1 |
| px_eAuthRAND | B128_Type | oct2bit('A3DE0C6D363E30C364A4078F1BF8D577'O) | | Random Challenge |
| px_ePrimaryBandChannelBandwidth | Dl_Bandwidth_Type | n25 | | E-UTRA primary band channel bandwidth |
| px_eJapanMCC_Band6 | NAS_Mcc | '442'H | | Japan MCC code to be used for Band 6. The same value will be used for E-UTRA and Inter-RAT cells. Type is different to that defined in TS 34.123-3 [7]. |
| px_ePrimaryFrequencyBand | FrequencyBand_Type | 1 | | E-UTRA primary frequency band |
| px_eSecondaryFrequencyBand | FrequencyBand_Type | 2 | | E-UTRA secondary frequency band |
| px_eTDDsubframeConfig | TDD_SubframeAssignment_Type | 1 | | TDD uplink-downlink subframe configuration |
| px_eUE_Category_Type | UE_Category_Type | 1 | | UE Category values 1..5 as defined in 36.306 clause 4.1 |
| px_eSecondaryBandChannelBandwidth | Dl_Bandwidth_Type | n25 | | E-UTRA secondary band channel bandwidth |
| px_IPv4_Address | charstring | | | IPv4 Address |
| px_IPv6_Address | charstring | | | IPv6 Address |
| px_NAS_CipheringAlgorithm | B3_Type | 001'B | | NAS Ciphering Algorithm |
| px_NAS_IntegrityProtAlgorithm | B3_Type | 001'B | | NAS Integrity Algorithm |
| px_RRC_CipheringAlgorithm | CipheringAlgorithm | eea0 | | Ciphering Algorithm |
| px_RRC_IntegrityProtAlgorithm | IntegrityProtAlgorithm | eia1 | | Integrity Algorithm |
| px_SMS_ChkMsgReceived | boolean | true | | Whether the operator can check an MT Short Message received |
| px_SMS_PrefMem1 | charstring | "SM" | | SMS Preferred Memory 1 <mem1> of TS 27.005 cl. 3.2.2 |
| px_SMS_PrefMem2 | charstring | "SM" | | SMS Preferred Memory 2 <mem1> of TS 27.005 cl. 3.2.2 |
| px_SMS_PrefMem3 | charstring | "MT" | | SMS Preferred Memory 3 <mem1> of TS 27.005 cl. 3.2.2 |
| px_SMS_Service | charstring | "0" | | SMS Service <service> of TS 27.005 cl. 3.2.1 |
| px_IPv4viaNAS_TestMode | boolean | FALSE | | This parameter can be set to TRUE so as to force allocation of IPv4 only PDN connection and IP address allocation via NAS signalling in the preamble of test cases using test mode (see TS 36.508 [3] clause 4.5.2A). |

# 10 Postambles

The purpose of this clause is to specify postambles to bring the UE to a well defined state regardless of the UE state at the termination of main test body or of the SS conditions and values of the system information inherited from the test.

# 10.1 Postambles for E-UTRA to UTRA tests

This clause describes UE postamble procedures which are used at the end of inter-RAT test cases specified in TS 36.508 [3] so as to switch off the UE.

UE LTE and UTRAN postamble conditions are specified in Table 10.1-1.

**Table 10.1-1: UE postamble conditions**

| LTE UE attach type | UE UTRA CS/PS domain | Postamble condition |
|---|---|---|
| attach | pc_CS AND pc_PS | C1 |
| | pc_PS AND NOT (pc_CS) | C2 |
| combined_attach | pc_CS AND pc_PS | C3 |
| | pc_CS AND NOT (pc_PS) | C4 |

## 10.1.1 UE postamble states and procedures for E-UTRA to UTRA

In order to bring the UE to the switched/powered off state, a number of procedures need to be executed in a hierachical sequence, according to the reference end state specified in each test procedure sequence. The sequences and the identified procedures are shown in figure 10.1.1-1.

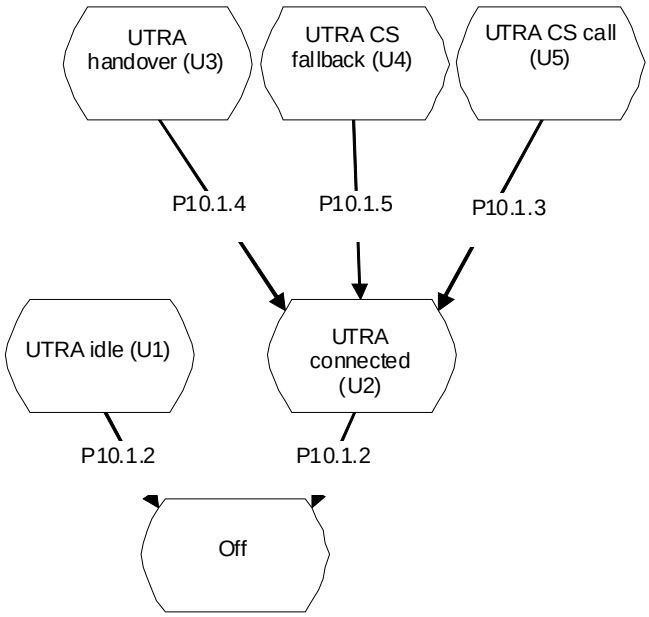


**Figure 10.1.1-1: UE postamble procedures for E-UTRA / UTRA test cases**

NOTE: Depending on the test case specifications the termination of a test case can be in any state of this diagram.

UE in UTRA state U2, U3, U4 and U5 may send data on the established radio bearer and shall be accepted and handled.

NOTE: NAS and AS security procedures during routing area update and handover are performed according to 3GPP TS 33.401[24] clauses 9.1.1 and 9.2.1 and 3GPP TS 25.331[36] clause 8.3.6.3.

## 10.1.2 Switch/Power off procedure

### 10.1.2.1 Procedure

**Table 10.1.2.1-1: Switch/Power off procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The UE is powered off or switched off, (see ICS) | - | - |
| - | EXCEPTION: Steps 2 to 7 specify the behaviour if UE supports pc_SwitchOnOff. | - | - |
| - | EXCEPTION: Steps 2 to 4 are used only when the UE is in UTRA idle end state (U1). | | |
| 2 | The UE transmits RRC CONNECTION REQUEST | --> | RRC CONNECTION REQUEST |
| 3 | The SS transmit a RRC CONNECTION SETUP | <-- | RRC CONNECTION SETUP |
| 4 | The UE transmits an RRC CONNECTION SETUP COMPLETE message | --> | RRC CONNECTION SETUP COMPLETE |
| - | EXCEPTION: Step 5a1 specifies behaviour when the current UTRA cell is in NMO I and the UE is in condition:<br>- C1 or<br>- C3 | - | - |
| 5a1 | The UE transmits an INITIAL DIRECT TRANSFER message including a DETACH REQUEST message with the detach type='power switched off, GPRS/IMSI combined detach' | --> | DETACH REQUEST |
| - | EXCEPTION: Step 5b1 specifies behaviour when the current UTRA cell is in (NMO I or NMO II) and the UE is in condition C4 | - | - |
| 5b1 | The UE transmits an INITIAL DIRECT TRANSFER message.<br>This message includes an IMSI DETACH INDICATION message | --> | IMSI DETACH INDICATION |
| - | EXCEPTION: Step 5c1 specifies behaviour when the current UTRA cell is in (NMO I or NMO II) and the UE is in condition C2 | - | - |
| 5c1 | The UE transmits an INITIAL DIRECT TRANSFER message.<br>This message includes a DETACH REQUEST message with detach type='power switched off, PS detach'' | --> | DETACH REQUEST |
| - | EXCEPTION: Steps 5d1 and 5d2 specify behaviour when the current UTRA cell is in NMO II and the UE is in condition:<br>- C1 or<br>- C3.<br>Both detach messages (in steps 5d1 and 5d2) can be sent by UE in any order. | - | - |
| 5d1 | The UE transmits an INITIAL DIRECT TRANSFER message.<br>This message includes a DETACH REQUEST message with the detach type='power switched off, PS detach'' | --> | DETACH REQUEST |
| 5d2 | The UE transmits an INITIAL DIRECT TRANSFER message.<br>This message includes an IMSI DETACH INDICATION message | --> | IMSI DETACH INDICATION |
| 6 | The SS transmits an RRC CONNECTION RELEASE message | <-- | RRC CONNECTION RELEASE |
| 7 | The UE transmits a RRC CONNECTION RELEASE COMPLETE message | --> | RRC CONNECTION RELEASE COMPLETE |

## 10.1.3 CC disconnect procedure

### 10.1.3.1 Procedure

**Table 10.1.3.1-1: CC disconnect procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a DISCONNECT message. | <-- | DISCONNECT |
| 2 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a RELEASE message. | --> | RELEASE |
| 3 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a RELEASE COMPLETE message. | <-- | RELEASE COMPLETE |

## 10.1.4 PS Routing Area Update procedure

### 10.1.4.1 Procedure

**Table 10.1.4.1-1: PS Routing Area Update procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| - | EXCEPTION: steps 1a1 to 1a5 specify the UE behaviour when the current UTRA cell is in NMO I and the UE is in condition:<br>- C1 or<br>- C3 and the UE is not registered to the LAC of the current UTRA cell | - | - |
| 1a1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE REQUEST message with Update type =’Combined RA/LA Updated' | --> | ROUTING AREA UPDATE REQUEST |
| 1a2 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 1a3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 1a4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1a5 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: steps 1b1 to 1b5 specify the UE behaviour when the current UTRA cell is in (NMO I or NMO II) and the UE is in condition:<br>- C2 or<br>- C3 and the UE is registered to the LAC of the current UTRA cell | - | - |
| 1b1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE REQUEST message with Update type =’RA Update' | --> | ROUTING AREA UPDATE REQUEST |
| 1b2 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 1b3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 1b4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1b5 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: steps 1c1 to 1c9 specify the UE behaviour when the current UTRA cell is in NMO II and the UE is in condition:<br>- C1 or<br>- C3 and the UE is not registered to the LAC of the current UTRA cell.<br><br>The LOCATION UPDATE REQUEST message (step 1c6) can be received during the routing area updating procedure (steps 1c1 to 1c4). | - | - |

| | | | |
|---|---|---|---|
| 1c1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE REQUEST message with Update type ='RA Update'. | --> | ROUTING AREA UPDATE REQUEST |
| 1c2 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 1c3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 1c4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1c5 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| 1c6 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 1c7 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 1c8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 1c9 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 1c10 | The EU transmits a UPLINK DIRECT TRANSFER message.<br>This message includes a TMSI REALLOCATION COMPLETE | --> | TMSI REALLOCATION COMPLETE |

## 10.1.5 CS fallback procedure

### 10.1.5.1 Procedure

**Table 10.1.5.1-1: CS fallback procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| - | EXCEPTION: Steps 1a1 and 1a2 specify the MO call procedure. | - | - |
| 1a1 | The UE transmits an INITIAL DIRECT TRANSFER message including a CM SERVICE REQUEST message. | --> | CM SERVICE REQUEST |
| 1a2 | The SS transmits an UPLINK DIRECT TRNASFER message including a CM SERVICE REJECT with the reject cause #32 (Service option not supported) | <-- | CM SERVICE REJECT |
| - | EXCEPTION: Step 1b1 specifies the MT call procedure. | - | - |
| 1b1 | The UE transmits an INITIAL DIRECT TRANSFER message including a PAGING RESPONSE message. | --> | PAGING RESPONSE |
| 2 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE |
| 3 | The UE transmits an RRC CONNECTION RELEASE COMPLETE message. | --> | RRC CONNECTION RELEASE COMPLETE |
| 4 | The UE transmits an RRC CONNECTION REQUEST message. | --> | RRC CONNECTION REQUEST |
| 5 | The SS transmits an RRC CONNECTION SETUP message | | RRC CONNECTION SETUP |
| 6 | The UE transmits an RRC CONNECTION SETUP COMPLETE message | --> | RRC CONNECTION SETUP COMPLETE |
| - | EXCEPTION: Steps 7a1 and 7a5 specify the the routing area update procedure when the current UTRA cell is in NMO I and the UE is in condition C3 and the UE is not registered to the LAC of the current UTRA cell. | - | - |
| 7a1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE REQUEST message with Update type ='Combined RA/LA Updated'. | --> | ROUTING AREA UPDATE REQUEST |
| 7a2 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 7a3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 7a4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 7a5 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: Steps 7b1 and 7b4 specify the location updating procedure when the current UTRA cell is in network mode (NMO I or NMO II) and the UE is in condition C4 and the UE is not registered to the LAC of the current UTRA cell. | - | - |
| 7b1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 7b2 | The SS transmits a SECURITY MODE | <-- | SECURITY MODE COMMAND |

| | | | |
|---|---|---|---|
| | COMMAND message. | | |
| 7b3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 7b4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 7b5 | The EU transmits a UPLINK DIRECT TRANSFER message.<br>This message includes a TMSI REALLOCATION COMPLETE | --> | TMSI REALLOCATION COMPLETE |
| - | EXCEPTION: steps 7c1 to 7c9 specify the UE behaviour when the current UTRA cell is in NMO II and the UE is in condition C3 and the UE is registered to the LAC of the current UTRA cell.<br>The LOCATION UPDATE REQUEST message (step 7c6) can be received during the routing area updating procedure (steps 7c1 to 7c4). | - | - |
| 7c1 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE REQUEST message with Update type ='RA Update'. | --> | ROUTING AREA UPDATE REQUEST |
| 7c2 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 7c3 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 7c4 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 7c5 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| 7c6 | The UE transmits an UPLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 7c7 | The SS transmits a SECURITY MODE COMMAND message. | <-- | SECURITY MODE COMMAND |
| 7c8 | The UE transmits a SECURITY MODE COMPLETE message. | --> | SECURITY MODE COMPLETE |
| 7c9 | The SS transmits a DOWNLINK DIRECT TRANSFER message.<br>This message includes a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 7c10 | The EU transmits a UPLINK DIRECT TRANSFER message.<br>This message includes a TMSI REALLOCATION COMPLETE | --> | TMSI REALLOCATION COMPLETE |
| 8 | The SS transmits an RRC CONNECTION RELEASE message. | <-- | RRC CONNECTION RELEASE |
| 9 | The UE transmits an RRC CONNECTION RELEASE COMPLETE message. | --> | RRC CONNECTION RELEASE COMPLETE |

## 10.2 Postambles for E-UTRAN to GERAN tests

This clause describes UE postamble procedures which are used at the end of inter-RAT test cases defined in TS 36.508 [3] so as to switch off the UE. UE LTE and GERAN postamble transitions are specified in Table 10.2-1.

**Table 10.2-1: UE postamble conditions**

| LTE UE attach type | UE GERAN CS/PS domain | Postamble condition |
|---|---|---|
| attach | pc_GPRS | C1 |
| combined attach | pc_GPRS | C2 |
| | NOT pc_GPRS | C3 |

## 10.2.1 UE postamble states and procedures for E-UTRA to GERAN test cases

In order to bring the UE to the switched/powered off state there are a number of procedures that need to be executed in a hierachical sequence, according to the reference end state specified in each test procedure sequence. The sequences and the identified procedures are shown in figure 10.2.1-1

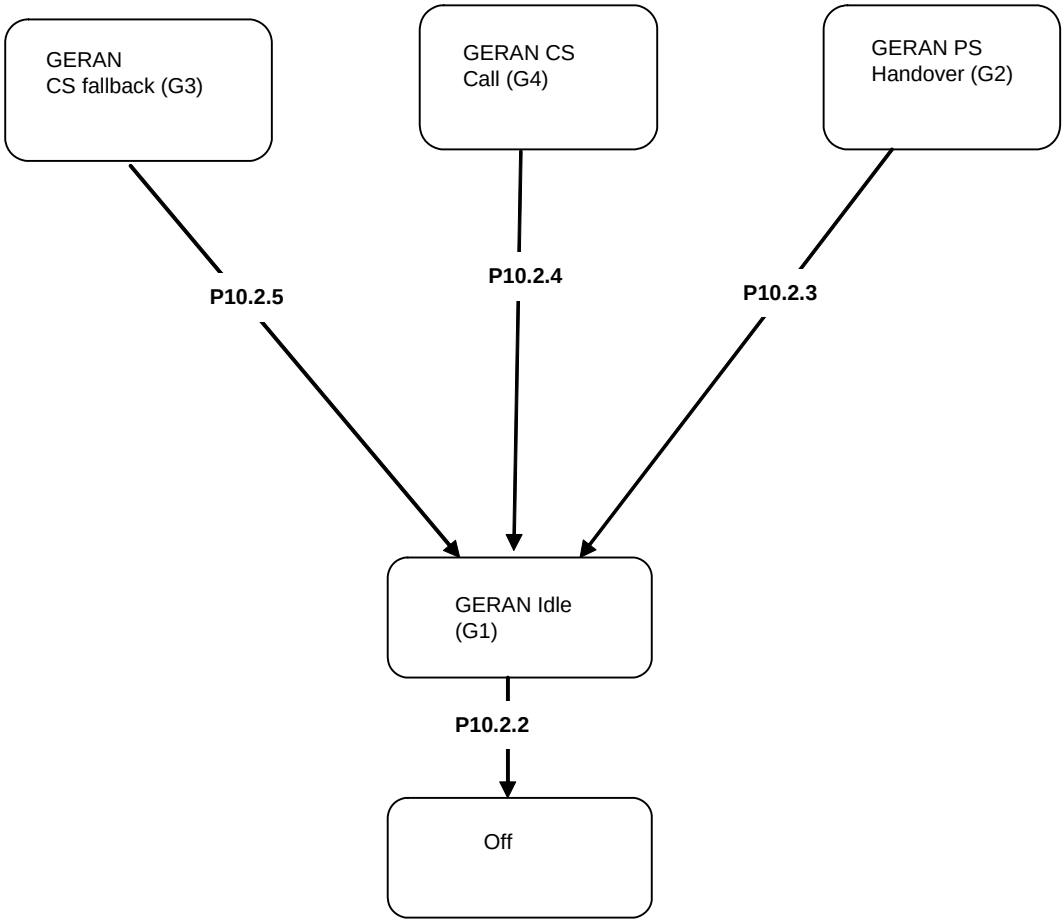


**Figure 10.2.1-1: UE postamble procedures for E-UTRA / GERAN test cases**

NOTE 1: Depending on the test case specifications the termination of a test case can be in any state of this diagram.

NOTE 2: The security procedures for interworking to GERAN are according to 3GPP TS 33.401[24] clauses 10.2.1 and 10.3.1.

## 10.2.2 Switch/Power off procedure

### 10.2.2.1 Procedure

**Table 10.2.2.1-1: Switch/Power off procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The UE is powered off or switched off, (see ICS) | - | - |
| - | EXCEPTION: Steps 2a1 to 2c2 specify the behaviour if UE supports pc_SwitchOnOff. | - | - |
| - | EXCEPTION: Step 2a1 specifies behaviour when the GERAN cell is in (NMO I or NMO II) and UE is in condition C1 | - | - |
| 2a1 | The UE transmits a DETACH REQUEST message | --> | DETACH REQUEST |
| - | EXCEPTION: Step 2b1 specifies behaviour when the GERAN cell is in (NMO I or NMO II) and UE is in condition C3 | - | - |
| 2b1 | The UE transmits an IMSI DETACH INDICATION message | --> | IMSI DETACH INDICATION |
| - | EXCEPTION: Steps 2c1 and 2c2 specify behaviour when the GERAN cell is in NMO II and UE is in condition C2. The messages can be sent in any order | - | - |
| 2c1 | The UE transmits an IMSI DETACH INDICATION message | --> | IMSI DETACH INDICATION |
| 2c2 | The UE transmits a DETACH REQUEST message | --> | DETACH REQUEST |

## 10.2.3 PS Handover procedure

### 10.2.3.1 Procedure

**Table 10.2.3.1-1: PS handover procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| - | EXCEPTION: Steps 1a1 and 1a3 specify the UE behaviour when GERAN cell is in NMO I and the UE is in condition C2 and the UE is not registered to the LAC of this cell. | - | - |
| 1a1 | The UE transmits a ROUTING AREA UPDATE REQUEST message with update type='Combined RA/LA Update'. | --> | ROUTING AREA UPDATE REQUEST |
| 1a2 | The SS transmits a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1a3 | The UE transmits a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: Steps 1b1 and 1b3 specify the location updating procedure when GERAN cell is in (NMO I or NMO II) and the UE is in condition C2 and the UE is registered to the LAC of this cell. | - | - |
| 1b1 | The UE transmits a ROUTING AREA UPDATE REQUEST message with update type='RA Update'. | --> | ROUTING AREA UPDATE REQUEST |
| 1b2 | The SS transmits a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1b3 | The UE transmits a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: Steps 1c1 and 1c6 specify the location updating procedure when GERAN cell is in NMO II and the UE is in condition C2 and the UE is not registered to the LAC of this cell. | - | - |
| 1c1 | The UE transmits a ROUTING AREA UPDATE REQUEST message with update type='RA Update'. | --> | ROUTING AREA UPDATE REQUEST |
| 1c2 | The SS transmits a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 1c3 | The UE transmits a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| 1c4 | The UE transmits a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 1c5 | The SS transmits a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 1c6 | The UE transmits a TMSI REALLOCATION COMPLETE | | TMSI REALLOCATION COMPLETE |

## 10.2.4 CC disconnect procedure

### 10.2.4.1 Procedure

**Table 10.2.4.1-1: CC disconnect procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The SS transmits a DISCONNECT message. | <-- | DISCONNECT |
| 2 | The UE transmits a RELEASE message. | --> | RELEASE |
| 3 | The SS transmits a RELEASE COMPLETE message. | <-- | RELEASE COMPLETE |
| 4 | The SS transmits a CHANNEL RELEASE message. | <-- | CHANNEL RELEASE |

## 10.2.5 CS fallback procedure

### 10.2.5.1 Procedure

**Table 10.2.5.1-1: CS fallback procedure MO call**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| - | EXCEPTION: Steps 1a1 and 1a2 specify the MO call procedure. | - | - |
| 1a1 | The UE transmits a CM SERVICE REQUEST message. | --> | CM SERVICE REQUEST |
| 1a2 | The SS transmits a CM SERVICE REJECT with the reject cause #32 (Service option not supported) | <-- | CM SERVICE REJECT |
| - | EXCEPTION: Step 1b1 specifies the MT call procedure. | - | - |
| 1b1 | The UE transmits a PAGING RESPONSE message. | --> | PAGING RESPONSE |
| - | EXCEPTION: Steps 2a1 to 2a6 specify the procedure when GERAN cell is in NMO II and if the UE is in condition C2 and the UE is registered to the LAC of the current GERAN cell. | - | - |
| 2a1 | The UE transmits a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 2a2 | The SS transmits a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 2a3 | The UE transmits a TMSI REALLOCATION COMPLETE | | TMSI REALLOCATION COMPLETE |
| 2a4 | The UE transmits a ROUTING AREA UPDATE REQUEST message. | --> | ROUTING AREA UPDATE REQUEST |
| 2a5 | The SS transmits a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 2a6 | The UE transmits a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |
| - | EXCEPTION: Steps 2b1 to 2b3 specify the location updating procedure when GERAN cell is in (NMO I or NMO II) and if the UE is in condition C3 and the UE is not registered to the LAC of the current GERAN cell | - | - |
| 2b1 | The UE transmits a LOCATION UPDATING REQUEST message. | --> | LOCATION UPDATING REQUEST |
| 2b2 | The SS transmits a LOCATION UPDATING ACCEPT | <-- | LOCATION UPDATING ACCEPT |
| 2b3 | The UE transmits a TMSI REALLOCATION COMPLETE | | TMSI REALLOCATION COMPLETE |
| - | EXCEPTION: Steps 2c1 to 2c3 specify the routing area updating procedure when the GERAN cell is in NMO I and the UE is in condition C2and the UE is not registered to the LAC of the current GERAN cell | - | - |
| 2c1 | The UE transmits a ROUTING AREA UPDATE REQUEST message with update type = ‘Combined RA/LA update’. | --> | ROUTING AREA UPDATE REQUEST |
| 2c2 | The SS transmits a ROUTING AREA UPDATE ACCEPT message. | <-- | ROUTING AREA UPDATE ACCEPT |
| 2c3 | The UE transmits a ROUTING AREA UPDATE COMPLETE message. | --> | ROUTING AREA UPDATE COMPLETE |

# 10.3 Postambles for E-UTRA test cases

This clause describes UE postamble states which can be used in the post condition of E-UTRA test cases defined in TS 36.523-1[1]. The clause also specifies a set of procedures to bring the UE into these states.

## 10.3.1 UE postamble states and procedures for E-UTRA test cases

In order to bring the UE to switched/powered off state there are some procedures that need to be executed. The identified procedures are shown in figure 10.3.1-1.

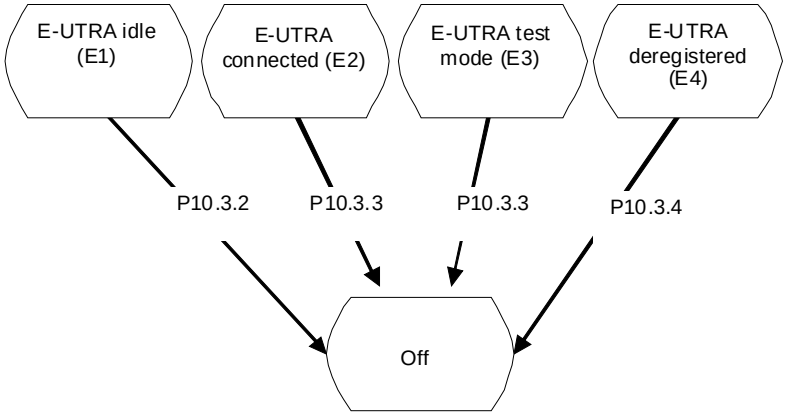


**Figure 10.3.1-1: UE postamble states and procedures for E-UTRA**

## 10.3.2 Switch/Power off procedure in State 2E1

### 10.3.2.1 Procedure

**Table 10.3.2.1-1: Switch/Power off procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The UE is powered off or switched off, (see ICS) | - | - |
| - | EXCEPTION: Steps 2a1 to 2a4 specify behaviour if the UE supports pc_SwitchOnOff | - | - |
| 2a1 | UE transmits an *RRCConnectionRequest* message. | --> | RRC: *RRCConnectionRequest* |
| 2a2 | SS transmit an *RRCConnectionSetup* message. | <-- | RRC: *RRCConnectionSetup* |
| 2a3 | The UE transmits an *RRCConnectionSetupComplete* message to confirm the successful completion of the connection establishment and to initiate the Detach procedure by including the DETACH REQUEST message. | --> | RRC: *RRCConnectionSetupComplete*<br>NAS: DETACH REQUEST |
| 2a4 | The SS transmits an RRC CONNECTION RELEASE message | <-- | RRC CONNECTION RELEASE |

### 10.3.3 Switch/Power off procedure in State E2 and E3

#### 10.3.3.1 Procedure

**Table 10.3.3.1-1: Switch/Power off procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The UE is powered off or switched off (see ICS) | - | - |
| - | EXCEPTION: Steps 2a1 to 2a2 specify behaviour if the UE supports pc_SwitchOnOff | - | - |
| 2a1 | The UE transmits DETACH REQUEST | --> | DETACH REQUEST |
| 2a2 | The SS transmits an RRC CONNECTION RELEASE message | <-- | RRC CONNECTION RELEASE |

### 10.3.4 Switch/Power off procedure in State E4

#### 10.3.4.1 Procedure

**Table 10.3.4.1-1: Switch/Power off procedure**

| Step | Procedure | Message Sequence | |
|---|---|---|---|
| | | U - S | Message |
| 1 | The UE is powered off or switched off (see ICS) | - | - |

# 11 Guidelines on test execution

This clause provides the guidelines on test executions.

## 11.1 Guidelines for different operating Bands

The restriction on test case execution as listed in this clause is due to the restriction of bandwidth to accomodate the necessary number of radio frequencies for the specific operating Band as used by the test cases.

A test case using more than one radio frequency, i.e. using the radio frequencies f2 or f3 or f4 specified in TS 36.508 [3], shall avoid to be executed on operating

Band 12 with 10MHz bandwidth,

Band 13,

Band 17 with 10MHz bandwidth.

The list containing such test cases is given below:

6.1.1.1, 6.1.2.5, 6.1.2.7, 6.1.2.8, 6.1.2.9, 6.1.2.11, 6.1.2.15, 6.3.6,

8.1.3.4, 8.1.3.5, 8.2.4.6, 8.3.1.3, 8.3.1.4, 8.3.1.6, 8.3.1.9, 8.3.1.10, 8.3.1.11,

9.1.2.6, 9.2.1.1.1a, 9.2.1.1.7, 9.2.1.1.9, 9.2.1.1.10, 9.2.1.1.11, 9.2.1.1.12, 9.2.1.1.13, 9.2.1.1.15, 9.2.1.1.16, 9.2.1.1.17, 9.2.1.1.18, 9.2.1.2.1, 9.2.1.2.9, 9.2.1.2.10, 9.2.1.2.11, 9.2.1.2.12, 9.2.1.2.13,9.2.3.1.1, 9.2.3.1.4, 9.2.3.1.9a, 9.2.3.1.10, 9.2.3.1.11, 9.2.3.1.12, 9.2.3.1.15, 9.2.3.1.16, 9.2.3.1.17, 9.2.3.1.18, 9.2.3.1.19, 9.2.3.1.25, 9.2.3.1.27, 9.2.3.2.1, 9.2.3.2.6, 9.2.3.2.12, 9.2.3.2.15.

A test case using more than two radio frequencies, i.e. using the radio frequencies f3 or f4 specified in TS 36.508 [3], shall avoid to be executed on operating

Band 6,

Band 14,

Band 17 with 5MHz bandwidth.

The list containing such test cases is given below:

6.1.1.1, 6.1.2.7, 6.1.2.8, 6.1.2.9, 6.1.2.15,

8.3.1.4,

9.1.2.6, 9.2.1.1.1a, 9.2.1.1.7, 9.2.1.1.13, 9.2.1.1.15, 9.2.1.1.16, 9.2.1.2.9, 9.2.1.2.11, 9.2.1.2.12, 9.2.3.1.4, 9.2.3.1.15, 9.2.3.1.17, 9.2.3.1.18.

A test case using more than three radio frequencies, i.e. using the radio frequency f4 specified in TS 36.508 [3], shall avoid to be executed on operating

Band 12 with 5MHz bandwidth,

Band 18,

Band 19,

Band 34.

The list containing such test cases is given below:

6.1.1.1,

9.2.1.1.7, 9.2.1.2.12 9.2.3.1.4.

# Annex A (normative): Test Suites

This annex contains the approved TTCN Test Suites. The test suites have been produced using the Testing and Test Control Notation version 3 (TTCN3) according to ES 201 873-1 [13].

## A.1 Baseline of specifications

Table A.1 shows the baseline of the relevant cores specifications and the test specifications which the delivered TTCN test suites are referred to.

**Table A.1: References of the test and Core specifications**

| | |
|---|---|
| **Core specifications baseline** | 3GPP TS 36.331 [19] |
| | 3GPP TS 24.301 [21] |
| **Test specifications** | 3GPP TS 36.508 [3] |
| | 3GPP TS 36.509 [4] |
| | 3GPP TS 36.523-1 [1] |
| | 3GPP TS 36.523-2 [2] |

## A.2 E-UTRA Test Suites

**Table A.2: E-UTRA / EPS TTCN test cases**

| Test case | Description |
|---|---|

| | |
|---|---|
| 6.1.2.2 | Cell selection, Qrxlevmin |
| 6.1.2.4 | Cell reselection |
| 7.1.1.1 | CCCH mapped to UL SCH/ DL-SCH / Reserved LCID (Logical Channel ID) |
| 7.1.1.2 | DTCH or DCCH mapped to UL SCH/ DL-SCH / Reserved Logical Channel ID |
| 7.1.2.1 | Correct selection of RACH parameters / Random access preamble and PRACH resource explicitly signalled to the UE by RRC / Non-contention based random access procedure |
| 7.1.2.2 | Correct selection of RACH parameters / Random access preamble and PRACH resource explicitly signalled to the UE in PDCCH Order / Non-contention based random access procedure |
| 7.1.2.3 | Correct selection of RACH parameters / Preamble selected by MAC itself / Contention based random access procedure |
| 7.1.2.4 | Random access procedure / Successful |
| 7.1.2.5 | Random access procedure / MAC PDU containing multiple RARs |
| 7.1.2.7 | MAC contention resolution / Temporary C-RNTI |
| 7.1.2.9 | MAC backoff indicator |
| 7.1.3.1 | Correct handling of DL assignment / Dynamic case |
| 7.1.3.3 | MAC PDU header handling |
| 7.1.3.4 | Correct HARQ process handling / DCCH and DTCH |
| 7.1.3.5 | Correct HARQ process handling / CCCH |
| 7.1.3.6 | Correct HARQ process handling / BCCH |
| 7.1.3.7 | MAC padding |
| 7.1.4.1 | Correct handling of UL assignment / Dynamic case |
| 7.1.4.4 | Correct handling of MAC control information / Scheduling requests and PUCCH |
| 7.1.4.5 | Correct handling of MAC control information / Scheduling requests and random access procedure |
| 7.1.4.6 | Correct handling of MAC control information / Buffer status / UL data arrive in the UE Tx buffer and retransmission of BSR / Regular BSR |
| 7.1.4.7 | Correct handling of MAC control information / Buffer Status / UL resources are allocated / Padding BSR |
| 7.1.4.8 | Correct handling of MAC control information / Buffer status / Periodic BSR timer expires |
| 7.1.4.10 | MAC padding |
| 7.1.4.13 | MAC PDU header handling |
| 7.1.4.15 | UE power headroom reporting / Periodic reporting |
| 7.1.4.16 | UE power headroom Reporting / DL pathloss change reporting |
| 7.1.7.1.1 | DL-SCH transport block size selection / DCI format 1 / RA type 0 |
| 7.1.7.1.2 | DL-SCH transport block size selection / DCI format 1 / RA type 1 |
| 7.1.7.1.3 | DL-SCH transport block size selection / DCI format 1A / RA type 2 / Localised VRB |
| 7.1.7.1.4 | DL-SCH transport block size selection / DCI format 1A / RA type 2 / Distributed VRB |
| 7.2.2.1 | UM RLC / Segmentation and reassembly / 5-bit SN / Framing info field |
| 7.2.2.2 | UM RLC / Segmentation and reassembly / 10-bit SN / Framing info field |
| 7.2.2.3 | UM RLC / Reassembly / 5-bit SN / LI value > PDU size |
| 7.2.2.4 | UM RLC / Reassembly / 10-bit SN / LI value > PDU size |
| 7.2.2.5.1 | UM RLC / 5-bit SN / Correct use of sequence numbering |
| 7.2.2.5.2 | UM RLC / 5-bit SN / Correct use of sequence numbering |
| 7.2.2.6 | UM RLC / Concatenation, segmentation and reassembly |
| 7.2.2.7 | UM RLC / In sequence delivery of upper layer PDUs without residual loss of RLC PDUs / Maximum re-ordering delay below t-Reordering |
| 7.2.2.8 | UM RLC / In sequence delivery of upper layer PDUs without residual loss of RLC PDUs / Maximum re-ordering delay exceeds t-Reordering |
| 7.2.2.9 | UM RLC / In sequence delivery of upper layer PDUs with residual loss of RLC PDUs / Maximum re-ordering delay exceeds t-Reordering |
| 7.2.2.10 | UM RLC / Duplicate detection of RLC PDUs |
| 7.2.2.11 | UM RLC / RLC re-establishment procedure |
| 7.2.3.1 | AM RLC / Concatenation and reassembly |
| 7.2.3.2 | AM RLC / Segmentation and reassembly / No PDU segmentation |
| 7.2.3.3 | AM RLC / Segmentation andreassembly / Framing info field |
| 7.2.3.4 | AM RLC / Segmentation and reassembly / Different numbers of length indicators |
| 7.2.3.5 | AM RLC / Reassembly / LI value > PDU size |
| 7.2.3.8 | AM RLC / Control of receive window |
| 7.2.3.9 | AM RLC / Polling for status |
| 7.2.3.10 | AM RLC / Receiver status triggers |

| | |
|---|---|
| 7.2.3.13 | AM RLC / Reconfiguration of RLC parameters by upper layers |
| 7.2.3.14 | AM RLC / In sequence delivery of upper layers PDUs |
| 7.2.3.15 | AM RLC / Re-ordering of RLC PDU segments |
| 7.2.3.16 | AM RLC / Re-transmission of RLC PDU without re-segmentation |
| 7.2.3.17 | AM RLC / Re-segmentation RLC PDU / SO, FI, LSF |
| 7.2.3.18 | AM RLC / Reassembly / AMD PDU reassembly from AMD PDU segments, Segmentation Offset and Last Segment Flag fields |
| 7.2.3.20 | AM RLC / Duplicate detection of RLC PDUs |
| 7.3.1.1 | Maintenance of PDCP sequence numbers / User plane / RLC AM |
| 7.3.1.2 | Maintenance of PDCP sequence numbers / User plane / RLC UM / Short PDCP SN (7 bits) |
| 7.3.3.1 | Ciphering and deciphering / Correct functionality of EPS AS encryption algorithms / SNOW 3G |
| 7.3.3.2 | Ciphering and deciphering / Correct functionality of EPS UP encryption algorithms / SNOW 3G |
| 7.3.3.3 | Ciphering and deciphering / Correct functionality of EPS AS encryption algorithms / AES |
| 7.3.3.4 | Ciphering and deciphering / Correct functionality of EPS UP encryption algorithms / AES |
| 7.3.4.1 | Integrity protection / Correct functionality of EPS AS integrity algorithms / SNOW 3G |
| 7.3.4.2 | Integrity protection / Correct functionality of EPS AS integrity algorithms / AES |
| 7.3.6.1 | PDCP discard |
| 8.1.1.1 | RRC / Paging for connection in idle mode |
| 8.1.2.1 | RRC connection establishment / Success |
| 8.1.3.1 | RRC connection release / Success |
| 8.2.1.1 | RRC connection reconfiguration / Radio bearer establishment for transition from RRC_IDLE to RRC_CONNECTED / Success / Default bearer / Early bearer establishment |
| 8.2.1.3 | RRC connection reconfiguration / Radio bearer establishment / Success / Dedicated bearer |
| 8.2.2.1 | RRC connection reconfiguration / Radio resource reconfiguration / Success |
| 8.2.2.2 | RRC connection reconfiguration / SRB/DRB reconfiguration / Success |
| 8.2.3.1 | RRC connection reconfiguration / Radio bearer release / Success |
| 8.2.4.3 | RRC connection reconfiguration / Handover / Success / Intra-cell / Security reconfiguration |
| 8.3.1.1 | Measurement configuration control and reporting / Intra E-UTRAN measurements / Event A1 |
| 8.3.1.2 | Measurement configuration control and reporting / Intra E-UTRAN measurements / Event A2 |
| 8.5.1.5 | Radio link failure / Radio link recovery while T310 is running |
| 8.5.4.1 | UE capability transfer / Success |
| 9.1.2.1 | Authentication accepted |
| 9.1.2.3 | Authentication not accepted by the network, GUTI used, authentication reject and re-authentication |
| 9.1.2.4 | Authentication not accepted by the UE / MAC code failure |
| 9.1.2.5 | Authentication not accepted by the UE / SQN failure |
| 9.1.3.1 | NAS security mode command accepted by the UE |
| 9.1.3.2 | NAS security mode command not accepted by the UE |
| 9.1.4.2 | Identification procedure / IMEI requested |
| 9.2.1.1.1 | Attach Procedure / Success / Valid GUTI |
| 9.2.1.1.2 | Attach Procedure / Success / With IMSI / GUTI reallocation |
| 9.2.2.1.1 | UE initiated detach / UE switched off |
| 9.2.2.1.6 | UE initiated detach / Abnormal case / Local detach after 5 attempts due to no network response |
| 9.2.2.2.1 | NW initiated detach / Re-attach required |
| 9.2.3.1.5 | Periodic tracking area update / Accepted |
| 9.2.3.1.8 | UE receives an indication that the RRC connection was released with cause "load balancing TAU required" |
| 9.3.1.1 | Service request initiated by UE for user data |
| 9.3.1.7 | Service request / Rejected / UE identity cannot be derived by the network |
| 9.3.1.7a | Service request / Rejected / UE implicitly detached |
| 9.3.2.1 | Paging procedure |
| 9.4.1 | Integrity protection / Correct functionality of EPS NAS integrity algorithm / SNOW3G |
| 9.4.2 | Integrity protection / Correct functionality of EPS NAS integrity algorithm / AES |
| 9.4.3 | Ciphering and deciphering / Correct functionality of EPS NAS encryption algorithm / SNOW3G |
| 9.4.4 | Ciphering and deciphering / Correct functionality of EPS NAS encryption algorithm / AES |
| 12.2.1 | Data transfer of E-UTRA radio bearer combinations 1, 3, 6 and 9 |
| 13.1.1 | Activation and deactivation of additional data radio bearer in E-UTRA |

The Test Suite in TTCN3 is contained in multiple ASCII files which accompany the present document.

# Annex B (informative): Style Guides

## B.1 Introduction

This annex is based on the style guide given in TS 34.123-3 [7], annex E but the language for UE conformance tests is TTCN-3.

## B.2 General Requirements for TTCN-3 Implementations

The TTCN-3 implementation for UE conformance tests shall be based on the following general design considerations:

- Even though it is not reflected in TTCN-3 anymore in UE conformance tests ASPs and PDUs will still be distinguished. This has impact on type definitions and naming conventions.
- In general, templates for UE conformance tests shall be separated for sending and receiving.
- Modified templates shall not be modified again.
- All local variables shall be declared at the beginning of a function;
  the order of declarations is
  - local constants
  - local variables
  - local timers
- The purpose of the test case implementation is conformance testing.
- The common RAN5 approval process needs to be considered.

The TTCN-3 implementation for UE conformance tests shall fulfil the following requirements.

The implementation shall:

- follow ES 201 873-1 [13] (TTCN-3 Core Language) and ES 201 873-4 [27] (TTCN-3 Operational Semantics);
- be independent from interface specifications like TRI (ES 201 873-5 [28]) and TCI (ES 201 873-6 [29]) as well as from proprietary approaches;
- not use or rely on tool dependent features;
- support maintainability and extendibility;
- follow the naming conventions as defined below.

Further requirements:

- Usage of external functions should be avoided.
- Type definitions:
  - Existing ASN.1 type definitions contained in protocol specifications are imported from the respective standards. All other type definitions shall be done within TTCN-3.

# B.3 Naming Conventions

Even though these are being used for TTCN-3 the naming conventions provided in the present document are mainly backward compatible to TTCN-2 as defined in TS 34.123-3 [7].

## B.3.1 Prefixes and Restrictions for TTCN-3 Objects

**Table B.3.1: Prefixes used for TTCN-3 objects**

| TTCN object | Initial Letter | Prefix/ Postfix | Comment |
|---|---|---|---|
| TTCN module | upper case | (none) | |
| TTCN group | upper case | (none) | |
| function parameter | upper case | p_ | |
| function running on a component | upper case | f_ | |
| local function (tree) not to be used by other modules | upper case | fl_ | local function not to be used by other modules |
| external function | upper case | fx_ | |
| altstep | upper case | a_ | (including defaults) |
| test case selection expression | | | name as specified in TS 36.523-2 [2] shall be used |
| global constant | upper case | tsc_ | (see note 1) |
| local constant | upper case | const_ | local constant being defined in a function |
| Enumerated | | (none) | there are no restrictions regarding enumerated types |
| type definition | upper case | _Type | (see note 7) |
| local variable | upper case | v_ | (see note 6) |
| global (component) variable | upper case | vc_ | (see note 2) |
| port type | upper case | | |
| port name | upper case | | |
| local timer | upper case | t_ | |
| ASP template | upper case | cas_<br>cads_<br>car_<br>cadr_ | send ASP<br>modified (derived) send ASP<br>receive ASP<br>modified (derived) receive ASP |
| PDU template | upper case | cs_<br>cds_<br>cr_<br>cdr_ | send PDU<br>modified (derived) send PDU<br>receive PDU<br>modified (derived) receive PDU<br>(see note 3) |
| CM template | upper case | cms_<br>cmr_ | send coordination message<br>receive coordination message |
| Template<br>(neither ASP nor PDU nor CM) | upper case | cs_<br>cds_<br>cr_<br>cdr_<br>crs_ | send template<br>modified (derived) send template<br>receive template<br>modified (derived) receive template<br>templates for IEs used in both directions<br>(see note 5) |
| test suite parameter (PICS) | upper case | pc_ | |
| test suite parameter (PIXIT) | upper case | px_ | |
| test case | | TC_ | (see note 4) |

NOTE 1: Global constants may be defined differently in imported modules (e.g. without any prefix and with lower case initial letter).
NOTE 2: Global variables or timers are those defined within the TTCN-3 components. They are visible to all the functions run in the component.
NOTE 3: Base template may have a second prefix:
- 508: PDU as defined in TS 36.508 [3];
- 108: PDU as defined in TS 34.108 [8].

NOTE 4: Test case names will correspond to the clause in the prose that specifies the test purpose. E.g. TC_8_1.
NOTE 5: Applicable only in case of "quasi-constant" definitions, e.g. to define a (constant) random pattern to be used for sending and receiving when the UE is configured in loopback mode.
NOTE 6: Counter variables do not need to have a prefix.
NOTE 7: Exceptions for type definitions:
- ASP names are fully upper case letters and typically have postfix "_REQ", "_CNF" or "_IND".
- RRC protocol type definitions are extracted and imported from TS 36.331/25.331 and are therefore out of scope.
- NAS protocol type definitions follow the names provided in the tabular notion of the standards and therefore do not have a "_Type" postfix.

### B.3.4 Identifiers consisting of more than one Name

When identifiers are a concatenation of several words the words shall start with capital letters:

e.g.:. "px" + "Cell" + "A" + "Cell" + "Id" -> px_CellACellId.

Further details are described in TS 34.123-3 [7], clause E.2.1.

## B.4 Implementation Issues

### B.4.1 Control part

Even though the control part may not be used in a test campaign but be overruled by the test management system it is used to provide the following information:

- All test cases contained in the test suite.
- For each test case:
  - Test case selection expression.

For maintenance reasons it shall be possible to generate the control part automatically by an appropriate tool.

### B.4.2 Top Level Test Case Definitions

The top level test case definitions run on the MTC exclusively. The tasks of these test case definitions are generally the same for each test case:

- Start guard timer.
- Create PTCs.
- Connect PTCs.
- Start PTCs.
- Wait for PTCs having finished.

Additionally the MTC may host the upper tester but this is left open to implementation.

For maintenance reasons it shall be possible to generate the top level test case definitions defined for the MTC automatically by an appropriate tool. To achieve this, the name of a function to be started on particular PTC need derived from the test case name:

e.g. the function for PTC_A in testcase TC_XX_YY_ZZ shall be f_TC_XX_YY_ZZ_A.

Cells are created in an off-state in the preambles of the corresponding PTCs while UE is in the switched off-state.

## B.4.3 Inter Component Communication

Communication between PTCs or PTCs and the MTC can be done by messages or by build-in mechanisms as *done* and *kill*. For maintenance reasons and extendibility the inter component communication shall be encapsulated by TTCN-3 implementation.

## B.4.4 Encoding Information

For UE conformance tests several encoding rules need to be applied by the TTCN-3 codec. Even though the codec is out of scope of the present document there are aspects with impact on TTCN-3 implementation depending on different type definitions.

**Table B.4.4-1**

| Type definitions | Encoding |
|---|---|
| ASN.1 types used for RRC signalling | ASN.1 PER |
| ASN.1 types used by NAS protocols | ASN.1 BER |
| NAS types | Tabular notated (see note) |
| DRB Types | Tabular notated (see note) |
| GPRS Padding | see TS 34.123-3, clause 6.10.2.9.1 |
| GSM Spare Padding | see TS 34.123-3, clause 6.10.2.9.2 |
| LowHigh Rule | see TS 34.123-3, clause 6.10.2.9.3 |
| SACCHSysInfo Spare Padding | see TS 34.123-3, clause 6.10.2.9.5 |
| TTCN-3 types not used at the air interface:<br>- Configuration of system simulator<br>- Coordination between components<br>- Types used internally in TTCN-3 | (no specific encoding required) |
| NOTE: Tabular notated is performed by concatenation of all the present fields in the TTCN-3 template. | |

Encoding information may be provided and supported in TTCN-3 by grouping of type definitions and using the *encode* attribute.

## B.4.5 Verdict Assignment

In general the following rules shall be applied.

**Table B.4.5-1: Rules for verdict assignment**

| Verdict | Rule |
|---|---|
| **Pass** | shall be assigned for each step defined in the prose of the test case |
| **Fail** | shall be assigned when there is a non-conformant signalling by the UE within the test body |
| **Inconc** | shall be assigned outside the test body and when it is not unequivocal whether a misbehaviour is caused by non-conformity of the UE signalling |
| **Error** | In case of obvious programming or parameterisation errors (e.g. missing *case* in a *select* statement) |

### B.4.5.1 PASS verdict assignment

The PASS verdicts are assigned by test cases or test case specific functions.

For generic test procedures as specified in 36.508 cl. 6.4.2, the preliminary pass is assigned directly after the procedure if all described in the procedure UL messages have been successfully received; this allows re-usage of these procedures for other purposes.

### B.4.5.2 FAIL or INCONC verdict assignment

The verdict FAIL or INCONC can be assigned in test cases, in the test case-specific function, in the common functions and in the default behaviour.

Test case or test case-specific function

In normal cases the common function f_EUTRA_SetVerdictFailOrInconc shall be used to assign FAIL or INCONC depending on whether it is in the test body or outside of the body.

If in test cases a verdict FAIL shall be assigned for watchdog timer timeouts this needs to be done explicitly.

Common Functions

The majority of the common functions have no verdict assignment. If a verdicts assignment is required in some common functions, the common function f_EUTRA_SetVerdictFailOrInconc shall be used to assign FAIL or INCONC.

As an exception in the altstep a_EUTRA_RacingCond_AwaitRrcMessage an INCONC is assigned when the RRC message and the L1/MAC indication are in the wrong order.

### B.4.5.3 Verdict assignment in default behaviour

The default behaviour handles all events not being handled in test cases or functions. Whether the verdict FAIL or INCONC to be assigned in the default behaviour it depends very much on the port where the event occurs.

**Table B.4.5.3-1: Verdict assignment in default behaviour upon test ports**

| Test port | Message | Comment | Verdict |
|---|---|---|---|
| SYS | SYSTEM_CTRL_CNF | unexpected confirmation | INCONC |
| SYSIND | SYSTEM_IND: Error indication | unspecific error at SS | INCONC |
| | SYSTEM_IND: MAC indication | (NOTE 1) | FAIL in the test body<br>INCONC outside the test body |
| | SYSTEM_IND: L1 indication | RachPreamble, SchedReq, UL_HARQ may be repeated by the UE in case of transmission errors<br>(NOTE 1) | INCONC |
| SRB | SRB_COMMON_IND | Any unexpected L3 signalling | FAIL in the test body<br>INCONC outside the test body |
| NASCTRL | NAS_CTRL_CNF | unexpected confirmation | INCONC |
| DRB | DRB_COMMON_IND | L2 and combined tests (NOTE 2) | FAIL in the test body<br>INCONC outside the test body |
| | | pure signalling tests (NOTE 2) | INCONC |
| UT | UT_COMMON_CNF | unexpected confirmation | INCONC |
| Note 1: L1/MAC indications need to be enabled by the test case therefore they occur only when being relevant for the test case.<br>Note 2: L2 and combined tests can be distinguished from pure signalling tests by additional global information controlled by f_EUTRA_TestBody_Set. | | | |

**Table B.4.5.3-2: Verdict assignment in default behaviour when time-out**

| Timeout | Comment | Verdict |
|---|---|---|
| any timer | unspecific timeout (NOTE) | INCONC |
| NOTE: Local timers of test cases or functions cannot be distinguished in the default behaviour. | | |

## B.4.6 Default Behaviour

As experience from UMTS conformance tests there shall be one standard default behaviour for each component.

The following rules shall be applied:

- The standard default behaviour is activated during initialisation of the respective component.
  In normal cases a TTCN writer does not need to care about the default.
- In general there is only one default behaviour activated (i.e. the standard default behaviour).
- The standard default behaviour shall cover all ports and timers of the component.
- Whenever possible deviations from the standard default behaviour shall be implemented locally rather than by introducing a new default behaviour.

If for exceptional cases the standard default behaviour needs to be replaced by another default behaviour or another default behaviour needs to be activated on top, the TTCN writer is responsible:

- to avoid side effects;
- to restore the standard behaviour.

## B.4.7 Templates for Sending and Receiving

Templates used for sending and receiving shall be separated in general:

- A template shall be either for sending or for receiving; this shall be reflected in the prefix of the identifier.
- Send templates shall use no receive templates and vice versa.
- All parameters of a send template shall be restricted to:
  - values;
  - template (value);
  - template (omit).
- Parameters of receive templates may allow wildcards. They can be:
  - values;
  - unrestricted template parameters;
  - template parameters restricted to be present.
- The only exception to the above rule is for "quasi-constant" definitions, as described in note 5 of table B.3.1. Otherwise, even when the same data is expected for sending and receiving templates, there shall be different templates and the following rule shall be applied.
- The receive template is assigned the send template e.g.:
  - template My_Type cr_Template := cs_Template
- This results in separate definitions for sending and receiving and improves maintainability.

NOTE 1: For maintenance reasons, a send template shall never be derived from a receive template; and also a receive template shall never be assigned to a send template.

NOTE 2: When a send template is assigned to a receive template, the formal parameters of the receive template must follow the rules of send templates (i.e. it shall only contain 'template (value)', 'template (omit)' or values only).

### B.4.8 Logging

In general no explicit log statements shall be used. As an exception log may be used to report unexpected situations in TTCN-3 like fatal programming error.

### B.4.9 Top level comments

No restriction is specified for the top level comments.

### B.4.10 Mapping of DRBs

LTE DRBs are mapped in TTCN according to the following rules:

- DRB1 is exclusively reserved for the default DRB and hence is always AM
- additional DRBs (AM or UM) may be assigned from DRB2 onward in any order
- there shall be no reconfiguration of a DRB from AM to UM or vice versa (unless a test case explicitly requires this); this especially means that DRB1 is never reconfigured to UM
- in general at the SS all DRBs needed by a test case may be configured at the beginning of the test case.

## B.5 Modularisation

Even though there are no specific rules how to apply modularisation in general some principles can be defined:

- Maintainability and extendibility:
  - Maintainability and extendibility are essential for definition of the modular structure.
- Granularity of modules:
  - Cyclic imports are forbidden in TTCN-3; this has impact on the extendibility:
    - The granularity of modules shall not be too small.
  - Too big modules are hard to handle and may cause increase of compilation time:
    - The granularity of modules shall not be too rough.

NOTE: These are only vague principles since there is no way to define what small or huge modules are.

- General module structure:
  - The following modularisation can be applied independent from the internal structure:
    - Type definitions: TTCN-3, ASN.1.
    - Component definitions.
    - Common Templates: component dependent, component independent.
    - Common behaviour: MTC, PTCs.

- Test case specific templates.
- Test case specific behaviour.

- Whether or how these module groups can further be sub-divided is implementation dependent and therefore out of scope of the present document.

# Annex C (informative): Design Principles

## C.1 ASP Design

All ASPs consist of a common part (defined as a TTCN-3 type) and a specific part.

All ASPs sent by the SS include timing information (SFN, subframe number) in the common part.

Only one ASP is defined per direction per port, but this ASP may contain a union of several sub-ASPs in the specific part.

In general a small number of common ASPs cover all functionality, although other ASPs may be introduced to simplify TTCN-3 implementation and improve readability. Recurrent SS changes, such as power level changes, security activation and MAC scheduling are handled in dedicated ASPs. In addition, special purpose ASPs are used to control special behaviour, for example in L2 tests.

Configuration ASPs re-use ASN.1 definitions defined in the core specs.

No encoding rules are specified for the configuration ASPs; how they are encoded is left up to the SS implementation.

Configuration ASPs are 'procedure-based', rather than 'protocol layer-based' and reflect the state transitions of the SS. The same ASPs are used for reconfiguration and for initial configuration. In the case of reconfiguration the semantics of omit is to keep the configuration as it is; therefore when an IE in a configuration may be left out this is done e.g. by setting the respective field to a special value "None".

Data ASPs for sending/receiving peer-to-peer PDUs and user data all have different ASPs for the different SAPs.

The common part includes (at least):

- Timing Info:
  - SFN.
  - Subframe number (optional).
  - Which timing to use will depend on the test procedure and ASP purpose.
- Control Info:
  - Confirmation Flag.

The RRC ASN.1 IEs used in the specific part of the configuration ASPs:

- are imported using the granularity at the channel structure level or below;
- allow the ASP to be organised according to SS requirements;
- have a name that relates to SS configuration.

The SS specific IEs used in the specific part of the configuration ASPs (i.e. those elements not imported from the RRC ASN.1):

- use a naming convention such that they are easily distinguishable from the RRC ASN.1 IEs;
- are defined in TTCN-3 (i.e. not in ASN.1).

# C.2 SS State Model

Figure C.2 shows the basic SS state model. It is basic in the sense that internally the SS may have more states; however, (re)configuration actions (state transitions in the model) should cause the SS to transit between the states defined below.

The following assumptions have been made about this state model:

- It presents a model of states in scope of a single cell. Hence, all configuration activities shall be performed in scope of a single cell.
- It depicts only SS states and SS (re)configuration actions between these states:
  - It does not show events which may trigger state transitions, e.g. L3 messages or procedures - i.e. it is test case and L3 procedure agnostic.
  - It does not show any peer-to-peer (i.e. between SS and UE) messages.
- Triggers for state transitions are always SS configuration messages (ASPs) coming from the test suite:
  - L2 messages coming from the UE can only trigger internal SS sub-state transitions and semi-autonomous procedures.
- L1 and L2 procedures (e.g. random access procedure, scheduling, security activation steps) are semi-autonomously handled by the SS and after being pre-configured do not require interaction with the test case:
  - The majority of test cases do not need to worry about e.g. RA procedure and letting the SS handle it would greatly simplify test case definition and implementation.
  - There may be stringent time requirements in case of some procedures that can be hard to meet in a generic way in the test suite.
  - Semi-autonomous procedures should be flexibly configurable and should have a "manual" mode in which they are handled by the test suite in order to enable testing them. What is the desired level and way of control is FFS.

Most states are stationary states, i.e. the SS can stay in them for a long time or, after performing some procedures, returns to these states. However, there is one state (indicated by dashed lines) which is part of the AS security activation procedure and is transitional, i.e. the SS can only stay in it for a short time until a transition the next stationary state is triggered.

To make the diagram more readable, a separate state called *ANY_STATE* has been introduced, together with some transitions. It shows which transitions are allowed at any point of time in any state.

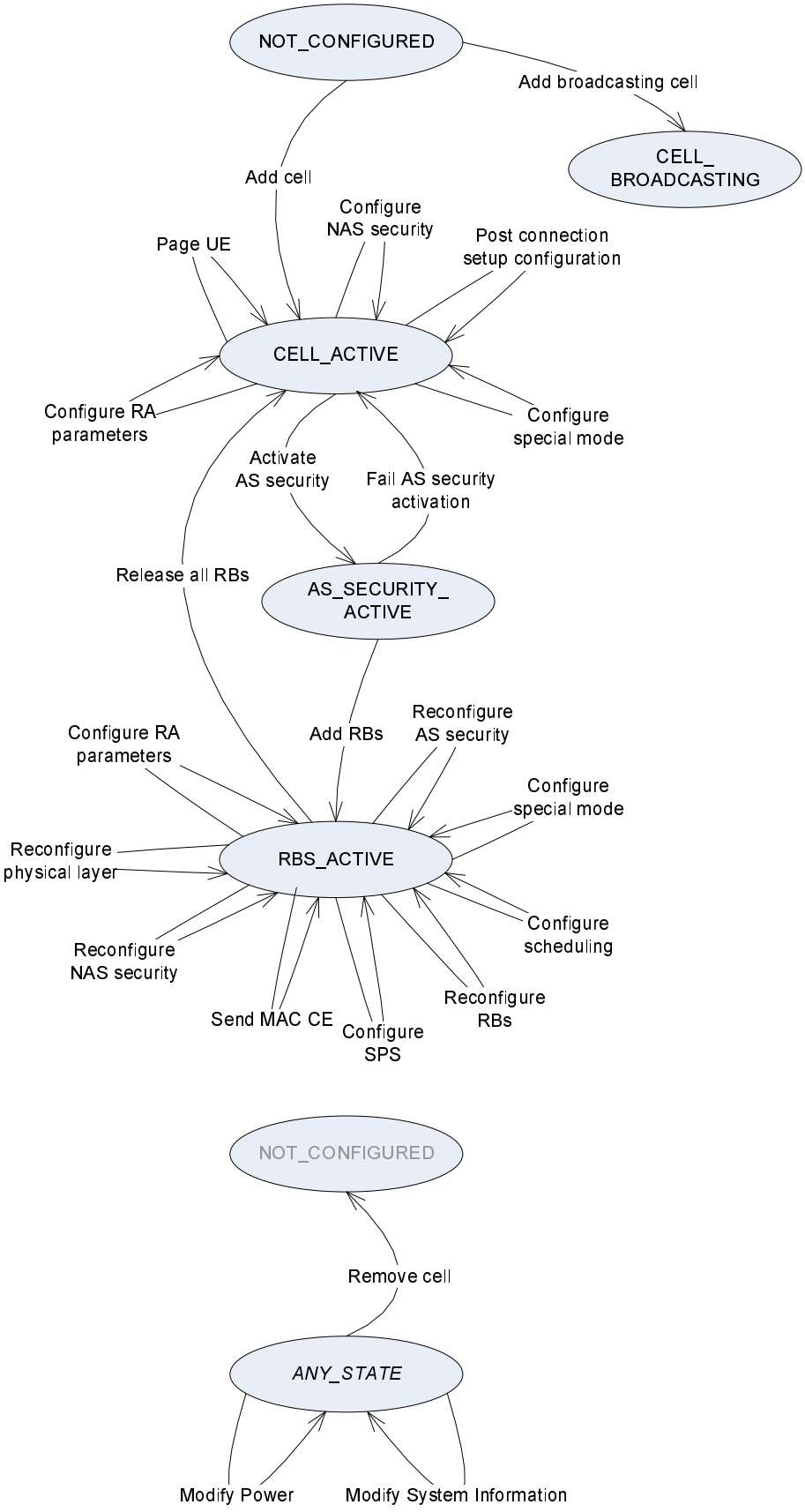


**Figure C.2-1: Basic SS state model**

Description of states.

**Table C.2-1**

| State | Description |
|---|---|
| NOT_CONFIGURED | The cell does not exist (is not configured) in the SS |
| CELL_BROADCASTING | Physical DL channels and signals configured<br>Initial cell configuration done: freq, BW, antennas, MIMO mode, power, etc.<br>Transport and logical channels configured for SI broadcast<br>Cell is broadcasting SI and downlink signals<br>NOTE 1: This type of cell is needed only to serve as a neighbouring cell for measurement purposes, where full cell configuration does not need to be specified. There is no need to be able to promote a broadcasting cell to a full cell.<br>NOTE 2: It is currently open whether a separate cell type with limited PRACH/RACH Rx capability is needed - this depends on whether a justified use case is defined for such a cell type. |
| CELL_ACTIVE | Cell configured to send and receive data from UE (fully functional)<br>SRB0 defined (default configuration specified in TS 36.508 [3])<br>SRB1 defined (default configuration specified in TS 36.508 [3]) |
| AS_SECURITY_ACTIVE | The SS has AS security (integrity protection and ciphering) active<br>NOTE: The SS needs to autonomously take care of a temporary state in which integrity protection is applied to an outgoing SMC message, but ciphering is not. |
| RBS_ACTIVE | SRB2 and/or DRBs are configured for the UE (in addition to SRB0 and SRB1) |
| ANY_STATE | Represents any of the above states (except NOT_CONFIGURED) |

# Annex D (normative)
# TTCN-3 Definitions

## D.1 EUTRA_ASP_TypeDefs

Type definitions for configuration of the system simulator;
Common design principles:

- Semantics of OMIT: for all TTCN-3 type definitions used in ASPs omit means "keep as it is" =>
  - on initial configuration in general all fields shall be provided;
  - no default values for fields are foreseen;
  - if necessary non-existence of information shall be explicitly configured (e.g. with a union of "no configuration" and "configuration parameters";
  - fields within structures imported from the core spec are excepted from this rule.

### D.1.1 ASN1_Container

Definitions containing ASN.1 types for backward compatibility;

NOTE 1: PCCH_Message and BCCH_DL_SCH_Message already have a critical extension mechanism by RRC type definition.

NOTE 2: BCCH_BCH_Message contains the MIB and therefore is considered to be not extendable.

NOTE 3: "simple types" are not considered: C_RNTI, PhysCellId, CellIdentity, ARFCN_ValueEUTRA.

**TDD_Config_Type**

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **TDD_Config_Type** | |
| **Comment** | | |
| R8 | TDD_Config | |

**AntennaInfoCommon_Type**

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **AntennaInfoCommon_Type** | |
| **Comment** | | |
| R8 | AntennaInfoCommon | |

**AntennaInfoDedicated_Type**

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **AntennaInfoDedicated_Type** | |
| **Comment** | | |
| R8 | AntennaInfoDedicated | |

### PHICH_Config_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PHICH_Config_Type | |
| Comment | | |
| R8 | PHICH_Config | |

### PRACH_Config_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PRACH_Config_Type | |
| Comment | | |
| R8 | PRACH_Config | |

### PUCCH_ConfigCommon_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PUCCH_ConfigCommon_Type | |
| Comment | | |
| R8 | PUCCH_ConfigCommon | |

### PUCCH_ConfigDedicated_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PUCCH_ConfigDedicated_Type | |
| Comment | | |
| R8 | PUCCH_ConfigDedicated | |

### PUSCH_ConfigCommon_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PUSCH_ConfigCommon_Type | |
| Comment | | |
| R8 | PUSCH_ConfigCommon | |

### PUSCH_ConfigDedicated_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | PUSCH_ConfigDedicated_Type | |
| Comment | | |
| R8 | PUSCH_ConfigDedicated | |

### SoundingRS_UL_ConfigCommon_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | SoundingRS_UL_ConfigCommon_Type | |
| Comment | | |
| R8 | SoundingRS_UL_ConfigCommon | |

### SoundingRS_UL_ConfigDedicated_Type

| TTCN-3 Union Type | | |
|---|---|---|
| Name | SoundingRS_UL_ConfigDedicated_Type | |
| Comment | | |
| R8 | SoundingRS_UL_ConfigDedicated | |

### SchedulingRequestConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SchedulingRequestConfig_Type** | |
| **Comment** | | |
| R8 | SchedulingRequestConfig | |

### CQI_ReportConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **CQI_ReportConfig_Type** | |
| **Comment** | | |
| R8 | CQI_ReportConfig | |

### RACH_ConfigCommon_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RACH_ConfigCommon_Type** | |
| **Comment** | | |
| R8 | RACH_ConfigCommon | |

### RACH_ConfigDedicated_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RACH_ConfigDedicated_Type** | |
| **Comment** | | |
| R8 | RACH_ConfigDedicated | |

### MeasGapConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **MeasGapConfig_Type** | |
| **Comment** | | |
| R8 | MeasGapConfig | |

### PDCP_Config_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_Config_Type** | |
| **Comment** | | |
| R8 | PDCP_Config | |

### UL_AM_RLC_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UL_AM_RLC_Type** | |
| **Comment** | | |
| R8 | UL_AM_RLC | |

### DL_AM_RLC_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DL_AM_RLC_Type** | |
| **Comment** | | |
| R8 | DL_AM_RLC | |

### UL_UM_RLC_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UL_UM_RLC_Type** | |
| **Comment** | | |
| R8 | UL_UM_RLC | |

### DL_UM_RLC_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DL_UM_RLC_Type** | |
| **Comment** | | |
| R8 | DL_UM_RLC | |

### TTI_BundlingConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TTI_BundlingConfig_Type** | |
| **Comment** | | |
| R8 | boolean | |

### DRX_Config_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DRX_Config_Type** | |
| **Comment** | | |
| R8 | DRX_Config | |

### SpsConfigurationDL_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SpsConfigurationDL_Type** | |
| **Comment** | | |
| R8 | SPS_ConfigDL.setup | |

### SpsConfigurationUL_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SpsConfigurationUL_Type** | |
| **Comment** | | |
| R8 | SPS_ConfigUL.setup | |

### UplinkPowerControlCommon_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UplinkPowerControlCommon_Type** | |
| **Comment** | | |
| R8 | UplinkPowerControlCommon | |

### UplinkPowerControlDedicated_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UplinkPowerControlDedicated_Type** | |
| **Comment** | | |
| R8 | UplinkPowerControlDedicated | |

## D.1.2 System_Configuration

Formal ASP Definitions for system configuration

**SystemRequest_Type**

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **SystemRequest_Type** | |
| **Comment** | | |
| Cell | CellConfigRequest_Type | configure/release a cell |
| CellAttenuationList | CellAttenuationList_Type | power attenuation for one or several cells;<br>all cells included in the list shall be changed at the same time;<br>all cells in the list shall reach the new cell power within a maximum of 100ms (10 frames)<br>acc. to the tolerances given in TS 36.508<br>**NOTE: In the common ASP part the CellId shall be set**<br>**- to the cell the timing information refers to if activation time shall be applied**<br>**- to eutra_Cell_NonSpecific when there is no activation time** |
| RadioBearerList | RadioBearerList_Type | configure/release one or several SRBs and/or DRBs |
| EnquireTiming | Null_Type | get SFN and sub-frame number for this cell |
| AS_Security | AS_Security_Type | StartRestart/Release of AS security |
| Sps | SpsConfig_Type | to configure/activate or release semi-persistent scheduling |
| Paging | PagingTrigger_Type | to trigger SS to send paging at the given paging occasion (as calculated in TTCN) |
| L1MacIndCtrl | L1Mac_IndicationControl_Type | to configure SS to generate indications for L1/MAC events |
| PdcpCount | PDCP_CountReq_Type | to set or enquire PDCP COUNT for one ore more RBs |
| L1_TestMode | L1_TestMode_Type | To Set L1/MAC in special Test modes eg. DL CRC, PHICH etc |
| PdcchOrder | RA_PDCCH_Order_Type | to configure SS to transmit a PDCCH order with configured C-RNTI to the UE<br>to trigger RA procedure;<br>result in DCI Format 1A transmission as in TS 36.212, clause 5.3.3.1.3 |

**SystemConfirm_Type**

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **SystemConfirm_Type** | |
| **Comment** | confirmations for system configuration;<br>in general to be sent after the configuration has been done | |
| Cell | Null_Type | (no further parameters from SS) |
| CellAttenuationList | Null_Type | (no further parameters from SS)<br>NOTE 1:<br>**the confirmation shall be sent when all cells have changed power levels**<br>NOTE 2:<br>**for the CellId in the common ASP part the same rules are applied as for the SYSTEM REQ** |
| RadioBearerList | Null_Type | (no further parameters from SS) |
| EnquireTiming | Null_Type | SFN and sub-frame number are included in the TimingInfo |
| AS_Security | Null_Type | (no further parameters from SS) |
| Sps | Null_Type | (no further parameters from SS) |
| Paging | Null_Type | normally not needed but defined for completeness |
| L1MacIndCtrl | Null_Type | (no further parameters from SS) |
| PdcpCount | PDCP_CountCnf_Type | as response to 'Get' a list is returned containing COUNT information for the requested RBs |
| L1_TestMode | Null_Type | confirmation for L1 test mode |
| PdcchOrder | Null_Type | confirmation for PDCCH Order |

**SystemIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SystemIndication_Type** | |
| **Comment** | | |
| Error | charstring | indicates an error situation in SS;<br>is not explicitly handled in TTCN but causes an INCONC due to default behaviour;<br>an additional error code can be signalled in the common part of the ASP;<br>SS shall raise an error in case of<br>- Invalid TimingInfo for TDD<br>- Contradiction of periodic UL grants and TDD configuration<br>- Data scheduled for the same TTI does not fit into an available transport block<br>(NOTE: additional cases may occur) |
| RachPreamble | RachPreamble_Type | RACH preamble being sent by the UE |
| SchedReq | Null_Type | indication for scheduling request sent by the UE |
| BSR | BSR_Type | to report the Buffer status report being received |
| UL_HARQ | HARQ_Type | to report the UL HARQ as received on PUCCH[TTI] for corresponding DL transmission in TTI-x,<br>where x is normally 4 |
| C_RNTI | C_RNTI | indicates C-RNTI being contained in a MAC PDU sent by the UE |
| PHR | PHR_Type | to report the Power headroom report received |
| HarqError | HarqError_Type | indicates detection of HARQ error:<br>1. HARQ CRC error for UL data<br>2. HARQ NACK from the UE unless SS is configured to report HARQ ACK/NACK |

# D.1.3 Cell_Configuration

Specific Info for Cell Configuration Primitive

## D.1.3.1 Cell_Configuration_Common

**EUTRA_ASP_TypeDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_CellAttenuation_Off** | Attenuation_Type | {Off:=true} | |

**Cell_Configuration_Common: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **EUTRA_FDD_Info_Type** | Null_Type | no further parameters defined for FDD |
| **EutraBand_Type** | integer (1..40) | E-UTRA Band acc. to TS 36.101, clause 5.2 (common for UL/DL) |
| **CfiValue_Type** | integer (1..3) | |
| **AbsoluteCellPower_Type** | integer (-145..0) | absolute cell power (dBm) |
| **InitialAttenuation_Type** | Attenuation_Type (tsc_CellAttenuation_Off) | Attenuation restricted to 'Off' |
| **ToRS_EPRE_Ratio_Type** | integer (-35..0) | any-resource-element to RS ratio in dB (e.g. PDSCH-to-RS ratio; see TS 36.213, clause 5.2) |

### CellConfigRequest_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **CellConfigRequest_Type** | |
| **Comment** | | |
| AddOrReconfigure | CellConfigInfo_Type | for cell configuration:<br>CellId : identifier of the cell to be configured<br>RoutingInfo : None<br>TimingInfo : Now (for initial configuration and for reconfiguration in general)<br>ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general) |
| Release | Null_Type | to remove a cell completely -<br>CellId : identifier of the cell to be configured<br>RoutingInfo : None<br>TimingInfo : Now<br>ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general) |

### CellConfigInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CellConfigInfo_Type** | | |
| **Comment** | common information for initial cell configuration or reconfiguration;<br>in case of reconfiguration OMIT means 'keep configuration as it is' | | |
| Basic | BasicCellConfig_Type | opt | basic information for a cell (e.g. broadcasting) |
| Active | ActiveCellConfig_Type | opt | add. configuration for active cell (i.e. cell being capable to receive RACH preamble) |

### CellConfigCapability_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **CellConfigCapability_Type** |
| **Comment** | capabilities af a cell acc. to the initial condition of a test case |
| broadcastOnlyCell | no detection of RACH preables required; cell is only broadcasting |
| minimumUplinkCell | detection of RACH preables required but not any further RX capability |
| fullCell | full TX and RX capabilities |

### BasicCellConfig_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **BasicCellConfig_Type** | | |
| **Comment** | | | |
| ConfigCapability | CellConfigCapability_Type | opt | mandatory for the initial configuration; to be omitted afterwards |
| StaticCellInfo | StaticCellInfo_Type | opt | Common information which does not change during a test |
| PhysicalLayerConfigDL | PhysicalLayerConfigDL_Type | opt | default settings regarding physical control channels: PCFICH, PHICH, PDCCH |
| InitialCellPower | InitialCellPower_Type | opt | reference cell power for the RS of each antenna in DL<br>NOTE 1:<br>the power of the RS of an antenna may be reduced by antenna specific configuration<br>NOTE 2:<br>in general the power may be adjusted on a per resource element basis<br>=> all physical channel/signal power settings shall be ajusted relatively to the RS;<br>if there are more than one TX antennas each one may have its own attenuation;<br>independently from those relative power settings the cell power can easily be adjusted by just changing the reference power |
| BcchConfig | BcchConfig_Type | opt | configuration of BCCH/BCH; SS is triggered to configure RLC/MAC regardingly;<br>BCCH data on the PDSCH is distiguished by the SI-RNTI<br>PBCH: MIB;<br>PDSCH: scheduling and resource allocation; SIBs |
| PcchConfig | PcchConfig_Type | opt | configuration of PCCH/PCH; SS is triggered to configure RLC/MAC regardingly;<br>PCCH data on the PDSCH is distiguished by the P-RNTI<br>(needed even to modify SI => shall be configured for CELL_BROADCASTING) |

### ActiveCellConfig_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ActiveCellConfig_Type** | | |
| **Comment** | | | |
| C_RNTI | C_RNTI | opt | (pre-)configured C-RNTI;<br>affects scrambling of PDSCH/PUSCH and CRC of PDCCH(s);<br>shall be used implicitly in RACH procedure (i.e. as CE in RAR) |
| PhysicalLayerConfigUL | PhysicalLayerConfigUL_Type | opt | parameters for PRACH, PUCCH, PUSCH |
| RachProcedureConfig | RachProcedureConfig_Type | opt | to configure the SS's behaviour for the RACH procedure |
| CcchDcchDtchConfig | CcchDcchDtchConfig_Type | opt | Parameters related to CCCH/DCCH/DTCH in UL and DL |

### StaticCellInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **StaticCellInfo_Type** | | |
| **Comment** | Common information which (normally) does not change during a test;<br>therefore all fields are mandatory | | |
| Common | CommonStaticCellInfo_Type | | |
| Downlink | DownlinkStaticCellInfo_Type | | |
| Uplink | UplinkStaticCellInfo_Type | opt | **NOTE: for TDD UL and DL are using the same parameters** |

### CommonStaticCellInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CommonStaticCellInfo_Type** | | |
| **Comment** | information common for UL and DL; all fields are mandatory | | |
| RAT | EUTRA_RAT_Type | | FDD or TDD; FDD/TDD specific parameters |
| PhysicalCellId | PhysCellId | | N(cell, ID): imported from core spec;<br>-> cell specific reference signals (non-MBSFN)<br>-> scrambling of all DL physical channels:<br>PBCH, PCFICH, PDCCH, PHICH and PDSCH (together with nRNTI) |
| eNB_CellId | CellIdentity | opt | Placeholder for Cell identity (28 bits): eNB (20bits) and cell identity (8bits).<br>The use of that field is for future usage and omit for the time being |
| EutraBand | EutraBand_Type | | NOTE:<br>in 3G there are overlapping bands therefore the band needs to be provided;<br>in EUTRA it is provided as well to be extendable in the future |
| CellTimingInfo | CellTimingInfo_Type | | |

### EUTRA_TDD_Info_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **EUTRA_TDD_Info_Type** | | |
| **Comment** | | | |
| Configuration | TDD_Config_Type | | TDD_Config acc. to RRC ASN.1 (acc. TS 36.331, clause 6.3.2 ) |

### EUTRA_HalfDuplexFDD_Info_Type

| TTCN-3 Record Type | |
|---|---|
| **Name** | **EUTRA_HalfDuplexFDD_Info_Type** |
| **Comment** | NOTE:<br>for the time being there is no test case or test configuration using half duplex FDD;<br>(type definition is used as place holder only) |

### EUTRA_RAT_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **EUTRA_RAT_Type** | |
| **Comment** | specifies RAT type and frame structure (TS 36.211, clause 4) | |
| FDD | EUTRA_FDD_Info_Type | |
| TDD | EUTRA_TDD_Info_Type | |
| HalfDuplexFDD | EUTRA_HalfDuplexFDD_Info_Type | |

### CellTimingInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CellTimingInfo_Type** | | |
| **Comment** | Cell Timing | | |
| Tcell | integer (0..307199) | | frame duration Tf = 307200 * Ts = 10ms; System Time Unit Ts = 1/(15000 * 2048) |
| SfnOffset | integer (0..1023) | | (assuming 10 bit SFN) |

### DownlinkStaticCellInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DownlinkStaticCellInfo_Type** | | |
| **Comment** | DL Static Info | | |
| Earfcn | ARFCN_ValueEUTRA | | DL-EARFCN as defined in TS 36.101 |
| Bandwidth | Dl_Bandwidth_Type | | N(DL, RB) = 6..110 (6, 15, 25, 50, 75, 100) |
| RBSize | EUTRA_RBSize_Type | | may be skipped assuming normal sub-carrier spacing => N(RB, SC) = 12 |
| CyclicPrefix | EUTRA_CyclicPrefix_Type | | |

### UplinkStaticCellInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **UplinkStaticCellInfo_Type** | | |
| **Comment** | UL Static Info | | |
| Earfcn | ARFCN_ValueEUTRA | | UL-EARFCN as defined in TS 36.101 |
| Bandwidth | Ul_Bandwidth_Type | | N(DL, RB) = 6..110 (6, 15, 25, 50, 75, 100) |
| CyclicPrefix | EUTRA_CyclicPrefix_Type | | |

### EUTRA_RBSize_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **EUTRA_RBSize_Type** |
| **Comment** | Resource Block Size in freq domain;<br>N(RB,SC) is 12 for normal sub-carrier spacing |
| n_RB_SC_12 | |
| n_RB_SC_24 | |

### EUTRA_CyclicPrefix_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **EUTRA_CyclicPrefix_Type** |
| **Comment** | NOTE: in DL extended cyclic prefix depends on sub-carrier spacing |
| normal | |
| extended | |

### Modulation_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **Modulation_Type** |
| **Comment** | 'unused' e.g. for 2nd codeword when there is no spatial multiplexing |
| unused | |
| qpsk | |
| qam16 | |
| qam64 | |

### Attenuation_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **Attenuation_Type** | |
| **Comment** | attenuation of the reference power | |
| Value | integer (0..144) | cell power reference power reduced by the given attenuation (value is in dB) |
| Off | Null_Type | even though in TS 36.508 -145dBm is given for a non suitable cell we specify an explicit "Off" value here |

**ToRS_EPRE_Ratios_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ToRS_EPRE_Ratios_Type** | | |
| **Comment** | RA and RB ratios according to see TS 36.213, clause 5.2 | | |
| RA | ToRS_EPRE_Ratio_Type | opt | |
| RB | ToRS_EPRE_Ratio_Type | opt | |

**InitialCellPower_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **InitialCellPower_Type** | | |
| **Comment** | | | |
| MaxReferencePower | AbsoluteCellPower_Type | | maximum value of cell reference power (RS EPRE in dBm/15kHz as per TS 36.508, clause 4.3.4.1);<br>a cell is initialised with this reference power;<br>its value is the upper bound of the cell power during the test case |
| Attenuation | InitialAttenuation_Type | | initial attenuation |

## D.1.3.2 Downlink_Physical_Layer_Configuration

Downlink physical layer configuration:
- DL antenna configuration
- control region (PCFICH, PHICH, PDCCH)
- primary/secondary sync signals
- power control for physical channels and signals

### D.1.3.2.1 Antenna_Configuration

**Antenna_Configuration: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **AntennaPortId_Type** | integer (0, 1, 2, 3) | |

**AntennaPortInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AntennaPortInfo_Type** | | |
| **Comment** | NOTE:<br>for conformance tests it may not be necessary to consider propagation pathes for different antennas;<br>=> fields of AntennaPortInfo_Type are used as place holders for future usage and are of 'Dummy_Type' for the time being | | |
| PowerAttenuation | Dummy_Type | | even though eNb shall send with the same power on all antennas at the UE there may be different signal strength<br>=> RS will have reduced power<br>NOTE: the EPRE ratios (e.g. PDSCH-to-RS ratio) are assumed to be equal for all antennas |
| PropagationDelay | Dummy_Type | | signal from different antennas may have different propagation delay |

**AntennaPortConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **AntennaPortConfig_Type** | |
| **Comment** | | |
| AddOrReconfigure | AntennaPortInfo_Type | add / re-configure antenna port |
| Release | Null_Type | release antenna port |

**AntennaPort_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AntennaPort_Type** | | |
| **Comment** | | | |
| Id | AntennaPortId_Type | | |
| Config | AntennaPortConfig_Type | | |

**DownlinkAntennaGroupConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DownlinkAntennaGroupConfig_Type** | | |
| **Comment** | | | |
| AntennaInfoCommon | AntennaInfoCommon_Type | | acc. to TS 36.331, clause 6.3.2; contains antennaPortsCount = an1, an2, an4;<br>static parameter; will (normally) not be modified whilst a test;<br>NOTE:<br>information is redundant since number of antenna ports may implicitly be determined by the number of ports being configured |
| AntennaPort | record length (1..4) of AntennaPort_Type | | 1, 2 or 4 antennas;<br>from the UE's point of view each antenna may have a different power level and a different propagation delay |

### D.1.3.2.2 Physical_Channels

**PbchConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PbchConfig_Type** | | |
| **Comment** | | | |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PBCH's resource elements relative to the RS |

**PcfichConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PcfichConfig_Type** | | |
| **Comment** | | | |
| CfiValue | CfiValue_Type | opt | control format indicator signalled on PCFICH |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PFCICH's resource elements relative to the RS |

**PhichConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PhichConfig_Type** | | |
| **Comment** | | | |
| PhichConfig | PHICH_Config_Type | opt | parameters acc. TS 36.331, clause 6.3.2:<br>phich-Duration, phich-Resource;<br>may have impact on Cfi |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PHICH's resource elements relative to the RS |

### CCE_StartIndex_DL_UL_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CCE_StartIndex_DL_UL_Type** | | |
| **Comment** | CCE_St_Ind' or CCE_St_Ind" acc. to table 7.1.1-1 in TS 36.523-3 | | |
| CCE_StartIndex_DL | integer | | |
| CCE_StartIndex_UL | integer | | |

### CCE_StartIndexList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **CCE_StartIndexList_Type** |
| **Comment** | describes PDCCH candidates for all sub-frames |
| record length(10) of CCE_StartIndex_DL_UL_Type | |

### PdcchCandidate_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdcchCandidate_Type** | | |
| **Comment** | CCE start indeces for a given RNTI value acc. to table 7.1.1-1 in TS 36.523-3 | | |
| RNTI | C_RNTI | | RNTI value as per table 7.1.1-1 |
| CCE_StartIndexList | CCE_StartIndexList_Type | | CCE Start Indices corresponding to the RNTI |

### PdcchCandidateList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **PdcchCandidateList_Type** |
| **Comment** | list of RNTIs and their corresponding CCE Start Indices |
| record of PdcchCandidate_Type | |

### PdcchConfig_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdcchConfig_Type** | | |
| **Comment** | UE performs blind detection for common and UE specific search spaces for different aggregation levels (PDCCH formats acc. TS 36.211, clause 6.8.1)<br>content of the PDCCHs (DCI formats acc. TS 36.212, clause 5.3.3) shall be controlled together with scheduling and resource allocation | | |
| CommonSearchSpaceFormat | integer (2, 3) | opt | PDCCH format for common search space;<br>acc. to TS 36.213, clause 9.1.1 only aggregation level 4 and 8 are allowed (i.e. PDCCH format 2 and 3 |
| UeSpecificSearchSpaceFormat | integer (0, 1, 2, 3) | opt | UE specific search space: corresponding aggregation levels 1, 2, 4, 8 |
| PdcchCandidateList | PdcchCandidateList_Type | opt | PDCCH candidate list acc. to table 7.1.1-1 in TS 36.523-3 |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PDCCH's resource elements relative to the RS |

**PdschRelativeTxPower_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdschRelativeTxPower_Type** | | |
| **Comment** | NOTE 1:<br>the power control for the PDSCH is assumed to be (semi-)static for signalling conformance tests acc. to TS 36.323;<br>**nevertheless for different channels and purposes with the PDSCH there may be different power settings;**<br>NOTE 2:<br>acc. to TS 36.213, clause 5.2 the EPRE ratio is different in time domain for OFDM symbols containing or not containing reference signals;<br>**this needs to be considered by SS** | | |
| RachResponse | ToRS_EPRE_Ratios_Type | opt | |
| BcchOnPdsch | ToRS_EPRE_Ratios_Type | opt | |
| PcchOnPdsch | ToRS_EPRE_Ratios_Type | opt | |
| CcchDcchDtch | ToRS_EPRE_Ratios_Type | opt | |

**PdschConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdschConfig_Type** | | |
| **Comment** | | | |
| RelativeTxPower | PdschRelativeTxPower_Type | opt | |

### D.1.3.2.3 Physical_Signals

**PrimarySyncSignal_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PrimarySyncSignal_Type** | | |
| **Comment** | | | |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PSS's resource elements relative to the RS |

**SecondarySyncSignal_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SecondarySyncSignal_Type** | | |
| **Comment** | | | |
| RelativeTxPower | ToRS_EPRE_Ratios_Type | opt | power ratio for PSS's resource elements relative to the RS |

**SRS_UL_Config_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SRS_UL_Config_Type** | | |
| **Comment** | | | |
| Common | SoundingRS_UL_ConfigCommon_Type | | |
| Dedicated | SoundingRS_UL_ConfigDedicated_Type | | |

**PhysicalLayerConfigDL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PhysicalLayerConfigDL_Type** | | |
| **Comment** | all fields are declared as optional to allow single reconfigurations; in this case omit means "keep as it is" | | |
| AntennaGroup | DownlinkAntennaGroupConfig_Type | opt | |
| Pbch | PbchConfig_Type | opt | |
| Pcfich | PcfichConfig_Type | opt | |
| Phich | PhichConfig_Type | opt | |
| Pdcch | PdcchConfig_Type | opt | |
| Pdsch | PdschConfig_Type | opt | |
| Pss | PrimarySyncSignal_Type | opt | |
| Sss | SecondarySyncSignal_Type | opt | |

## D.1.3.3 Uplink_Physical_Layer_Configuration

Uplink physical channel configuration: PRACH, PUCCH, PUSCH and UL RS

**PUCCH_Configuration_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PUCCH_Configuration_Type** | | |
| **Comment** | | | |
| Common | PUCCH_ConfigCommon_Type | opt | |
| Dedicated | PUCCH_ConfigDedicated_Type | opt | |

**PUSCH_Configuration_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PUSCH_Configuration_Type** | | |
| **Comment** | | | |
| Common | PUSCH_ConfigCommon_Type | opt | |
| Dedicated | PUSCH_ConfigDedicated_Type | opt | |

**SS_TimingAdvanceConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SS_TimingAdvanceConfig_Type** | |
| **Comment** | | |
| InitialValue | RACH_TimingAdvance_Type | initial value corresponding to what is sent to the UE in RACH response<br>(range acc. 11 bit value; 0 in normal cases) |
| Relative | TimingAdvanceIndex_Type | timing advance command to adjust changes of timing advance acc. to TS 36.213, clause 4.2.3;<br>(range acc. 6 bit value: -31..32) |

**PhysicalLayerConfigUL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PhysicalLayerConfigUL_Type** | | |
| **Comment** | NOTE:<br>For the time being there is no requirement to configure the SS with TPC-PDCCH-Config:<br>In general SS is required to keep the UE's UL power constant | | |
| Prach | PRACH_Config_Type | opt | parameters acc. TS 36.331, clause 6.3.2;<br>in general depending on FDD/TDD (see TS 36.211, clause 5.7) |
| Pucch | PUCCH_Configuration_Type | opt | parameters acc. TS 36.331, clause 6.3.2 |
| Pusch | PUSCH_Configuration_Type | opt | parameters acc. TS 36.331, clause 6.3.2<br>(including configuration of RS) |
| TimingAdvance | SS_TimingAdvanceConfig_Type | opt | to adjust timing advance;<br>normally timing advance is configured as 0 at the beginning and never changed during the test case;<br>in some MAC test cases timing advance may be configured to a non-zero (11 bit value) at the beginning and modified by (6 bit) timing advance commands during the test |
| SRS_UL_Config | SRS_UL_Config_Type | opt | sounding reference symbol (SRS); -> TS 36.213, clause 8.2, TS 36.211, clause 5.5.3 |
| SR_Config | SchedulingRequestConfig_Type | opt | PUCCH resources for scheduling requests acc. to TS 36.213 table 10.15;<br>as signalled to the UE acc. to TS 36.331, clause 6.3.2 |
| CQI_ReportConfig | CQI_ReportConfig_Type | opt | |
| UplinkPowerControlCommon | UplinkPowerControlCommon_Type | opt | |
| UplinkPowerControlDedicated | UplinkPowerControlDedicated_Type | opt | |

## D.1.3.4 Common_MAC_Configuration

Transport channel and MAC related procedures and configuration

**Common_MAC_Configuration: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **ImcsValue_Type** | integer (0..31) | Modulation and coding scheme index coding |
| **TimingAdvanceIndex_Type** | integer (0..63) | acc. to TS 36.321, clause 6.1.3.5 "Timing Advance Command MAC Control Element" and TS 36.213, clause 4.2.3 "Transmission timing adjustments" |
| **TimingAdvance_Period_Type** | integer (150, 400, 600, 1020, 1530, 2040, 4090, 8190) | 150 coresponds to 75% of 200ms drx-InactivityTimer as used for L2 UM tests;<br>the other values correspond to 80 % of TimeAlignmentTimer (acc. to TS 36.523-3, clause 7.2)<br>(TS 36.331, clause 6.3.2: sf500, sf750, sf1280, sf1920, sf2560, sf5120, sf10240) rounded to nearest multiple of 10 |

**RedundancyVersionListDL_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RedundancyVersionListDL_Type** |
| **Comment** | NOTE:<br>in general the list shall contain maxHARQ-Tx elements;<br>if there are not enough elements specified SS shall raise an error;<br>per default the list is configured to 0,2,3,1,0 (TS 36.321, clause 5.4.2.2) |
| record length (1..28) of RedundancyVersion_Type | |

### UL_TransRetransmission_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UL_TransRetransmission_Type** | |
| **Comment** | | |
| NewTransmission | Null_Type | new transmission of data with redundancy version RV=0 (acc. to TS 36.321 clause 5.4.2.2); NDI is toggled |
| ReTransmissionAdaptive | RedundancyVersion_Type | retransmission of data with given redundancy version; NDI is not toggled |
| ReTransmissionNonAdaptive | Null_Type | |

### UL_TransRetransmissionList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **UL_TransRetransmissionList_Type** |
| **Comment** | |
| record length (1..28) of UL_TransRetransmission_Type | |

### Imcs_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **Imcs_Type** | |
| **Comment** | | |
| Value | ImcsValue_Type | |
| NotUsed | Null_Type | |

### ULGrant_Period_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ULGrant_Period_Type** | |
| **Comment** | | |
| OnlyOnce | Null_Type | grant is sent out only once; no period |
| Duration | integer (-1,1..infinity) | duration of the grant period (TTI=1ms) |

### TransmissionRepetition_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TransmissionRepetition_Type** | |
| **Comment** | | |
| Continuous | Null_Type | |
| NumOfCycles | integer (1..infinity) | |

### PUCCH_AutoSynch_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PUCCH_AutoSynch_Type** | | |
| **Comment** | | | |
| TimingAdvance | TimingAdvanceIndex_Type | | |
| TA_Period | TimingAdvance_Period_Type | | time period after which TA MAC control elements need to be automatically transmitted |
| TA_Repetition | TransmissionRepetition_Type | | number of TA MAC control element repetitions to be automatically transmitted or 'Continuous' |

### PUCCH_Synch_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PUCCH_Synch_Type** | |
| **Comment** | | |
| None | Null_Type | no PUCCH Synchronisation applied |
| Auto | PUCCH_AutoSynch_Type | SS automatically maintains PUCCH synchronization at UE |

### FreqDomainSchedulCommon_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **FreqDomainSchedulCommon_Type** | | |
| **Comment** | common type to specify restrictions for frequency domain scheduling by a start index and a maximum range of RBs;<br>in general the resource allocation refers to virtual resource blocks:<br>- format 1A (localised):<br>FirstRbIndex refers to the first physical RB; the RBs are subsequent (upto MaxRbCnt RBs);<br>may be applied for all kind of channels<br>- format 1C (distributed):<br>FirstRbIndex refers to the first virtual RB; the virtual RBs are subsequent (upto MaxRbCnt RBs)<br>but mapped (distributed) to physical resource; typically applied on BCCH, PCCH and RAR<br>- format 1 (localised):<br>FirstRbIndex refers to the first physical RB; RBs are not consecutive;<br>SS needs to provided bitmap of RBs (see TS 36.523-3) to cope with mapping of virtual resource allocation (format 1C) applied on other channels;<br>typically there are either<br>- all channels having format 1A (localised)<br>- BCCH, PCCH and RAR having format 1C (distributed) + DTCH/DCCH having format 1 | | |
| FirstRbIndex | integer | | index of the first (vitual) resource block in frequency domain;<br>0 .. N(UL/DL, RB) - 1;<br>NOTE:<br>DCI format 1C refers to a virtual RB allocation i.e. the resource block index;<br>differs from the physical resource allocation<br>where the RBs are distributed over the whole frequency bandwidth (TS 36.213, clause 7.1.6.3) |
| MaxRbCnt | integer | | max. number of resource blocks to be assigned;<br>FirstRbIndex + MaxRbCnt <= N(UL/DL, RB);<br>SS shall not assigned more than the given resource blocks to the respective channel<br>(i.e. MaxRbCnt is the upper bound);<br>if the the configuration for a channel exceeds the total bandwidth this is a TTCN error<br>(=> SS shall raise an error) |

### FreqDomainSchedulExplicit_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **FreqDomainSchedulExplicit_Type** | | |
| **Comment** | type used for explicit DL scheduling; Nprb is the exact nunber of RBs whereas in FreqDomainSchedulCommon_Type MaxRbCnt is the upper bound | | |
| FirstRbIndex | Integer | | index of the first resource block in frequency domain;<br>0 .. N(UL/DL, RB) - 1 |
| Nprb | Integer | | number of resource blocks to be assigned; |

### PdcchDciFormat_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **PdcchDciFormat_Type** |
| **Comment** | DCI format acc. to TS 36.212, clause 5.3.3.1;<br>SS shall apply physical parameters accordingly as specified in TS 36.508, clause 4.3.6 |
| dci_0 | physical layer parameters acc. TS 36.508 Table 4.3.6.1.1-1 |
| dci_1 | physical layer parameters acc. TS 36.508 Table 4.3.6.1.2-1 |
| dci_1A | physical layer parameters acc. TS 36.508 Table 4.3.6.1.3-1 |
| dci_1B | |
| dci_1C | physical layer parameters acc. TS 36.508 Table 4.3.6.1.4-1 |
| dci_1D | |
| dci_2 | physical layer parameters acc. TS 36.508 Table 4.3.6.1.5-1 |
| dci_2A | physical layer parameters acc. TS 36.508 Table 4.3.6.1.6-1 |
| dci_3 | |
| dci_3A | |

### PdcchResourceAllocation_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **PdcchResourceAllocation_Type** |
| **Comment** | Resource allocation acc. TS 36.213, clause 7.1.6 |
| ra_0 | |
| ra_1 | |
| ra_2_Localised | => physical and virtual RB index are identical |
| ra_2_Distributed | => virtual resource allocation |

### DciDlInfoCommon_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DciDlInfoCommon_Type** | | |
| **Comment** | used for normal DL scheduling acc. to TS 36.523-3, clause 7.3 | | |
| Format | PdcchDciFormat_Type | | BCCH, PCCH and RACH Response: 1A or 1C (TS 36.213, clause 7.1)<br>CCCH: 1A since transmission mode is not (may not be) configured at the UE yet (TS 36.213, clause 7.1)<br>DTCH/DCCH: depending on transmission mode |
| ResourceAllocType | PdcchResourceAllocation_Type | | depends on DCI format, e.g. ra_2_Localised or ra_2_Distributed for DCI format 1A |
| Modulation_1st CW | Modulation_Type | | max. modulation scheme for the 1st code word;<br>depending on the amount of data a lower modulation scheme may be by SS but not a higher one;<br>BCCH, PCCH and RACH Response: QPSK only |
| Modulation_2nd CW | Modulation_Type | | modulation scheme for 2nd code word in case of spatial multiplexing;<br>can be different than 1st code word (see TS 36.211, clause 6.3.2; TS 36.212, clause 5.3.3.1.5);<br>'unused' when there is no spatial multiplexing;<br>NOTE:<br>Acc. to 36.523-3 cl. 7.3.3.4 in normal mode MIMO shall not be used<br>=> for the time being Modulation_2ndCW is always "unused" |
| FreqDomainSchedul | FreqDomainSchedulCommon_Type | | index of 1st RB; max. number of RBs per TTI;<br>NOTE:<br>in case of DCI format 1C the first RB index has no meaning since distributed virtual resource blocks assigned in this case (TS 36.213, clause 7.1.6.3) |
| RedundancyVersionList | RedundancyVersionListDL_Type | | list of Redundancy version to be used in case of retransmission; the number of elements in the list provides the maxHARQ-Tx |

### DciDlInfoExplicit_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DciDlInfoExplicit_Type** | | |
| **Comment** | used for explicit DL scheduling acc. to TS 36.523-3, clause 7.3 | | |
| Imcs_1stCW | Imcs_Type | | MCS index of table 7.1.7.1-1 of TS 36.213 |
| Imcs_2ndCW | Imcs_Type | | MCS index for the 2nd code word in case of MIMO; 'NotUsed' when MIMO is not used |
| Format | PdcchDciFormat_Type | | |
| ResourceAllocType | PdcchResourceAllocation_Type | | |
| FreqDomainSchedul | FreqDomainSchedulExplicit_Type | | |
| RedundancyVersionList | RedundancyVersionListDL_Type | | list of Redundancy version to be used in case of retransmission the number of elements in the list provides the maxHARQ-Tx |

### DciDlInfo_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DciDlInfo_Type** | |
| **Comment** | | |
| Auto | DciDlInfoCommon_Type | SS shall chose the appropriate TBS up to the maximim number of resource blocks |
| Explicit | DciDlInfoExplicit_Type | used in MAC or RAB tests where exact TBS needs to be specified |

### DciUlInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DciUlInfo_Type** | | |
| **Comment** | | | |
| Imcs | Imcs_Type | | MCS index of table 8.6.1-1 of TS 36.213 |
| TransRetransmissionList | UL_TransRetransmissionList_Type | | list of possible retransmissions and their redundancy versions (depending on being adapive or non-adaptive; the number of elements in the list provides the maxHARQ-Tx) |
| FreqDomainSchedul | FreqDomainSchedulExplicit_Type | | |

### PeriodicGrant_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PeriodicGrant_Type** | | |
| **Comment** | | | |
| Period | ULGrant_Period_Type | | time period after which UL Grant need to be automatically transmitted or 'OnlyOnce' |
| NoOfRepetitions | TransmissionRepetition_Type | | number of UL Grant repetitions to be automatically transmitted or continuous repetition |

**UL_GrantConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UL_GrantConfig_Type** | |
| **Comment** | | |
| OnSR_Reception | Null_Type | SS tranmits UL Grant as configured by CommonDciInfoUL_Type at every reception of SR;<br>to be used in non L2 Test |
| Periodic | PeriodicGrant_Type | SS tranmits UL Grant as configured by CommonDciInfoUL_Type periodically;<br>to be used in L2 tests;<br>MAC tests testing Grants might set the period as infinite and num grant as 1 |
| None | Null_Type | disable any grant transmission |

## D.1.3.5 Random_Access_Procedure

**EUTRA_ASP_TypeDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_RandomAccessResponseListSize** | integer | 10 | arbitrary value (needs to be extended, if necessary);<br>in case of RACH in idle, UE will keep on making RACH attempts until t300 expires<br>=> number of PRACH preambles maybe even greater than maximum value of PREAMBLE_TRANS_MAX |

**Random_Access_Procedure: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RACH_TimingAdvance_Type** | integer (0..2047) | 11 bit timing advance as used in RACH response (absolute value) |

**UplinkGrant_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **UplinkGrant_Type** | | |
| **Comment** | TS 36.213, clause 6.2 | | |
| HoppingFlag | B1_Type | | Hopping flag |
| RB_Allocation | B10_Type | | Fixed size resource block assignment |
| ModAndCodScheme | B4_Type | | Truncated modulation and coding scheme |
| TPC_Command | B3_Type | | TPC command for scheduled PUSCH |
| UL_Delay | B1_Type | | UL delay |
| CQI_Req | B1_Type | | CQI request |

### ContentionResolution_ContainedRlcPdu_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ContentionResolution_ContainedRlcPdu_Type** | |
| **Comment** | | |
| RlcPdu | octetstring | octetstring of an RLC PDU containing e.g. the RRC Connection Setup;<br>to be sent in the same MAC PDU as the MAC Contention Resolution Control Element |
| None | Null_Type | MAC PDU containing the MAC Contention Resolution Control Element does not contain an RLC PDU<br>(i.e. RRC Connection Setup is sent in another PDU) |

### ContentionResolution_ContainedId_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ContentionResolution_ContainedId_Type** | |
| **Comment** | | |
| XorMask | ContentionResolutionId_Type | When SS receives Contention Resolution ID from the UE,<br>SS shall XOR it with the given mask and use this as Contention Resolution ID;<br>this allows to get an unmatching Contention Resolution ID;<br>in normal cases mask shall be set to<br>tsc_ContentionResolutionId_Unchanged<br>(i.e. the Contention Resolution ID remains unchanged) |
| None | Null_Type | MAC Contention Resolution Control Element is not contained in the MAC PDU sent out as response on Msg3 |

### TCRNTI_ContentionResolutionMacPdu_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **TCRNTI_ContentionResolutionMacPdu_Type** | | |
| **Comment** | NOTE:<br>Either ContainedId or ContainedRlcPdu (or both) shall not be 'none';<br>(if no Contention Resolution Mac Pdu shall be sent,<br>TCRNTI_ContentionResolutionCtrl_Type.NoContResolID shall be used instead) | | |
| ContainedId | ContentionResolution_ContainedId_Type | | Either the Contention Resolution ID as received from the UE<br>or a modified Contention Resolution ID (XorMask != tsc_ContentionResolutionId_Unchanged)<br>or no Contention Resolution ID at all |
| ContainedRlcPdu | ContentionResolution_ContainedRlcPdu_Type | | the MAC PDU containing the MAC Contention Resolution Control Element may contain the RRC Connection Setup;<br>in this case the RRC PDU shall be completely encoded been contained in an RLC PDU |

### TCRNTI_ContentionResolutionCtrl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TCRNTI_ContentionResolutionCtrl_Type** | |
| **Comment** | when the UE responds on a Random Access Response with a RRC Connection Request on CCCH and not with a C-RNTI SS shall assume initial Random Access Procedure (TS 36.300, clause 10.1.5.1),<br>i.e. sends a ContentionResolutionId back to the UE | |
| MacPdu | TCRNTI_ContentionResolutionMacPdu_Type | MAC PDU containing the Contention Resolution ID and optionally an RRC PDU (RRC Connection Setup) |
| MacPdu_CRC_Error | TCRNTI_ContentionResolutionMacPdu_Type | same as MacPdu (see above),<br>but SS shall generate CRC error by toggling CRC bits;<br>no retransmissions shall be made as UE shall not send a NACK |
| NoContResolID | Null_Type | SS shall not include contention resolution ID (i.e. no MAC PDU shall be sent);<br>used for contention resolution fail case |

### CRNTI_ContentionResolutionCtrl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **CRNTI_ContentionResolutionCtrl_Type** | |
| **Comment** | configuration for Random Access Procedure in RRC_CONNECTED (see TS 36.300, clause 10.1.5.1);<br>when SS receives C-RNTI MAC element sent by the UE after Random Access Response,<br>SS shall deal with the C-RNTI as specified in this structure | |
| AutomaticGrant | DciUlInfo_Type | before expiry of the contention resolution timer SS shall automatically address PDCCH<br>using C-RNTI as sent by the UE; the UL grant is specified acc. to DciUlInfo_Type |
| None | Null_Type | Used in case of dedicated preamble transmission or to simulate failure cases;<br>SS shall not address PDCCH using C-RNTI<br>=> expiry of contention resolution timer on UE side |

### ContentionResolutionCtrl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ContentionResolutionCtrl_Type** | |
| **Comment** | NOTE: SS only needs to consider one kind of contention resolution at one time;<br>in the initial configuration of a cell TCRNTI_Based shall be configured and<br>the common assuption is that in RRC_CONNECTED normally there are no RACH procedures<br>(i.e. no CRNTI_Based configuration needed)<br>whereas e.g. in case of handover scenarios CRNTI_Based shall be configured | |
| TCRNTI_Based | TCRNTI_ContentionResolutionCtrl_Type | TCRNTI based contention resolution (e.g. initial access),<br>hence involves inclusion contention resolution identity in DL message 4 of RACH procedure |
| CRNTI_Based | CRNTI_ContentionResolutionCtrl_Type | CRNTI based contention resolution (e.g. in case UE is being in RRC_CONNECTED):<br>hence uplink message in step 3 (of RACH procedure) is followed by PDCCH transmission with UE C-RNTI to end procedure |

### RapIdCtrl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RapIdCtrl_Type** | |
| **Comment** | | |
| Automatic | Null_Type | SS shall automatically use same RAPID as received from the UE |
| Unmatched | Null_Type | SS shall use RAPID being different from preamble sent by the UE;<br>SS shall calculate this RAPID acc. to RAPID := (RAPID + 3..63) mod 64<br>if single RAR is transmitted in a MAC PDU then only 3 is added<br>if multiple RAR's are transmitted in MAC PDU, then for first unmatched RAR 3 is added, second unmatched 4 is added, third unmatched 5 is added and so on |

### TempC_RNTI_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TempC_RNTI_Type** | |
| **Comment** | | |
| SameAsC_RNTI | Null_Type | in the RA response SS shall use the same C-RNTI as configured in ActiveCellConfig_Type;<br>this is useful for initial random access |
| Explicit | C_RNTI | in the RA response SS shall use different value as configured in ActiveCellConfig_Type;<br>this can be used when the UE already is in RRC_CONNECTED to have a temporary C-RNTI different from the one used by the UE;<br>**NOTE: when the UE is not in RRC_CONNECTED there shall be no explicit temp. C-RNTI since then the UE would assume this value as C-RNTI** |

### RandomAccessResponseParameters_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RandomAccessResponseParameters_Type** | | |
| **Comment** | paramenters to control content of RAR sent to the UE | | |
| RapId | RapIdCtrl_Type | | to control Random Access Preamble Id to be sent back to the UE; used in RAR MAC sub-header |
| InitialGrant | UplinkGrant_Type | | initial UL grant |
| TimingAdvance | RACH_TimingAdvance_Type | | timing advance: granularity of 0.52 micro sec (16*Ts);<br>see TS 36.300, clause 5.2.7.3, TS 36.321, clause 6.1.3.5;<br>NOTE:<br>timing advance has impact not only on the RA procedure;<br>**SS in general needs to adjust its timing accordingly** |
| TempC_RNTI | TempC_RNTI_Type | | NOTE:<br>For initial Random Access Procedure at network (SS) side there is no temporary C-RNTI:<br>network assigns the C-RNTI which is used by any UE as being temporary;<br>the UE which 'wins' the contention resolution keeps the (temporary) C-RNTI;<br>other UEs need to repeat the RACH procedure;<br>=> at the SS the TempC_RNTI shall be 'SameAsC_RNTI'<br>For Random Access Procedure in RRC_CONNECTED state the NW assigns a temporary C-RNTI which is replaced by the one stored at the UE;<br>=> TempC_RNTI may be 'SameAsC_RNTI' (in this case temp. C-RNTI and C-RNTI are equal what is not likely in a real network), or there is an explicit temp. C-RNTI what is used during RA procedure only (as in a real network) |

### RarList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RarList_Type** |
| **Comment** | in general MAC PDU may contain one or several RARs;<br>normally only one RAR is contained |
| record of RandomAccessResponseParameters_Type | |

### RandomAccessResponse_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RandomAccessResponse_Type** | |
| **Comment** | | |
| None | Null_Type | used for unsuccessful RA procedure |
| List | RarList_Type | normally one RAR to be sent to the UE; in general there can be more than one RAR |

### RandomAccessBackoffIndicator_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RandomAccessBackoffIndicator_Type** | |
| **Comment** | | |
| None | Null_Type | normal case, no back off indicator included |
| Index | integer (0..15) | Backoff Parameter values acc. TS 36.321, clause 7.2;<br>values 0..12 are defined, 13..15 may be used in error case |

### RandomAccessResponseCtrl_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RandomAccessResponseCtrl_Type** | | |
| **Comment** | configuration for Random Access Response mapped to DL-SCH mapped to PDSCH<br>TransmissionMode: single antenna mode when there is only one antenna configured, transmit diversit else;<br>RNTI: RA-RNTI (TS 36.321, clause 7.1);<br>if both RAR msg and backoff indicator are 'None' SS shall not respond on RAP | | |
| DciInfo | DciDlInfoCommon_Type | | DCI format: 1A or 1C (TS 36.213, clause 7.1)<br>ResourceAllocType: 2 (acc. to DCI format)<br>Modulation: QPSK<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI |
| Rar | RandomAccessResponse_Type | | RAR to be sent to the UE |
| BackoffInd | RandomAccessBackoffIndicator_Type | | possible backoff indicator; 'None' for normal cases |

### RandomAccessResponseConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RandomAccessResponseConfig_Type** | |
| **Comment** | | |
| Ctrl | RandomAccessResponseCtrl_Type | contains information to control sending of RAR |
| Ctrl_CRC_Error | RandomAccessResponseCtrl_Type | same as Ctrl (see above), but MAC PDU transmitted will contain CRC bits (0-3) being toggled;<br>no retransmissions shall be made as UE shall not send a NACK |
| None | Null_Type | to be used when there is no RAR to be sent at all |

### RachProcedure_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RachProcedure_Type** | | |
| **Comment** | | | |
| RAResponse | RandomAccessResponseConfig_Type | | control of how the SS shall react on RA preamble;<br>this may be<br>- the RAP id as expected by the UE<br>- a RAP id not matching to the UE's RAP<br>- a backoff indicator<br>- nothing at all |
| ContentionResolutionCtrl | ContentionResolutionCtrl_Type | | |

### RachProcedureList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RachProcedureList_Type** |
| **Comment** | to simulate RACH procedure with one or more than one attempt by the UE:<br>1. Normal cases:<br>one single RandomAccessResponse is sent to the UE matching the UE's RACH preamble;<br>contention resolution is successful immediately<br>=> list contains only one element which is used for any RA procedure<br>(Even if a RACH procedure is repeated by the UE for any reason this element shall be used;<br>e.g. it needs not to be handled as error when the UE sends another RACH preamble instead of the RRC connection request message)<br>2. Special cases:<br>there are upto tsc_RandomAccessResponseListSize preambles sent by the UE<br>=> there are upto tsc_RandomAccessResponseListSize responses to be configured as elements of the list;<br>SS shall start with the first element in the list and use the RAR as specified in this element;<br>if the RAR matches at the UE side the UE will send UL data and contention resolution is performed as configured for this element;<br>if the RAR does not match the UE sends another RAP and SS continues with the next element in the list;<br>in this case the contention resolution of the respective element is not used;<br>if the end of the list is reached and further RACH preambles are sent by the UE SS shall repeatively apply the last element of the list<br>(this is necessary because there might be not enough time to reconfigure SS after the end of the list has been reached and there shall be well-defined behaviour after the list has been processed);<br><br>to change from a special mode to normal mode the RachProcedureList is reconfigured by TTCN to achieve transparency and readability of the code;<br><br>NOTE:<br>when there are RACH_ConfigDedicated configured (see below) and the RA preamble matches with one the configured ones the contention resolution ctrl is obsolete (non contention based random access procedure) |
| record length(1..tsc_RandomAccessResponseListSize) of RachProcedure_Type | |

**RachProcedureConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RachProcedureConfig_Type** | | |
| **Comment** | parameters to control the random access procedure; TS 36.321, clause 5.1 | | |
| RACH_ConfigCommon | RACH_ConfigCommon_Type | opt | acc. TS 36.331, clause 6.3.2; may not be necessary for SS;<br>omit: "keep as it is" |
| RACH_ConfigDedicated | RACH_ConfigDedicated_Type | opt | acc. TS 36.331, clause 6.3.2;<br>when random access preamble sent by the UE matches with the configured one,<br>SS shall assume the random access procedure being non-contention based;<br>initial configuration: no RACH_ConfigDedicated are configured;<br>omit means "keep as it is" |
| RachProcedureList | RachProcedureList_Type | opt | in normal cases there is one element which is used for any RA procedure;<br>special cases are used in MAC test cases;<br>omit means "keep as it is" |

## D.1.3.6 System_Information_Control

Primitive to configuration BCCH/BCH

**System_Information_Control: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **BcchToPbchConfig_Type** | Null_Type | place holder for BCCH mapped to BCH mapped to PBCH:<br>MIB using fixed scheduling (periodicity: 40ms);<br>transmission mode:<br>single antenna port configuration (layer mapping acc. TS 36.211, clause 6.3.3.1)<br>or transmit diversity (layer mapping acc. TS 36.211, clause 6.3.3.3) depending on antenna configuration |

**Sib1Schedul_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **Sib1Schedul_Type** | | |
| **Comment** | SIB1: fixed scheduling in time domain acc. TS 36.331, clause 5.2.1.2 (periodicity: 80ms; repetitions every 20ms) | | |
| DciInfo | DciDlInfoCommon_Type | opt | DCI format: 1A or 1C (TS 36.213, clause 7.1)<br>ResourceAllocType: 2 (acc. to DCI format)<br>Modulation: QPSK<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI |

**SingleSiSchedul_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SingleSiSchedul_Type** | | |
| **Comment** | specifies scheduling for a single SI in freq and time domain | | |
| DciInfo | DciDlInfoCommon_Type | opt | DCI format: 1A or 1C (TS 36.213, clause 7.1)<br>ResourceAllocType: 2 (acc. to DCI format)<br>Modulation: QPSK<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI |
| SubframeOffset | integer | opt | offset within the SI-window;<br>**NOTE: SI-window may span more than one frame** |

### SiSchedul_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SiSchedul_Type** | | |
| **Comment** | specifies for a specific SI scheduling and repetitions within as SI window | | |
| Periodicity | SiPeriodicity_Type | opt | |
| Window | record of SingleSiSchedul_Type | opt | NOTE: **acc. to TS 36.331, clause 5.2.1.2 the same SI may occur more than once in an SI-window;** to allow this there is a "record of" even though acc. to TS 36.508, clause 4.4.3.3 all SIs are sent only once within the window |

### SiSchedulList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **SiSchedulList_Type** |
| **Comment** | |
| record length(1..maxSI_Message) of SiSchedul_Type | |

### AllSiSchedul_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AllSiSchedul_Type** | | |
| **Comment** | | | |
| WindowLength | SiWindowLength_Type | opt | to calculate start of each SI window acc. TS 36.331, clause 5.2.3 |
| SiList | SiSchedulList_Type | opt | list of SIs containing one ore more SIBs |

### BcchToPdschConfig_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **BcchToPdschConfig_Type** | | |
| **Comment** | configuration for BCCH mapped to DL-SCH mapped to PDSCH<br>TransmissionMode: single antenna mode when there is only one antenna configured, transmit diversity else;<br>RNTI: SI-RNTI (TS 36.321, clause 7.1) | | |
| Sib1Schedul | Sib1Schedul_Type | opt | scheduling of SIB1 in frequency domain |
| SiSchedul | AllSiSchedul_Type | opt | scheduling of SIs in frequency and time domain |

### SI_List_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **SI_List_Type** |
| **Comment** | TS 36.331, clause 6.2.1 BCCH-DL-SCH-Message and clause 6.2.2 SystemInformation |
| record of BCCH_DL_SCH_Message | |

**BcchInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **BcchInfo_Type** | | |
| **Comment** | all fields are declared as optional to allow modification of single field;<br>acc. to TS 36.331, clause 9.1.1.1 "RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.";<br>therefore this needs to be done by the system simulator | | |
| MIB | BCCH_BCH_Message | opt | TS 36.331, clause 6.2.1 BCCH-BCH-Message and clause 6.2.2 MasterInformationBlock;<br>NOTE:<br>the sequence number included in MIB needs to be handled and maintained by the system simulator;<br>**that means that the sequence number being setup by TTCN will be overwritten by SS** |
| SIB1 | BCCH_DL_SCH_Message | opt | TS 36.331, clause 6.2.1 BCCH-DL-SCH-Message and clause 6.2.2 SystemInformationBlockType1 |
| SIs | SI_List_Type | opt | |

**BcchConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **BcchConfig_Type** | | |
| **Comment** | all fields are optional to allow single modifications;<br>activation time may be applied in the common part of the ASP;<br>NOTE 1:<br>**acc. to TS 36.331, clause 9.1.1.1 there is no PDCP and RLC/MAC are in TM**<br>NOTE 2:<br>mapping/scheduling and contents of the System Information in general is done in one go<br>**(i.e. there are no separate ports for SIB data and configuration)** | | |
| Pbch | BcchToPbchConfig_Type | opt | |
| Pdsch | BcchToPdschConfig_Type | opt | |
| BcchInfo | BcchInfo_Type | opt | |

## D.1.3.7 Paging_Control

Primitive to configuration PCCH/PCH

**PcchConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PcchConfig_Type** | | |
| **Comment** | configuration for PCCH mapped to PCH mapped to PDSCH<br>TransmissionMode: single antenna mode when there is only one antenna configured, transmit diversity else;<br>RNTI: P-RNTI (TS 36.321, clause 7.1)<br>**NOTE: acc. to TS 36.331, clause 9.1.1.3 there is no PDCP and RLC/MAC are in TM** | | |
| DciInfo | DciDlInfoCommon_Type | opt | DCI format: 1A or 1C (TS 36.213, clause 7.1)<br>ResourceAllocType: 2 (acc. to DCI format)<br>Modulation: QPSK<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI |

## D.1.3.8 UE_Specific_Channel_Configuration

### D.1.3.8.1 UE_Specific_Channel_Configuration_DL

Scheduling and other information for CCCH/DCCH/DTCH mapped to DL-SCH mapped to PDSCH

#### D.1.3.8.1.1 MIMO_Configuration

Precoding information for spatial multiplexing (DCI format 2)

**PrecodingInfoForOneCodeWord_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PrecodingInfoForOneCodeWord_Type** | |
| **Comment** | **NOTE: not all index values may make sense (e.g. the indices refering to the values reported by the UE)** | |
| TwoAntennasClosedLoop | integer (0..6) | index acc. to TS 36.212 Table 5.3.3.1.5-2;<br>RI = 1; transmit diversity or code book index 0..3 acc. TS 36.211 Table 6.3.4.2.3-1 |
| FourAntennasClosedLoop | integer (0..34) | index acc. to TS 36.212 Table 5.3.3.1.5-3;<br>RI = 1..2; transmit diversity or code book index 0..15 acc. TS 36.211 Table 6.3.4.2.3-2 |
| TwoAntennasOpenLoop | Null_Type | no precoding info; RI=1 when only codeword 1 is enabled |
| FourAntennasOpenLoop | integer (0..1) | index acc. to TS 36.212 Table 5.3.3.1.5-4<br>RI = 1..2; RI=1 => transmit diversity; RI=2 => large delay CDD |

**PrecodingInfoForTwoCodeWords_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PrecodingInfoForTwoCodeWords_Type** | |
| **Comment** | **NOTE: not all index values may make sense (e.g. the indices refering to the values reported by the UE)** | |
| TwoAntennasClosedLoop | integer (0..2) | index acc. to TS 36.212 Table 5.3.3.1.5-2;<br>RI = 2; code book index 1, 2 acc. TS 36.211 Table 6.3.4.2.3-1 |
| FourAntennasClosedLoop | integer (0..50) | index acc. to TS 36.212 Table 5.3.3.1.5-3;<br>RI = 2..4; code book index 0..15 acc. TS 36.211 Table 6.3.4.2.3-2 |
| TwoAntennasOpenLoop | Null_Type | no precoding info; RI=2 when both codewords are enabled |
| FourAntennasOpenLoop | integer (0..2) | index acc. to TS 36.212 Table 5.3.3.1.5-4<br>RI = 2..4; large delay CDD |

**PrecodingInfoIndex_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PrecodingInfoIndex_Type** | |
| **Comment** | | |
| OneCodeWord | PrecodingInfoForOneCodeWord_Type | only codeword 1 shall be enabled in the DCI |
| TwoCodeWords | PrecodingInfoForTwoCodeWords_Type | both codewords shall be enabled in the DCI |

**PrecodingOperationMode_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **PrecodingOperationMode_Type** |
| **Comment** | how to determine precoding information for spatial multiplexing is signalled on PDCCH with DCI format 2 (TS 36.212, clause 5.3.3.1.5) |
| hardcoded | SS shall apply configured precoding info as configured regardless RI and PMI reported by the UE |
| automatic | SS shall apply configured precoding info as long as there are no RI and PMI reported by the UE; when there are RI and PMI reported by the UE these shall be used |

**SpatialMultiplexingInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SpatialMultiplexingInfo_Type** | | |
| **Comment** | **NOTE: there may be codebookSubsetRestriction as signalled to the UE (TS 36.331, clause 6.3.2 AntennaInfoDedicated) to be considered** | | |
| OperationMode | PrecodingOperationMode_Type | | |
| PrecodingIndex | PrecodingInfoIndex_Type | | **NOTE: contains information about number of code words to be used in DCI format 2** |

**MimoInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **MimoInfo_Type** | |
| **Comment** | | |
| NoMimo | Null_Type | |
| Spatial | SpatialMultiplexingInfo_Type | |

**CcchDcchDtchConfigDL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CcchDcchDtchConfigDL_Type** | | |
| **Comment** | configuration for CCCH/DCCH/DTCH mapped to DL-SCH mapped to PDSCH<br>TransmissionMode: as signalled to the UE (AntennaInfoDedicated in RRCConnectionSetup);<br>RNTI: C-RNTI (TS 36.321, clause 7.1);<br>all fields optional (omit = "keep as it is") since DCI format and modulation may be changed during a test;<br>for initial configuration all fields are mandatory | | |
| DciInfo | DciDlInfo_Type | opt | DCI format: 1A per default since for CCCH mimo cannot be applied in general<br>ResourceAllocType: (depending on DCI format)<br>Modulation: QPSK for signalling<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI;<br>in case of spatial multiplexing if there are 2 code words FreqDomainSchedul shall be applied to both |
| AntennaInfo | AntennaInfoDedicated_Type | opt | as signalled to the UE (TS 36.331, clause 6.3.2): transmissionMode, codebookSubsetRestriction |
| MimoInfo | MimoInfo_Type | opt | when spatial multiplexing is applied (transmissionMode 3, 4): precoding information, number of code words |

### D.1.3.8.2 UE_Specific_Channel_Configuration_UL

Scheduling information for CCCH/DCCH/DTCH mapped to UL-SCH mapped to PUSCH

**UplinkHoppingResourceParameters_Type**

| TTCN-3 Record Type | |
|---|---|
| **Name** | **UplinkHoppingResourceParameters_Type** |
| **Comment** | it is FFS whether/which parameters are needed to control hopping resource allocation as signalled in DCI format 0<br>(TS 36.212, clause 5.3.3.1.1) |

### UplinkHoppingControl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UplinkHoppingControl_Type** | |
| **Comment** | shall be considered by SS to fill in the information needed for DCI format 0 (TS 36.213, clause 7.1) | |
| Deactivated | Null_Type | |
| Activated | UplinkHoppingResourceParameters_Type | |

### CcchDcchDtchConfigUL_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CcchDcchDtchConfigUL_Type** | | |
| **Comment** | scheduling for CCCH/DCCH/DTCH mapped to UL-SCH mapped to PUSCH<br>NOTE 1:<br>for definition of the possible UL grants the location of the PUCCH (TS 36.211, clause 5.4.3)<br>**and the PRACH (TS 36.211, clause 5.7.3) need to be taken into account;**<br>NOTE 2:<br>**In contrast to the DL where the scheduling can be done (with consideration of some restrictions) by SS on a per need basis in the UL the scheduling depends on information provided by the UE: e.g. BSR (buffer status report), SR (scheduling request) see TS 36.523-3 clause 7.2 for further information.** | | |
| DciInfo | DciUlInfo_Type | opt | DCI format: 0 (TS 36.213, clause 7.1)<br>ResourceAllocType: 2 (acc. to DCI format)<br>Modulation: QPSK per default<br>Frequency domain schedule: index of 1st RB; max. number of RBs per TTI<br>(upper bound up to which SS may assign grants to the UE) |
| Hopping | UplinkHoppingControl_Type | opt | when Hopping = 'Activated' SS shall set hopping flag in DCI format 0 |
| PUCCH_Synch | PUCCH_Synch_Type | opt | parameters to control automatic control of timing advance |
| UL_GrantConfig | UL_GrantConfig_Type | opt | UL grant allocation to be applied |

### DrxCtrl_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DrxCtrl_Type** | |
| **Comment** | **DRX configuration for connected mode (TS 36.321, clause 5.7)** | |
| None | Null_Type | DRX not configured |
| Config | DRX_Config_Type | DRX is configured as signalled to the UE |

### TimeDomainRestriction_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **TimeDomainRestriction_Type** | | |
| **Comment** | | | |
| MeasGapConfig | MeasGapConfig_Type | | measurement gap configuration acc. to TS 36.331, clause 6.3.5 and gap pattern acc. TS 36.133 Table 8.1.2.1-1 |

**CcchDcchDtchConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CcchDcchDtchConfig_Type** | | |
| **Comment** | | | |
| TimeDomainRestriction | TimeDomainRestriction_Type | opt | to tell the SS when no assignments/grants shall be assigned to the UE |
| DL | CcchDcchDtchConfigDL_Type | opt | Scheduling, parameters related to CCCH, DCCH and DTCH in DL |
| UL | CcchDcchDtchConfigUL_Type | opt | Scheduling, parameters related to CCCH, DCCH and DTCH in UL |
| DrxCtrl | DrxCtrl_Type | opt | DRX configuration as sent to the UE (or 'None' when the UE does not support connected mode DRX) |
| TtiBundling | TTI_BundlingConfig_Type | opt | TTI bundling as configured at the UE |

## D.1.4 Cell_Power_Attenuation

**CellAttenuationConfig_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CellAttenuationConfig_Type** | | |
| **Comment** | | | |
| CellId | CellId_Type | | |
| Attenuation | Attenuation_Type | | |

**CellAttenuationList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **CellAttenuationList_Type** |
| **Comment** | |
| record length(1..tsc_EUTRA_MaxNumberOfCells) of CellAttenuationConfig_Type | |

## D.1.5 Radio_Bearer_Configuration

Radio Bearer Configuration: SRBs/DRBs

### D.1.5.1 PDCP_Configuration

**PDCP_SNLength_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **PDCP_SNLength_Type** |
| **Comment** | PDCP Sequence Number |
| PDCP_SNLength5 | TS 36.323 clause 6.2.2 |
| PDCP_SNLength7 | TS 36.323 clause 6.2.3 |
| PDCP_SNLength12 | TS 36.323 clause 6.2.4 |

### PDCP_ROHC_Mode_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_ROHC_Mode_Type** | | |
| **Comment** | | | |
| StartSN_Size | cause SS to handle PDCP incl. ROHC as transparent; used for PDCP ROHC testing, see TS 36.523-3, clause 4.2.1.3.1PDCP_SNLength_Type | | |

### PDCP_NonROHC_Mode_Type

| TTCN-3 EnumeratedRecord Type | | | |
|---|---|---|---|
| **Name** | **PDCP_NonROHC_Mode_Type** | | |
| **Comment** | | | |
| StartSN_Size | cause SS to handle PDCP without ROHC as transparent; used for PDCP without ROHC testing, see TS 36.523-3, clause 4.2.1.3.2PDCP_SNLength_Type | | |

### PDCP_TestModeInfo_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_TestModeInfo_Type** | |
| **Comment** | | |
| PDCP_ROHC_Mode | PDCP_ROHC_Mode_Type | ROHC test mode acc. to TS 36.523-3, clause 4.2.1.3.1;<br>requires PDCP to be configured for this RB =><br>- SS applies ciphering in UL and DL<br>- SS maintains PDCP sequence numbers and state variables<br>Furthermore in this mode<br>- SS does not add/remove PDCP headers<br>(in UL the PDCP PDUs are decoded depending on SN_Size)<br>- SS applies ROHC in DL only |
| PDCP_NonROHC_Mode | PDCP_NonROHC_Mode_Type | PDCP test mode acc. to TS 36.523-3, clause 4.2.1.3.2 (non-ROCH test mode);<br>requires PDCP to be configured as transparant =><br>- SS does not apply ciphering in UL and DL<br>- SS does not interpret, insert or remove PDCP headers<br>(in UL PDCP PDUs are decoded depending on SN_Size)<br>- SS does not maintain PDCP sequence numbers and state variables |

### PDCP_TestModeConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_TestModeConfig_Type** | |
| **Comment** | | |
| None | Null_Type | |
| Info | PDCP_TestModeInfo_Type | |

**PDCP_RbConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_RbConfig_Type** | |
| **Comment** | | |
| Srb | Null_Type | for SRB1/2 there are no PDCP_Parameters;<br>SN is always 5 bits |
| Drb | PDCP_Config_Type | PDCP-Configuration acc. to TS 36.331, clause 6.3.2;<br>among others for UM here pdcp-SN-Size is configured to be either len7bits or len12bits;<br>for AM it always is 12bit |
| Transparent | Null_Type | used for PDCP tests (TS 36.523-3, clause 4.2.1.3.2):<br>the SS does not apply ciphering and does not maintain PDCP sequence numbers and state variables;<br>in UL the PDCP PDUs are decoded acc. to the TestMode;<br>Note: a reconfiguration of a RB from transparent mode to 'normal' mode is not foreseen<br>(i.e. there is no mechanism to restore Ciphering, PDCP sequence numbers and state variables at the SS) |

**PDCP_ConfigInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_ConfigInfo_Type** | | |
| **Comment** | | | |
| Rb | PDCP_RbConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is" |
| TestMode | PDCP_TestModeConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is" |

**PDCP_Configuration_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_Configuration_Type** | |
| **Comment** | | |
| None | Null_Type | for SRB0 no PDCP is configured; furthermore the PDCP may not be configured e.g. for DRBs tested in MAC test cases |
| Config | PDCP_ConfigInfo_Type | |

## D.1.5.2 RLC_Configuration

RLC configuration: radio bearer specific

**RLC_Configuration: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RLC_AM_SequenceNumber_Type** | integer (0..1023) | RLC AM sequence number |
| **SS_RLC_TM_Type** | Null_Type | TM to configure SRB0; no parameters to be defined |

**RLC_ACK_Prohibit_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **RLC_ACK_Prohibit_Type** |
| **Comment** | |
| Prohibit | cause SS RLC layer to stop any ACK transmission for UL PDU's received from UE |
| Continue | bring back the SS RLC in normal mode, where ACK/NACK are transmitted at polling |

### RLC_NotACK_NextRLC_PDU_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **RLC_NotACK_NextRLC_PDU_Type** |
| **Comment** | |
| Start | cause SS RLC layer not to ACK the next received RLC PDU;<br>this is done regardless of whether the poll bit is set or not;<br>Example [from UMTS]:<br>when the UE gets new security information in a SECURITY MODE COMMAND<br>the response (SECURITY MODE COMPLETE) sent by the UE is not acknowledged at the RLC level;<br>this causes the UE to continue using the "old" security information |

### RLC_TestModeInfo_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RLC_TestModeInfo_Type** | |
| **Comment** | | |
| AckProhibit | RLC_ACK_Prohibit_Type | valid only when the RLC is configured in AM |
| NotACK_NextRLC_PDU | RLC_NotACK_NextRLC_PDU_Type | valid only when the RLC is configured in AM |
| ModifyVTS | RLC_AM_SequenceNumber_Type | to modify the VT(S) at SS: VT(S) at the SS side is set to this (absolute) value;<br>valid only when the RLC is configured in AM |
| TransparentMode_UMDwith5BitSN | Null_Type | shall be set when TTCN expects RLC PDUs as UMD in UL with an SN of 5 bits;<br>valid only when the RLC is configured in TM |
| TransparentMode_UMDwith10BitSN | Null_Type | shall be set when TTCN expects RLC PDUs as UMD in UL with an SN of 10 bits;<br>valid only when the RLC is configured in TM |
| TransparentMode_AMD | Null_Type | shall be set when TTCN expects RLC PDUs as AMD in UL;<br>valid only when the RLC is configured in TM |

### RLC_TestModeConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RLC_TestModeConfig_Type** | |
| **Comment** | | |
| None | Null_Type | |
| Info | RLC_TestModeInfo_Type | |

### SS_RLC_AM_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SS_RLC_AM_Type** | | |
| **Comment** | | | |
| Tx | UL_AM_RLC_Type | opt | the UE's UL setting to be used in SS's tx direction |
| Rx | DL_AM_RLC_Type | opt | the UE's DL setting to be used in SS's rx direction |

### SS_RLC_UM_Bi_Directional_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SS_RLC_UM_Bi_Directional_Type** | | |
| **Comment** | | | |
| Tx | UL_UM_RLC_Type | opt | the UE's UL setting to be used in SS's tx direction |
| Rx | DL_UM_RLC_Type | opt | the UE's DL setting to be used in SS's rx direction |

**SS_RLC_UM_Uni_Directional_UL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SS_RLC_UM_Uni_Directional_UL_Type** | | |
| **Comment** | | | |
| Rx | DL_UM_RLC_Type | opt | the UE's DL setting to be used in SS's rx direction |

**SS_RLC_UM_Uni_Directional_DL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SS_RLC_UM_Uni_Directional_DL_Type** | | |
| **Comment** | | | |
| Tx | UL_UM_RLC_Type | opt | the UE's UL setting to be used in SS's tx direction |

**RLC_RbConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RLC_RbConfig_Type** | |
| **Comment** | | |
| AM | SS_RLC_AM_Type | |
| UM | SS_RLC_UM_Bi_Directional_Type | |
| UM_OnlyUL | SS_RLC_UM_Uni_Directional_UL_Type | |
| UM_OnlyDL | SS_RLC_UM_Uni_Directional_DL_Type | |
| TM | SS_RLC_TM_Type | normally SRB0 only; may be used for test purposes also |

**RLC_Configuration_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_Configuration_Type** | | |
| **Comment** | | | |
| Rb | RLC_RbConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is" |
| TestMode | RLC_TestModeConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is" |

## D.1.5.3 MAC_Configuration

MAC configuration: radio bearer specific configuration

**EUTRA_ASP_TypeDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_MaxHarqRetransmission** | integer | 28 | maximum value for maxHARQ-Msg3Tx as being signalled to the UE |

**MAC_Test_DLLogChID_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **MAC_Test_DLLogChID_Type** | |
| **Comment** | | |
| LogChId | TestLogicalChannelId_Type | Specifies to over write the logical channel ID in MAC header in all the DL messages sent on the configured logical channel |
| ConfigLchId | Null_Type | Specifies that the normal mode of correct logical channel ID to be used in DL MAc header.<br>This will be the default mode, when SS is initially configured. |

### MAC_Test_DL_SCH_CRC_Mode_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **MAC_Test_DL_SCH_CRC_Mode_Type** |
| **Comment** | |
| Normal | default mode, the CRC generation is correct |
| Erroneous | SS shall generate CRC error by toggling CRC bits;<br>the CRC error shall be applied for all PDUs of the given RNTI and their retransmission until SS is configured back to 'normal' operation |
| Error1AndNormal | the SS generates wrong CRC for first transmission and correct CRC on first retransmission. Later SS operates in normal mode. The retransmission is automatically triggered by reception of HARQ NACK |

### MAC_Test_SCH_NoHeaderManipulation_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **MAC_Test_SCH_NoHeaderManipulation_Type** |
| **Comment** | |
| NormalMode | MAC header is fully controlled by the SS |
| DL_SCH_Only | No header to be added for the DL SCH transport channel.<br>TTCN will submit a final MAC PDU including header and payloads.<br>It is possible that data belonging to multiple DRBs is sent in one MAC PDU and from one special RB configured.<br>SRBs shall not be used on DL-SCH when DL-SCH MAC is configured in this mode. |
| UL_SCH_Only | No header to be removed for any transmission received on UL_SCH and the complete MAC PDU received on UL-SCH needs to be directed to the special RB configured with this MAC manipulation.<br>TTCN shall be written in such a way that when UL-SCH MAC is configured in this mode, the UE is not requested to transmit any other data on UL-SCH than using the special RB. |
| DL_UL_SCH | The DL-SCH shall be configured as for DL_SCH_Only and UL-SCH as for UL_SCH_Only |

### HARQ_ModeList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **HARQ_ModeList_Type** |
| **Comment** | |
| record length (1..tsc_MaxHarqRetransmission) of HARQ_Type | |

### PhichTestMode_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PhichTestMode_Type** | |
| **Comment** | | |
| NormalMode | Null_Type | PHICH is configured to operate in normal mode |
| ExplicitMode | HARQ_ModeList_Type | the number of elements in explicit list shall match the number of retransmissions being expected |

### MAC_TestModeInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_TestModeInfo_Type** | | |
| **Comment** | Parameters/Configuration for MAC tests | | |
| DiffLogChId | MAC_Test_DLLogChID_Type | | to be used in test cases 7.1.1.1 and 7.1.1.2 for using a different logical channel ID in MAC-heaader on DL-SCH channel |
| No_HeaderManipulation | MAC_Test_SCH_NoHeaderManipulation_Type | | to configure mode for no header manipulation in SS MAC layer for DL/UL SCH |

### MAC_TestModeConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **MAC_TestModeConfig_Type** | |
| **Comment** | | |
| None | Null_Type | |
| Info | MAC_TestModeInfo_Type | |

### MAC_LogicalChannelConfig_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_LogicalChannelConfig_Type** | | |
| **Comment** | | | |
| Priority | integer | | logical channel priority for the DL as described in TS 36.321, clause 5.4.3.1 for the UL |
| PrioritizedBitRate | PrioritizedBitRate_Type | | PBR as described for the UL; probably not needed at SS |

### MAC_Configuration_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_Configuration_Type** | | |
| **Comment** | | | |
| LogicalChannel | MAC_LogicalChannelConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is" |
| TestMode | MAC_TestModeConfig_Type | opt | mandatory for initial configuration; omit means "keep as it is"; for none MAC tests "TestMode.None:=true" |

### Radio_Bearer_Configuration: Basic Type Definitions

| TTCN-3 Basic Types | | |
|---|---|---|
| **LogicalChannelId_Type** | integer (0..10) | acc. TS 36.331, clause 6.3.2 for DRBs DTCH-LogicalChannelIdentity is INTEGER (3..10); additionally we have 0..2 for the SRBs |
| **TestLogicalChannelId_Type** | integer (0..31) | To be used in MAC test mode for reserved values of Logicall channels; |

### RadioBearerConfigInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RadioBearerConfigInfo_Type** | | |
| **Comment** | semantics of omit: "keep as it is" | | |
| Pdcp | PDCP_Configuration_Type | opt | for SRB0: "Pdcp.None:=true"<br>mandatory for initial configuration; omit means "keep as it is" |
| Rlc | RLC_Configuration_Type | opt | mandatory for initial configuration; omit means "keep as it is" |
| LogicalChannelId | LogicalChannelId_Type | opt | DRBs: DTCH-LogicalChannelIdentity as for rb-MappingInfo in DRB-ToAddModifyList;<br>SRBs: for SRBs specified configurations acc. to TS 36.331, clause 9.1.2 shall be applied:<br>SRB1: ul-LogicalChannel-Identity = dl-LogicalChannel-Identity = 1<br>SRB2: ul-LogicalChannel-Identity = dl-LogicalChannel-Identity = 2<br>for SRB0 being mapped to CCCH the LCID is '00000'B acc. to TS 36.321, clause 6.2.1;<br>mandatory for initial configuration; omit means "keep as it is" |
| Mac | MAC_Configuration_Type | opt | |

**RadioBearerConfig_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RadioBearerConfig_Type** | |
| **Comment** | | |
| AddOrReconfigure | RadioBearerConfigInfo_Type | add / re-configure RB -<br>CellId : identifier of the cell being configured<br>RoutingInfo : None<br>TimingInfo : 'Now' in common cases<br>ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general) |
| Release | Null_Type | release RB -<br>CellId : identifier of the cell being configured<br>RoutingInfo : None<br>TimingInfo : 'Now' in common cases<br>ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general) |

**RadioBearer_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RadioBearer_Type** | | |
| **Comment** | | | |
| Id | RadioBearerId_Type | | either for SRB or DRB |
| Config | RadioBearerConfig_Type | | |

**RadioBearerList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RadioBearerList_Type** |
| **Comment** | array of SRBs and/or DRBs (DRBs + 3 SRBs) |
| record length (1..tsc_MaxRB) of RadioBearer_Type | |

## D.1.6 AS_Security

Primitive for control of AS security

**PdcpSQN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdcpSQN_Type** | | |
| **Comment** | | | |
| Format | PdcpCountFormat_Type | | 5 bit, 7 bit or 12 bit SQN |
| Value | integer | | SQN value (5 bit, 7 bit or 12 bit SQN)<br>NOTE:<br>in TTCN the test case writer is responsible to deal with potential overflows<br>(e.g. there shall be a "mod 32", "mod 128" or "mod 4096" according to the format) |

**PDCP_ActTime_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_ActTime_Type** | |
| **Comment** | The sequence number in UL and DL for SRB1 should be one more than the present SQN, as Ciphering starts in UL and DL soon after SMC and SMComp;<br>For other SRB/DRB it should be the present SQN. | |
| None | Null_Type | No Activation time; to be used if Ciphering is not applied |
| SQN | PdcpSQN_Type | PDCP sequence number |

### SecurityActTime_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SecurityActTime_Type** | | |
| **Comment** | | | |
| RadioBearerId | RadioBearerId_Type | | |
| UL | PDCP_ActTime_Type | | |
| DL | PDCP_ActTime_Type | | |

### SecurityActTimeList_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **SecurityActTimeList_Type** |
| **Comment** | |
| record length (1..tsc_MaxRB) of SecurityActTime_Type | |

### AS_IntegrityInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AS_IntegrityInfo_Type** | | |
| **Comment** | for initial configuration activation time is not needed for integrity protection as all messages in DL after security activation are integrity protected;<br>this means this ASP is invoked before transmission of Security mode command;<br>if there is a integrity violation in UL SS shall set the IndicationStatus in the common ASP part to flag the integrity error<br>(IndicationStatus.Error.Integrity.Pdcp := true);<br>integrity to be provided for each SRB as per core spec | | |
| Algorithm | IntegrityProtAlgorithm_Type | | IntegrityProtAlgorithm_Type being defined in RRC ASN.1 |
| KRRCint | B128_Key_Type | | |
| ActTimeList | SecurityActTimeList_Type | opt | omit for initial configuration (i.e. all SRBs to be integrity protected immediately);<br>in HO scenarios activation time may be needed e.g. for SRB1 |

### AS_CipheringInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AS_CipheringInfo_Type** | | |
| **Comment** | | | |
| Algorithm | CipheringAlgorithm_Type | | CipheringAlgorithm_Type being defined in RRC ASN.1 |
| KRRCenc | B128_Key_Type | | |
| KUPenc | B128_Key_Type | | KUPenc is mandatory; and SS uses it when DRB are configured |
| ActTimeList | SecurityActTimeList_Type | | |

### AS_SecStartRestart_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **AS_SecStartRestart_Type** | | |
| **Comment** | | | |
| Integrity | AS_IntegrityInfo_Type | opt | optional to allow separated activation of integrity and ciphering; omit: keep as it is |
| Ciphering | AS_CipheringInfo_Type | opt | optional to allow separated activation of integrity and ciphering; omit: keep as it is |

**AS_Security_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **AS_Security_Type** | |
| **Comment** | Security mode command procedure (TS 36.331, clause 5.3.4):<br>both SMC and SMComp are integrity protected<br>(nevertheless SS shall be able to cope with unprotected SM reject);<br>ciphering is started just after SMComp (acc. to TS 36.331, clause 5.3.4.3 and 5.3.1.1) | |
| StartRestart | AS_SecStartRestart_Type | information to start/restart AS security protection in the PDCP |
| Release | Null_Type | to release AS security protection in the PDCP |

# D.1.7 Semi_Persistent_Scheduling

Semi-persistent scheduling (SPS)
NOTE 1:
configuration of SPS cannot be done completely in advance but needs to be activated by PDCCH signalling
=> SPS is configured/activated in an own primitive which may be sent to SS during RBs are being configured
NOTE 2:
semi-persistent (configured) scheduling is per UE (as well as 'normal' scheduling; see e.g. TS 36.300, clause 11.1)

**SpsAssignmentUL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SpsAssignmentUL_Type** | | |
| **Comment** | information to assign semi-persistent scheduls in UL | | |
| DciInfo | DciUlInfo_Type | opt | to apply a grant |
| SchedulInterval | SpsConfigurationUL_Type | opt | as in TS 36.331, clause 6.3.2 SPS-ConfigUL |
| SetNDI_1 | Null_Type | opt | if present then NDI is set as 1 indicating a retransmission; If absent then NDI is set as 0 indicating a new transmission |

**SpsAssignmentDL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SpsAssignmentDL_Type** | | |
| **Comment** | information to assign semi-persistent scheduls in DL | | |
| DciInfo | DciDlInfo_Type | opt | to apply a assignment |
| SchedulInterval | SpsConfigurationDL_Type | opt | as in TS 36.331, clause 6.3.2 SPS-ConfigDL |
| SetNDI_1 | Null_Type | opt | if present then NDI is set as 1 indicating a retransmission; If absent then NDI is set as 0 indicating a new transmission |

### SpsActivateInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SpsActivateInfo_Type** | | |
| **Comment** | Semi-persistent scheduling (SPS):<br>Even though SPS is pre-configured at the UE (e.g. RRCConnectionSetup->RadioResourceConfiguration->MAC_MainConfig) it needs to be activated by L1 signalling<br>=> SS shall 'activate' SPS by sending appropriate assignments/grants to the UE; this shall be done with an activation time.<br>If SPS is already configured and new Activate command is received, at the activation time SS locally deactivates old SPS configuration, sends UE an PDCCH assignment for new SPS assignment and locally activates new SPS configuration.<br>In DL, in addition to SS SPS assignment configuration with activation time 'T', TTCN writer shall also schedule a DL MAC PDU with same activation time 'T' and at every SPS ScheduleInterval (NOTE: in general it is an error when TTCN does not provide data for a SchedulInterval; SS shall send no data in this case).<br>Special fields of PDCCH assignment are filled as per table 9.2-1 of 36.213 | | |
| SPS_C_RNTI | C_RNTI | | SPS C-RNTI as signalled to UE |
| UplinkGrant | SpsAssignmentUL_Type | opt | |
| DownlinkAssignment | SpsAssignmentDL_Type | opt | |

### SpsPdcchRelease_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SpsPdcchRelease_Type** | | |
| **Comment** | On reception of this information SS shall send an SPS release indicated by PDCCH transmission with indicated DCI format (0 or 1A) at the activation time.<br>Special fields of PDCCH assignment are filled as per table 9.2-1A of 36.213 | | |
| SPS_C_RNTI | C_RNTI | | |
| DCI_Format | PdcchDciFormat_Type | | only formats 0 (UL release) and 1A (DL release) are applicable. It is a TTCN error if any other formats are used. |

### SpsDeactivateInfo_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SpsDeactivateInfo_Type** | |
| **Comment** | | |
| LocalRelease | Null_Type | SPS configuration shall be released at the SS, that means as well that the SS shall not address SPS_C_RNTI anymore from the given TimingInfo onward;<br>NOTE: there is no SPS release to be signalled on PDCCH (this is done with PdcchExplicitRelease - see below) |
| PdcchExplicitRelease | SpsPdcchRelease_Type | SS transmits PDCCH content indicating SPS release but holds the local SPS configuration until it is locally released |

### SpsConfig_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SpsConfig_Type** | |
| **Comment** | | |
| Activate | SpsActivateInfo_Type | CellId : identifier of the cell where the UE is active<br>RoutingInfo : None<br>TimingInfo : activation time for SPS assignment/grant transmission; NOTE: the first SPS DL data packet shall be sent with the same timing information<br>ControlInfo : CnfFlag:=false; FollowOnFlag:=false |
| Deactivate | SpsDeactivateInfo_Type | CellId : identifier of the cell where the UE is active<br>RoutingInfo : None<br>TimingInfo : activation time for SPS release indicated by PDCCH transmission or SS local deactivation<br>ControlInfo : CnfFlag:=false; FollowOnFlag:=false |

## D.1.8 Paging_Trigger

**PagingTrigger_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PagingTrigger_Type** | | |
| **Comment** | CellId : identifier of the cell where the UE is active<br>RoutingInfo : None<br>TimingInfo : Calculated paging occassion<br>ControlInfo : CnfFlag:=false; FollowOnFlag:=false<br>primitive to trigger transmission of a paging on the PCCH at a calculated paging occasion (TS 36.304, clause 7);<br>the paging occasion is calculated by TTCN and activation time is applied;<br>as for BCCH Infor acc. to TS 36.331, clause 9.1.1.3 "RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.";<br>therefore this needs to be done by the system simulator | | |
| Paging | PCCH_Message | | paging to be send out at paging occasion and being announced on PDCCH using P-RNTI |

## D.1.9 L1_MAC_Indication_Control

Primitive for control of L1/MAC indication for special purposes

**L1Mac_IndicationMode_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **L1Mac_IndicationMode_Type** |
| **Comment** | |
| enable | |
| disable | |

**L1Mac_IndicationControl_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **L1Mac_IndicationControl_Type** | | |
| **Comment** | NOTE:<br>Initially all indications are disabled in SS (i.e. it shall not be nacessary in 'normal' test cases to use this primitive but only if a specific indication is needed); omit means indication mode is not changed | | |
| RachPreamble | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of PRACH preamble received. |
| SchedReq | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of reception of Scheduling Request on PUCCH. |
| BSR | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of Buffer Status Report.<br>NOTE:<br>this is applicable only when MAC is configured in normal mode in UL;<br>MAC configured in test mode, results in over writing the report. |
| UL_HARQ | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of reception of HARQ ACK/NACK. |
| C_RNTI | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of C-RNTI sent by the UE within MAC PDU |
| PHR | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of Power Headroom Report.<br>NOTE:<br>this is applicable only when MAC is configured in normal mode in UL;<br>MAC configured in test mode, results in over writing the report. |
| HarqError | L1Mac_IndicationMode_Type | opt | To enable/disable reporting of HARQ errors |

# D.1.10 PDCP_Count

Primitives to enquire PDCP COUNT

**PDCP_Count: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **PdcpCountValue_Type** | B32_Type | |

**PdcpCountFormat_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **PdcpCountFormat_Type** |
| **Comment** | |
| PdcpCount_Srb | 27 bit HFN; 5 bit SQF |
| PdcpCount_DrbLongSQN | 20 bit HFN; 12 bit SQF |
| PdcpCount_DrbShortSQN | 25 bit HFN; 7 bit SQF |

**PdcpCount_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdcpCount_Type** | | |
| **Comment** | | | |
| Format | PdcpCountFormat_Type | | |
| Value | PdcpCountValue_Type | | |

**PdcpCountInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PdcpCountInfo_Type** | | |
| **Comment** | | | |
| RadioBearerId | RadioBearerId_Type | | |
| UL | PdcpCount_Type | opt | omit: keep as it is |
| DL | PdcpCount_Type | opt | omit: keep as it is |

**PdcpCountInfoList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **PdcpCountInfoList_Type** |
| **Comment** | |
| record length (1..tsc_MaxRB) of PdcpCountInfo_Type | |

**PdcpCountGetReq_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PdcpCountGetReq_Type** | |
| **Comment** | | |
| AllRBs | Null_Type | return COUNT values for all RBs being configured |
| SingleRB | RadioBearerId_Type | |

**PDCP_CountReq_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_CountReq_Type** | |
| **Comment** | | |
| Get | PdcpCountGetReq_Type | Request PDCP count for one or all RBs being configured at the PDCP |
| Set | PdcpCountInfoList_Type | Set PDCP count for one or all RBs being configured at the PDCP; list for RBs which's COUNT shall be manipulated |

**PDCP_CountCnf_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_CountCnf_Type** | |
| **Comment** | | |
| Get | PdcpCountInfoList_Type | RBs in ascending order; SRBs first |
| Set | Null_Type | |

## D.1.11 L1_MAC_Test_Mode

Primitive for control of L1/MAC Test Modes

**L1_TestMode_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **L1_TestMode_Type** | | |
| **Comment** | L1 test mode; in general RACH is handled separately | | |
| DL_SCH_CRC | DL_SCH_CRC_Type | | Manipulation of CRC bit generation for DL-SCH |
| Phich | PhichTestMode_Type | | HARQ feedback mode on the PHICH |

**DL_SCH_CRC_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DL_SCH_CRC_Type** | |
| **Comment** | NOTE: **CRC error mode for RA_RNTI is not addressed as it will be configured in RACHProcedureConfig** | |
| C_RNTI | MAC_Test_DL_SCH_CRC_Mode_Type | to configure mode for CRC bit for all MAC PDU's for which C-RNTI is used in PDCCH transmission |
| SI_RNTI | MAC_Test_DL_SCH_CRC_Mode_Type | to configure mode for CRC bit for all MAC PDU's for which SI-RNTI is used in PDCCH transmission |
| SPS_RNTI | MAC_Test_DL_SCH_CRC_Mode_Type | to configure mode for CRC bit for all MAC PDU's for which SPS-RNTI is used in PDCCH transmission |

## D.1.12 PDCCH_Order

Primitive to trigger SS to send PDCCH order to initiate RA procedure (TS 36.321, clause 5.1.1)

**PDCCH_Order: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **PrachPreambleIndex_Type** | Ra_PreambleIndex_Type | |
| **PrachMaskIndex_Type** | integer (0..15) | TS 36.321, clause 7.3 |

**RA_PDCCH_Order_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RA_PDCCH_Order_Type** | | |
| **Comment** | see also TS 36.212, clause 5.3.3.1.3 | | |
| PreambleIndex | PrachPreambleIndex_Type | | naming acc. TS 36.212, clause 5.3.3.1.3 |
| PrachMaskIndex | PrachMaskIndex_Type | | naming acc. TS 36.212, clause 5.3.3.1.3 |

## D.1.13 System_Indications

Primitives for System indications

**System_Indications: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **PRTPower_Type** | Dummy_Type | needs to define appropriately the power level report of PREAMBLE_RECEIVED_TARGET_POWER; NOTE: for the time being this is just a place holder for enhancements in the future. |
| **LogicalChannelGroup_Type** | integer (0..3) | |
| **BSR_Value_Type** | integer (0..63) | |
| **PHR_Type** | integer (0..63) | |

**HarqError_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **HarqError_Type** | |
| **Comment** | | |
| UL | Null_Type | indicates HARQ error detected at the SS side (error at UL transmission) |
| DL | Null_Type | indicates HARQ NACK sent by the UE (error at DL transmission) |

**RachPreamble_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RachPreamble_Type** | | |
| **Comment** | | | |
| RAPID | PrachPreambleIndex_Type | | indicates the RAPID of the preamble used (integer (0..63)) |
| PRTPower | PRTPower_Type | | represents the PREAMBLE_RECEIVED_TARGET_POWER |

**Short_BSR_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **Short_BSR_Type** | | |
| **Comment** | | | |
| LCG | LogicalChannelGroup_Type | | Logical channel Group |
| Value | BSR_Value_Type | | BSR value |

### Long_BSR_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **Long_BSR_Type** | | |
| **Comment** | | | |
| Value_LCG1 | BSR_Value_Type | | BSR value for LCG 1 |
| Value_LCG2 | BSR_Value_Type | | BSR value for LCG 2 |
| Value_LCG3 | BSR_Value_Type | | BSR value for LCG 3 |
| Value_LCG4 | BSR_Value_Type | | BSR value for LCG 4 |

### BSR_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **BSR_Type** | |
| **Comment** | | |
| Short | Short_BSR_Type | |
| Long | Long_BSR_Type | |

### HARQ_Type

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **HARQ_Type** |
| **Comment** | ack represents HARQ ACK; nack represents HARQ_NACK |
| ack | |
| nack | |

# D.1.14 System_Interface

**SYSTEM_CTRL_REQ**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SYSTEM_CTRL_REQ** | | |
| **Comment** | | | |
| Common | ReqAspCommonPart_Type | | TimingInfo depends on respective primitive: |
| Request | SystemRequest_Type | | - Cell<br>TimingInfo: 'now' (in general)<br>- CellAttenuationList<br>TimingInfo: 'now' (in general, but activation time may be used also)<br>- RadioBearerList<br>TimingInfo: 'now' (in general)<br>- EnquireTiming<br>TimingInfo: 'now'<br>- AS_Security<br>TimingInfo: 'now';<br>NOTE: "activation time" may be specified in the primitive based on PDCP SQN<br>- Sps<br>TimingInfo: activation time for SPS assignment transmission<br>- Paging<br>TimingInfo: Calculated paging occassion<br>- L1MacIndCtrl<br>TimingInfo: 'now' in general;<br>activation time may be used in special case for release and/or reconfiguration of one or several RBs;<br>the following rules shall be considered:<br>- release/Reconfiguration of an RB shall not be scheduled ealier than 5ms after a previous data transmission on this RB<br>- subsequent release and reconfiguration(s) shall be scheduled with an interval of at least 5ms<br>- a subsequent data transmission on an RB shall not be scheduled ealier than 5ms after the last reconfiguration of the RB<br>the configuration shall be performed exactly at the given time<br>- PdcpCount<br>TimingInfo: 'now'<br>- L1_TestMode<br>TimingInfo: depends on the test mode;<br>activation time is used e.g. for manipulation of the CRC<br>- PdcchOrder<br>TimingInfo: 'now' (in general) |

**SYSTEM_CTRL_CNF**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SYSTEM_CTRL_CNF** | | |
| **Comment** | | | |
| Common | CnfAspCommonPart_Type | | TimingInfo is ignored by TTCN (apart from EnquireTiming)<br>=> SS may set TimingInfo to "None" |
| Confirm | SystemConfirm_Type | | |

**SYSTEM_IND**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SYSTEM_IND** | | |
| **Comment** | | | |
| Common | IndAspCommonPart_Type | | The SS shall provide TimingInfo (SFN + subframe number) depending on the respective indication: |
| Indication | SystemIndication_Type | | - Error<br>TimingInfo: related to the error (if available)<br>- RachPreamble<br>TimingInfo: shall indicate start of the RACH preamble<br>- SchedReq<br>TimingInfo: subframe containing the SR<br>- BSR<br>TimingInfo: subframe in which the MAC PDU contains the BSR<br>- UL_HARQ<br>TimingInfo: subframe containing the UL HARQ<br>- C_RNTI<br>TimingInfo: subframe in which the MAC PDU contains the C_RNTI<br>- PHR<br>TimingInfo: subframe in which the MAC PDU contains the PHR |

**EUTRA_SYSTEM_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **EUTRA_SYSTEM_PORT** | |
| **Comment** | EUTRA PTC: Port for system configuration | |
| out | SYSTEM_CTRL_REQ | |
| in | SYSTEM_CTRL_CNF | |

**EUTRA_SYSIND_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **EUTRA_SYSIND_PORT** | |
| **Comment** | EUTRA PTC: Port for system indications | |
| in | SYSTEM_IND | |

# D.2 EUTRA_ASP_DrbDefs

ASP interface for DRBs

# D.2.1 PDU_TypeDefs

## D.2.1.1 MAC_PDU

**MAC_PDU: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **MAC_CTRL_C_RNTI_Type** | C_RNTI | TS 36.321, clause 6.1.3.2 |
| **MAC_CTRL_ContentionResolutionId_Type** | ContentionResolutionId_Type | TS 36.321, clause 6.1.3.4<br>fix 48-bit size;<br>consists of a single field defined UE Contention Resolution Identity<br>(uplink CCCH SDU transmitted by MAC) |
| **MAC_CTRL_TimingAdvance_Type** | B8_Type | TS 36.321, clause 6.1.3.5<br>indicates the amount of timing adjustment in 0.5 ms that the UE has to apply;<br>the length of the field is [8] bits |
| **MAC_SDU_Type** | octetstring | |

**MAC_PDU_Length_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_PDU_Length_Type** | | |
| **Comment** | NOTE:<br>since F and L field are either both present or both omitted they are put into this record;<br>to allow homogeneous (direct) encoding the PDU length is not defined as union;<br>TTCN-3 does allow length restrictions to one lenght or a range of length but not to two specific lengthes;<br>further restriction may be achieved by appropriate templates (parameter either 7 or 15 bit) | | |
| Format | B1_Type | | F:<br>The Format field indicates the size of the Length field as indicated in table 6.2.1-3.<br>There is one F field per MAC PDU subheader except for the last subheader and sub-headers corresponding to fixed-sized MAC control elements. The size of the F field is 1 bit.<br>If the size of the MAC SDU or MAC control element is less than 128 bytes, the UE shall set the value of the F field to 0, otherwise the UE shall set it to 1 |
| Value | B7_15_Type | | L:<br>The Length field indicates the length of the corresponding MAC SDU or MAC control element in bytes.<br>There is one L field per MAC PDU subheader except for the last subheader and sub-headers corresponding to fixed-sized MAC control elements.<br>The size of the L field is indicated by the F field |

### MAC_PDU_SubHeader_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_PDU_SubHeader_Type** | | |
| **Comment** | | | |
| Reserved | B2_Type | | Reserved bits |
| Extension | B1_Type | | E:<br>The Extension field is a flag indicating if more fields are present in the MAC header or not.<br>The E field is set to "1" to indicate another set of at least R/R/E/LCID fields.<br>The E field is set to "0" to indicate that either a MAC SDU, a MAC control element or padding starts at the next byte |
| LCID | B5_Type | | LCID:<br>The Logical Channel ID field identifies the logical channel instance of the corresponding MAC SDU or the type of the corresponding MAC control element or padding as described in tables 6.2.1-1 and 6.2.1-2 for the DL and UL-SCH respectively.<br>There is one LCID field for each MAC SDU, MAC control element or padding included in the MAC PDU. The LCID field size is 5 bits;<br>NOTE: In case of DRX command the sub-header corresponds to a control element of length zero (i.e. there is no control element) |
| Length | MAC_PDU_Length_Type | opt | |

### MAC_Header_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **MAC_Header_Type** |
| **Comment** | |
| record of MAC_PDU_SubHeader_Type | |

### MAC_CTRL_ShortBSR_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_CTRL_ShortBSR_Type** | | |
| **Comment** | TS 36.321, clause 6.1.3.1 | | |
| LCG | B2_Type | | |
| Value | B6_Type | | |

### MAC_CTRL_LongBSR_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_CTRL_LongBSR_Type** | | |
| **Comment** | TS 36.321, clause 6.1.3.1 | | |
| Value_LCG1 | B6_Type | | |
| Value_LCG2 | B6_Type | | |
| Value_LCG3 | B6_Type | | |
| Value_LCG4 | B6_Type | | |

### MAC_CTRL_PowerHeadRoom_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_CTRL_PowerHeadRoom_Type** | | |
| **Comment** | TS 36.321, clause 6.1.3.6 | | |
| Reserved | B2_Type | | |
| Value | B6_Type | | |

**MAC_CTRL_ElementList_Type**

| TTCN-3 Set Type | | | |
|---|---|---|---|
| **Name** | **MAC_CTRL_ElementList_Type** | | |
| **Comment** | NOTE 1:<br>for simplicication UL and DL are not distiguished even though the control elements are either UL or DL<br>NOTE 2:<br>type is defined as set: the ordering is not signifficant;<br>nevertheless the ordering is well-defined by the sub-headers;<br>for codec implementations it is in any case necessary to evaluate the sub-header information in order to encode/decode the payload | | |
| ShortBSR | MAC_CTRL_ShortBSR_Type | opt | UL only |
| LongBSR | MAC_CTRL_LongBSR_Type | opt | UL only |
| C_RNTI | MAC_CTRL_C_RNTI_Type | opt | UL only |
| ContentionResolutionID | MAC_CTRL_ContentionResolutionId_Type | opt | DL only |
| TimingAdvance | MAC_CTRL_TimingAdvance_Type | opt | DL only |
| PowerHeadRoom | MAC_CTRL_PowerHeadRoom_Type | opt | UL only |

**MAC_SDUList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **MAC_SDUList_Type** |
| **Comment** | |
| record of MAC_SDU_Type | |

**MAC_PDU_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **MAC_PDU_Type** | | |
| **Comment** | | | |
| Header | MAC_Header_Type | | list of MAC PDU SubHeaders corresponding to MAC control elements and MAC SDUs |
| CtrlElementList | MAC_CTRL_ElementList_Type | opt | Mac control elements;<br>acc. to TS 36.321, clause 6.1.2 "MAC control elements, are always placed before any MAC SDU." |
| SduList | MAC_SDUList_Type | opt | MAC SDUs, which can typically be RLC PDUs |
| Padding | octetstring | opt | Octet aligned Padding if more than or equal to 2 bytes |

**MAC_PDUList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **MAC_PDUList_Type** |
| **Comment** | |
| record of MAC_PDU_Type | |

## D.2.1.2 RLC_PDU

### D.2.1.2.1 Common

RLC PDU definition: common AM/UM field definitions

**Common: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RLC_FramingInfo_Type** | B2_Type | 00 -<br>First byte of the Data field corresponds to the first byte of a RLC SDU.<br>Last byte of the Data field corresponds to the last byte of a RLC SDU.<br>01 -<br>First byte of the Data field corresponds to the first byte of a RLC SDU.<br>Last byte of the Data field does not correspond to the last byte of a RLC SDU.<br>10 -<br>First byte of the Data field does not correspond to the first byte of a RLC SDU.<br>Last byte of the Data field corresponds to the last byte of a RLC SDU.<br>11 -<br>First byte of the Data field does not correspond to the first byte of a RLC SDU.<br>Last byte of the Data field does not correspond to the last byte of a RLC SDU. |

**RLC_LengthIndicator_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_LengthIndicator_Type** | | |
| **Comment** | | | |
| Extension | B1_Type | | 0 - Data field follows from the octet following the LI field following this E field<br>1 - A set of E field and LI field follows from the bit following the LI field following this E field |
| LengthIndicator | B11_Type | | Length Indicator |

**RLC_LI_List_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RLC_LI_List_Type** |
| **Comment** | |
| record of RLC_LengthIndicator_Type | |

**RLC_PDU_Header_FlexPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_PDU_Header_FlexPart_Type** | | |
| **Comment** | Flexible part of the header with a number of K LIs | | |
| LengthIndicator | RLC_LI_List_Type | | List of E, LI fields |
| Padding | B4_Type | opt | optional 4 bit padding present in case of odd number of LI's |

## D.2.1.2.2 TM_Data

RLC PDU definition: UM (TS 36.322, clause 6.2.1.2)

**TM_Data: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RLC_TMD_PDU_Type** | octetstring | TS 36.322, clause 6.2.1.2 |

### D.2.1.2.3 UM_Data

RLC PDU definition: UM (TS 36.322, clause 6.2.1.3)
NOTE:
To allow direct encoding the definition for RLC UM Data PDU is split into data PDU with 5/10 bit sequence number

**UM_Data: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RLC_DataField_Type** | octetstring | restrictions imposed from LI size of 11 bits is not applicable when the LI's are not present |

**RLC_UMD_Header_FixPartShortSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_Header_FixPartShortSN_Type** | | |
| **Comment** | TS 36.322, clause 6.2.1.3 Figure 6.2.1.3-1, 6.2.1.3-3 and 6.2.1.3-4); one octet | | |
| FramingInfo | RLC_FramingInfo_Type | | 2 bits FI |
| Extension | B1_Type | | 1 bit E |
| SequenceNumber | B5_Type | | 5 bits SN |

**RLC_UMD_Header_FixPartLongSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_Header_FixPartLongSN_Type** | | |
| **Comment** | TS 36.322, clause 6.2.1.3 Figure 6.2.1.3-2, 6.2.1.3-5 and 6.2.1.3-6); two octets | | |
| Reserved | B3_Type | | 3 bits reserved |
| FramingInfo | RLC_FramingInfo_Type | | 2 bits FI |
| Extension | B1_Type | | 1 bit E |
| SequenceNumber | B10_Type | | 10 bits SN |

**RLC_UMD_HeaderShortSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_HeaderShortSN_Type** | | |
| **Comment** | | | |
| FixPart | RLC_UMD_Header_FixPartShortSN_Type | | |
| FlexPart | RLC_PDU_Header_FlexPart_Type | opt | |

**RLC_UMD_HeaderLongSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_HeaderLongSN_Type** | | |
| **Comment** | | | |
| FixPart | RLC_UMD_Header_FixPartLongSN_Type | | |
| FlexPart | RLC_PDU_Header_FlexPart_Type | opt | |

**RLC_DataFieldList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RLC_DataFieldList_Type** |
| **Comment** | One to one correspondence with sub headers (LengthIndicatorList_Type) |
| record of RLC_DataField_Type | |

**RLC_UMD_PDU_ShortSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_PDU_ShortSN_Type** | | |
| **Comment** | | | |
| Header | RLC_UMD_HeaderShortSN_Type | | |
| Data | RLC_DataFieldList_Type | | |

**RLC_UMD_PDU_LongSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_UMD_PDU_LongSN_Type** | | |
| **Comment** | | | |
| Header | RLC_UMD_HeaderLongSN_Type | | |
| Data | RLC_DataFieldList_Type | | |

**RLC_UMD_PDU_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RLC_UMD_PDU_Type** | |
| **Comment** | | |
| ShortSN | RLC_UMD_PDU_ShortSN_Type | |
| LongSN | RLC_UMD_PDU_LongSN_Type | |

### D.2.1.2.4 AM_Data

RLC PDU definition: AM (TS 36.322, clause 6.2.1.4 and 6.2.1.5)

**RLC_AMD_Header_FixPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_AMD_Header_FixPart_Type** | | |
| **Comment** | TS 36.322, clause 6.2.1.4 Figure 6.2.1.4-1, 6.2.1.4-2 and 6.2.1.4-3);<br>2 or 4 octets | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| ReSeg | B1_Type | | 0 - AMD PDU<br>1 - AMD PDU segment |
| Poll | B1_Type | | 0 - Status report not requested<br>1 - Status report is requested |
| FramingInfo | RLC_FramingInfo_Type | | 2 bit FI |
| Extension | B1_Type | | 1 bit E |
| SN | B10_Type | | Sequence numbers |

**RLC_AMD_Header_SegmentPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_AMD_Header_SegmentPart_Type** | | |
| **Comment** | AMD PDU segment related info in PDU header acc. TS 36.322, clause 6.2.1.5 | | |
| LastSegmentFlag | B1_Type | | 0 - Last byte of the AMD PDU segment does not correspond to the last byte of an AMD PDU<br>1 - Last byte of the AMD PDU segment corresponds to the last byte of an AMD PDU |
| SegOffset | B15_Type | | The SO field indicates the position of the AMD PDU segment in bytes within the original AMD PDU.<br>Specifically, the SO field indicates the position within the Data field of the original AMD PDU<br>to which the first byte of the Data field of the AMD PDU segment corresponds to. |

**RLC_AMD_Header_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_AMD_Header_Type** | | |
| **Comment** | | | |
| FixPart | RLC_AMD_Header_FixPart_Type | | |
| SegmentPart | RLC_AMD_Header_SegmentPart_Type | opt | present in case of AMD Seg PDU only |
| FlexPart | RLC_PDU_Header_FlexPart_Type | opt | |

**RLC_AMD_PDU_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_AMD_PDU_Type** | | |
| **Comment** | | | |
| Header | RLC_AMD_Header_Type | | |
| Data | RLC_DataFieldList_Type | | |

### D.2.1.2.5 AM_Status

AM Status PDU (TS 36.322, clause 6.2.1.6)

**AM_Status: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RLC_Status_Padding_Type** | bitstring length (1..7) | NOTE:<br>in TTCN-3 length restriction cannot be done inline in record definition<br>**=> explicit type definition necessary** |

**RLC_Status_ACK_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_Status_ACK_Type** | | |
| **Comment** | | | |
| ACK_SN | B10_Type | | Acknowledgement SN (TS 36.322, clause 6.2.2.14) |
| Extn1 | B1_Type | | 0 - a set of NACK_SN, E1 and E2 does not follow.<br>1 - a set of NACK_SN, E1 and E2 follows. |

### RLC_Status_SegOffset_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_Status_SegOffset_Type** | | |
| **Comment** | | | |
| Start | B15_Type | | SOstart field indicates the position of the first byte of the portion of the AMD PDU in bytes within the Data field of the AMD PDU |
| End | B15_Type | | SOend field indicates the position of the last byte of the portion of the AMD PDU in bytes<br>within the Data field of the AMD PDU. The special SOend value '111111111111111'B is used to<br>indicate that the missing portion of the AMD PDU includes all bytes to the last byte of the AMD PDU |

### RLC_Status_NACK_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_Status_NACK_Type** | | |
| **Comment** | | | |
| NACK_SN | B10_Type | | |
| Extn1 | B1_Type | | 0 - A set of NACK_SN, E1 and E2 does not follow.<br>1 - A set of NACK_SN, E1 and E2 follows. |
| Extn2 | B1_Type | | 0 - A set of SOstart and SOend does not follow for this NACK_SN.<br>1 - A set of SOstart and SOend follows for this NACK_SN. |
| SO | RLC_Status_SegOffset_Type | opt | |

### RLC_Status_NACK_List_Type

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RLC_Status_NACK_List_Type** |
| **Comment** | |
| record of RLC_Status_NACK_Type | |

### RLC_AM_StatusPDU_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RLC_AM_StatusPDU_Type** | | |
| **Comment** | | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| Type | B3_Type | | 000 - STATUS PDU<br>001..111 - Reserved (=> PDU to be discarded by the receiving entity for this release of the protocol) |
| Ack | RLC_Status_ACK_Type | | ACK_SN and E1 bit |
| NackList | RLC_Status_NACK_List_Type | opt | presence depends on Extn1 bit of Ack filed (RLC_Status_ACK_Type) |
| Padding | RLC_Status_Padding_Type | opt | 1..7 bit padding if needed for octet alignment |

### RLC_PDU_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RLC_PDU_Type** | |
| **Comment** | | |
| TMD | RLC_TMD_PDU_Type | |
| UMD | RLC_UMD_PDU_Type | |
| AMD | RLC_AMD_PDU_Type | |
| Status | RLC_AM_StatusPDU_Type | |

**RLC_PDUList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **RLC_PDUList_Type** |
| **Comment** | |
| record of RLC_PDU_Type | |

## D.2.1.3 PDCP

PDCP user plane SDU and PDU definitions
NOTE:
To allow direct encoding the definition for PDCP Data PDU is split into data PDU with long/short sequence number

**PDCP: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **PDCP_SDU_Type** | octetstring | |

**PDCP_SDUList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **PDCP_SDUList_Type** |
| **Comment** | |
| record of PDCP_SDU_Type | |

**PDCP_DataPdu_LongSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_DataPdu_LongSN_Type** | | |
| **Comment** | User plane PDCP Data PDU with long sequence number (TS 36.323, clause 6.2.3) | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| Reserved | B3_Type | | |
| SequenceNumber | B12_Type | | 12 bit sequence number |
| SDU | PDCP_SDU_Type | | content (octetstring) |

**PDCP_DataPdu_ShortSN_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_DataPdu_ShortSN_Type** | | |
| **Comment** | User plane PDCP Data PDU with short sequence number (TS 36.323, clause 6.2.4) | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| SequenceNumber | B7_Type | | 7 bit sequence number |
| SDU | PDCP_SDU_Type | | content (octetstring) |

**PDCP_Ctrl_ROHC_FB_PDU_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_Ctrl_ROHC_FB_PDU_Type** | | |
| **Comment** | PDCP Control PDU for interspersed ROHC feedback packet (TS 36.323, clause 6.2.5) | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| Type | B3_Type | | 000 - PDCP status report<br>001 - Header Compression Feedback Information<br>010..111 - reserved |
| Reserved | B4_Type | | |
| ROHC_FB | octetstring | | Contains one ROHC packet with only feedback, i.e. a ROHC packet that is not associated with a PDCP |

**PDCP_Ctrl_StatusReport_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **PDCP_Ctrl_StatusReport_Type** | | |
| **Comment** | PDCP Control PDU for PDCP status report (TS 36.323, clause 6.2.6) | | |
| D_C | B1_Type | | 0 - Control PDU<br>1 - Data PDU |
| Type | B3_Type | | 000 - PDCP status report<br>001 - Header Compression Feedback Information<br>010..111 - reserved |
| FMS | B12_Type | | PDCP SN of the first missing PDCP SDU. |
| Bitmap | octetstring | opt | The MSB of the first octet of the type "Bitmap" indicates whether or not the PDCP SDU with the SN (FMS + 1) modulo 4096 has been received and, optionally decompressed correctly.<br>0 -<br>PDCP SDU with PDCP SN = (FMS + bit position) modulo 4096 is missing in the receiver.<br>The bit position of Nth bit in the Bitmap is N, i.e. the bit position of the first bit in the Bitmap is 1.<br>1 -<br>PDCP PSU with PDCP SN = (FMS + bit position) modulo 4096 does not need to be retransmitted.<br>The bit position of Nth bit in the Bitmap is N, i.e. the bit position of the first bit in the Bitmap is 1. |

**PDCP_PDU_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **PDCP_PDU_Type** | |
| **Comment** | | |
| DataLongSN | PDCP_DataPdu_LongSN_Type | user plane PDCP data PDU with 12 Bit Seq Number |
| DataShortSN | PDCP_DataPdu_ShortSN_Type | user plane PDCP data PDU with 7 Bit Seq Number |
| RohcFeedback | PDCP_Ctrl_ROHC_FB_PDU_Type | PDCP Control PDU for interspersed ROHC feedback packet |
| StatusReport | PDCP_Ctrl_StatusReport_Type | PDCP Control PDU for PDCP status report |

**PDCP_PDUList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **PDCP_PDUList_Type** |
| **Comment** | |
| record of PDCP_PDU_Type | |

## D.2.2 DRB_Primitive_Definitions

Primitive definitions to send/receive data PDUs over DRB's

## D.2.2.1 DRB_Common

**DRB_Common: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **HarqProcessId_Type** | integer (0..7) | The values 0..7 represent the ID of HARQ process ID |

**U_PlaneDataList_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **U_PlaneDataList_Type** | |
| **Comment** | MAC:<br>acc. to rel-8 protocols there is not more than one MAC PDU per TTI;<br>any MAC PDU is completely included in one subframe<br>RLC:<br>one or more RLC PDUs per TTI<br>(e.g. RLC Data + Status PDU on a logical channel;<br>more than one RLC Data PDU in one MAC PDU is valid too)<br>any RLC PDU is completely included in one subframe<br>PDCP:<br>one or more PDUs per TTI; one PDCP PDU may be included in more than one subframe | |
| MacPdu | MAC_PDUList_Type | SS configuration: RLC TM mode, MAC no header removal (PDCP is not configured) |
| RlcPdu | RLC_PDUList_Type | SS configuration: RLC TM mode, MAC header removal (PDCP is not configured) |
| PdcpPdu | PDCP_PDUList_Type | SS configuration: RLC AM/UM mode, PDCP no header removal |
| PdcpSdu | PDCP_SDUList_Type | SS configuration: RLC AM/UM mode, PDCP header removal |

**HarqProcessAssignment_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **HarqProcessAssignment_Type** | |
| **Comment** | in DL the HARQ process id may be specified by the test case or automatically assigned by SS | |
| Id | HarqProcessId_Type | HARQ process id as specified by the test case<br>NOTE:<br>the scope of this type is only for data being sent in one TTI;<br>if data needs more than one TTI the HarqProcessId is undefined for the 2nd TTI onward what shall be handled as an error at the SS; SS may send a SYSTEM_IND indicating an error in this case |
| Automatic | Null_Type | HARQ process id automatically assigned by SS |

## D.2.2.2 Downlink

**DRB_DataPerSubframe_DL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DRB_DataPerSubframe_DL_Type** | | |
| **Comment** | common definition for one or several PDUs/SDUs to be sent in the subframe given by the subframe offset;<br>NOTE 1:<br>For MAC and RLC PDUs a single PDU is always sent in one subframe;<br>SS shall raise an error indication (using SYSTEM_IND) when taht is not possible<br>NOTE 2:<br>For PDCP the data may be spread over more than one subframe (segmented by the RLC);<br>the TTCN implemetation is responsible to calculate appropriate offsets accordingly;<br>the exact timing depends on (and is exactly specified by) configuration of the DL scheduling;<br>SS shall raise an error when there is any conflict | | |
| SubframeOffset | integer | | subframe offset relative to the absolute timing information given in the common part of the ASP;<br>NOTE 1:<br>Notes:<br>Acc. to TS 36.523-3, clause 7.3.3 in case of TDD or half-duplex configuration only subframes available for DL are taken into consideration<br>NOTE 2:<br>if a PDCP PDU or SDU takes more than one subframe, SubframeOffset specifies the first TTI |
| HarqProcess | HarqProcessAssignment_Type | | HARQ process to be used: specific value (0..7) or automatically assigned by SS<br>NOTE:<br>for PDCP SDUs or PDUs automatic mode shall be used; otherwise SS shall raise an error |
| PduSduList | U_PlaneDataList_Type | | list of PDUs/SDUs to be sent in one TTI |

**DRB_DataPerSubframeList_DL_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **DRB_DataPerSubframeList_DL_Type** |
| **Comment** | list of user plane data to be sent in sub-frames given by the SubframeOffset in the single elements of the list;<br>Timing:<br>the start time for the whole sequence is given by the timing info of the ASP (common information);<br>the timing for the respective data pdus is given by the SubframeOffset relative to the common timing info;<br>design consideration:<br>repetitions of this sequence are not foreseen<br>(in which case the subframe offset could not be related to the timing info of the ASP) |
| record of DRB_DataPerSubframe_DL_Type | |

**U_Plane_Request_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **U_Plane_Request_Type** | | |
| **Comment** | NOTE: formal type definition to allow later enhancements;<br>U_Plane_Request_Type defines a sequence of subframes in which data shall be sent | | |
| SubframeDataList | DRB_DataPerSubframeList_DL_Type | | |

## D.2.2.3 Uplink

**DRB_DataPerSubframe_UL_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DRB_DataPerSubframe_UL_Type** | | |
| **Comment** | common definition for one or several PDUs/SDUs being received in one subframe<br>or to receive one PDCP PDU or SDU being spread over more than one TTI;<br>NOTE:<br>There is a fix relation between HARQ process id and subframe in UL<br>=> it is not necessary to include HARQ process id for UL data | | |
| PduSduList | U_PlaneDataList_Type | | list of PDUs/SDUs being received in one TTI;<br>elements of the list appear in the same order as the PDUs/SDUs in the MAC PDU;<br>for PDCP when a PDU or SDU takes more than one TTI the list only contains this PDU or SDU |
| NoOfTTIs | integer | | in case of PDCP:<br>number of TTIs the SDU or PDU has taken<br>NOTE 1: for the time being the NoOfTTIs is not checked by TTCN-3 and may be set to 1 by SS;<br>NOTE 2: the timing info in common part of the ASP refers to the last TTI<br>NOTE 3: when NoOfTTIs > 1 => PduSduList shall only contain one PDCP PDU or SDU<br>in case of MAC or RLC PDUs:<br>NoOfTTIs shall always be 1<br>(acc. to TS 36.321 MAC is not doing segmentation of RLC PDUs and acc. to TS 36.322, clause 6.2.2.2 the maximum RLC data is calculated to fit into a MAC PDU and RLC does segmentation accordingly) |
| RedundancyVersion | RedundancyVersion_Type | opt | to be included for MAC PDUs, omit else |

**U_Plane_Indication_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **U_Plane_Indication_Type** | | |
| **Comment** | **NOTE: formal type definition to allow later enhancements;**<br>U_Plane_Indication_Type defines data being received in a single subframe<br>i.e. PDUs of subsequent TTIs are indicated in separated ASPs | | |
| SubframeData | DRB_DataPerSubframe_UL_Type | | |

## D.2.3 System_Interface

**DRB_COMMON_REQ**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DRB_COMMON_REQ** | | |
| **Comment** | common ASP to send PDUs to DRBs | | |
| Common | ReqAspCommonPart_Type | | CellId : identifier of the cell<br>RoutingInfo : DRB id<br>TimingInfo : starting point when to start sending sequence of data PDUs<br>e.g.<br>SFN = X, subframe number = x;<br>U_Plane.SubframeDataList[i].SubframeOffset := offset_i;<br>=> U_Plane.SubframeDataList[i].PduSduList shall be sent out at<br>SFN = X + ((x + offset_i) / 10);<br>subframe number = (x + offset_i) % 10<br>ControlInfo : CnfFlag:=false; FollowOnFlag:=false |
| U_Plane | U_Plane_Request_Type | | |
| SuppressPdcch ForC_RNTI | Null_Type | opt | By default all DRB_COMMON_REQ scheduled DL PDU's are associated with an appropriate explicit configured or SS selected DL assignment allocation on PDCCH.<br>For SuppressPdcch:=true in the sub frame in which DL PDU's are transmitted, there is no associated DL assignment allocation for configured C-RNTI. This will be used for SPS assignment based transmission or in any error scenarios;<br>NOTE: this flag has no impact on PDCCH messages required for SPS activation |

**DRB_COMMON_IND**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **DRB_COMMON_IND** | | |
| **Comment** | common ASP to receive PDUs from DRBs | | |
| Common | IndAspCommonPart_Type | | CellId : identifier of the cell<br>RoutingInfo : DRB id<br>TimingInfo : time when message has been received<br>NOTE 1:<br>For MAC and RCL PDUs per definition U_Plane_Indication_Type corresponse to exactly one subframe<br>=> TimingInfo refers to this subframe<br>NOTE 2:<br>For PDCP a single PDU or SDU may take more than one TTI<br>=> TimingInfo refers to the end of the PDU/SDU and the length is given by NoOfTTIs in U_Plane_Indication_Type<br>(the end of the PDU/SDU is the last RLC PDU being received; in case of retransmissins this is not necessarily the RLC PDU with the last SN) |
| U_Plane | U_Plane_Indication_Type | | |

**EUTRA_DRB_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **EUTRA_DRB_PORT** | |
| **Comment** | | |
| out | DRB_COMMON_REQ | |
| in | DRB_COMMON_IND | |

# D.3 IP_AspTypes

General Notes:
NOTE 1:
In general the handling of IP data shall be independent from the RAT being used on lower layers.
NOTE 2:
It shall be possible for SS implementation to reuse existing IP stack implementations in the system adaptor;
therefore the well-known concept of socket programming shall be supported
(regardless of whether those are used in the system adaptor implementation or not)
NOTE 3:
Since in general at the network side there are several different IP addresses the SS needs to simulate more than one IP address;
that can be based on a concept of multiple virtual network adaptors
NOTE 4:
There is no easy way to control the routing of IP data for an IP connection from above the IP stack
i.e. there are no parameters at the socket interface to determine e.g. cell id and DRB id
=> another independent logical entity (DRB-MUX) is needed below the IP stack which is responsible to control the routing of IP packets from/to DRBs in different cells of different RATs

Reference:
An introduction to socket programming can be found in
UNIX Network Programming Volume 1, Third Edition: The Sockets Networking API
by W. Richard Stevens, Bill Fenner, Andrew M. Rudoff

## D.3.1 IP_Common

**IP_Common: Basic Type Definitions**

| **TTCN-3 Basic Types** | | |
|---|---|---|
| **PortNumber_Type** | UInt16_Type | |

**IPv4_AddrInfo_Type**

| **TTCN-3 Record Type** | | | |
|---|---|---|---|
| **Name** | **IPv4_AddrInfo_Type** | | |
| **Comment** | IPv4 specific info of the socket addr (AF_INET) | | |
| Addr | charstring | | IP Address as string (IP v4 dot notation) to be converted to 32-bit unsigned integer |

**IPv6_AddrInfo_Type**

| **TTCN-3 Record Type** | | | |
|---|---|---|---|
| **Name** | **IPv6_AddrInfo_Type** | | |
| **Comment** | IPv6 specific info of the socket addr (AF_INET6);<br>NOTE: sin6_flowinfo can be ignored and set to 0 | | |
| Addr | charstring | | to be converted to sin6_addr |
| ScopeId | UInt32_Type | opt | sin6_scope_id<br>in general an IPv6 address is like "fe80::1%eth0" with eth0 being the network adaptor mapped to a scope id (Unix)<br>assumption:<br>for UE conformance testing it is not necessary to distiguish different scopes and the scope id in general can be determined by the system adaptor => omit |

**IP_AddrInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_AddrInfo_Type** | |
| **Comment** | | |
| V4 | IPv4_AddrInfo_Type | |
| V6 | IPv6_AddrInfo_Type | |

**IP_Socket_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_Socket_Type** | | |
| **Comment** | Socket | | |
| IpAddr | IP_AddrInfo_Type | opt | IP address |
| Port | PortNumber_Type | opt | port number |

**InternetProtocol_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **InternetProtocol_Type** |
| **Comment** | |
| udp | |
| tcp | |
| icmp | |
| icmpv6 | |

**IP_Connection_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_Connection_Type** | | |
| **Comment** | A connection between peer-to-peer entities is unambiguously defined by the protocol (udp/tcp/icmp/icmpv4), the local socket and the remote socket | | |
| Protocol | InternetProtocol_Type | | |
| Local | IP_Socket_Type | opt | |
| Remote | IP_Socket_Type | opt | |

## D.3.2 IP_Config

Configuration of the routing table managed be the system adaptor's DRB-MUX:
foreach IP connection it is specified which
- RAT
- Cell
- DRB

to be used.
The IP connection does not need to be fully specified depending on the role SS plays (e.g. in case of a server role the port number of the remote side is not known in advance).
The configurations of DRBs within the same cell shall be mutual exclusive.

With the configuration of the IP routing the DRB is configured either in IP or in raw mode:
either there are entries for the DRB in the routing table (IP mode) or not (raw mode)
=> It is not necessary to reconfigure this for the respective RAT.

Behaviour of the DRB-MUX in UL:
- SS gets data packet from the lower layers (e.g. PDCP SDU)
- SS checks whether there is any IP connection configured for this DRB (identified by {RAT, CellId, DrbId})
  if YES => packet is routed to the IP stack (IP mode)
  if NO => packet is handed over to the DRB port (raw mode)

NOTE 1:

If there is any entry for the DRB in the routing table the DRB is considered as being in IP mode and all UL IP packets are sent to the IP stack regardless of whether their addresses match the DRB's routing entries or not (in general 'unknown' packets are discarded by the IP stack)
=> a DRB can be either in IP or in raw mode
NOTE 2:
=> SS does not need to evaluate the IP packets (i.e. there is no conflict with loopback data)

Behaviour of the DRB-MUX in DL:
- SS gets IP packets from the IP stack for an IP connection
- SS compares the IP connection (protocol, local/remote IP Addr) against the IP routing table and checks whether the corresponding protocol stack is configured at the lower layers =>
  1. no match:
     no entry in the routing table fits to the address in the IP packet
     or the corresponding RB is not configured
     => SS shall raise an error (DRBMUX_COMMON_IND_CNF.Error)
  2. one match:
     There is exactly one possibility to route the IP packet
     => SS shall send the packet to this RB
  3. several matches:
     There are more than one DRBs, cells or RATs to which the packet may be routed
     => SS shall raise an error if there is more than one DRB in one cell matching;
        if the DRBs belong to different cells or RATS SS shall send the data to all of them
        (whether this may occur in test cases is FFS)

General notes:
NOTE 1:
SS may use the information of the routing table to determine which network adaptors it needs to simulate (implementation dependent);
in general there will be more than one IP address at the network side.
=> it seems to be helpful to pre-configure all possible IP conections at the very beginning of a test case
NOTE 2:
In general the routing table is a simplified DL TFT implementation
NOTE 3:
When the routing table is empty all DRBs are in raw mode; this shall be the initial condition at the DRB-MUX;
=> for L2 testing in general (and apart from the preamble) there is no need to use/configure the IP_PTC; the configuration of the RAT specific U-plane stacks is not affected

### IP_Config: Basic Type Definitions

| **TTCN-3 Basic Types** | | |
|---|---|---|
| **IP_DrbIdType** | integer | DRB identity type common for all RATs (for EUTRA IP_DrbIdType corresponds to the ASN.1 type DRB-Identity; other RATs are FFS)<br>NOTE: this is introduced to simplify the dependencies |

### IP_EUTRA_Cell_Type

| **TTCN-3 Union Type** | | |
|---|---|---|
| **Name** | **IP_EUTRA_Cell_Type** | |
| **Comment** | | |
| Any | Null_Type | if this option is used, in all EUTRA cells the same DRB is used for this IP connection;<br>in general there is only a DRB stack on one cell, i.e. in DL the data is routed to the cell which actually has the DRB configured |
| Id | CellId_Type | with this option the data is routed to a specific cell regardless of whether the same DRB is configured in any other cell;<br>CellId_Type is defined in EUTRA_CommonDefs |

### IP_EUTRA_DrbInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_EUTRA_DrbInfo_Type** | | |
| **Comment** | | | |
| Cell | IP_EUTRA_Cell_Type | | |
| DrbId | IP_DrbIdType | | |

### IP_UTRAN_Cell_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_UTRAN_Cell_Type** | |
| **Comment** | | |
| Any | Null_Type | (see IP_EUTRA_Cell_Type) |
| Id | UTRAN_CellId_Type | (see IP_EUTRA_Cell_Type)<br>UTRAN_CellId_Type is defined in UTRAN_ASP_definitions |

### IP_UTRAN_DrbInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_UTRAN_DrbInfo_Type** | | |
| **Comment** | | | |
| Cell | IP_UTRAN_Cell_Type | | |
| DrbId | IP_DrbIdType | | |

### IP_GERAN_Cell_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_GERAN_Cell_Type** | |
| **Comment** | | |
| Any | Null_Type | (see IP_EUTRA_Cell_Type) |
| Id | GERAN_CellId_Type | (see IP_EUTRA_Cell_Type)<br>GERAN_CellId_Type is defined in GERAN_TypeDefs |

### IP_GERAN_DrbInfo_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_GERAN_DrbInfo_Type** | | |
| **Comment** | | | |
| Cell | IP_GERAN_Cell_Type | | |
| DrbId | IP_DrbIdType | | |

### IP_DrbInfo_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_DrbInfo_Type** | |
| **Comment** | | |
| Eutra | IP_EUTRA_DrbInfo_Type | |
| Utran | IP_UTRAN_DrbInfo_Type | |
| Geran | IP_GERAN_DrbInfo_Type | |

**IP_RoutingInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_RoutingInfo_Type** | | |
| **Comment** | | | |
| IpInfo | IP_Connection_Type | | IP connection tuple: protocol, local socket, remote socket<br>depending on the role the SS plays the following information may be provided<br>(informative; even less information can be suffcient):<br>1. TCP/UDP server<br>- local IP addr -- provided<br>- local port -- provided<br>- remote IP addr -- omit<br>- remote port -- omit<br>2. TCP/UDP client<br>- local IP addr -- provided<br>(to inform SS about the local IP addr for this service)<br>- local port -- omit;<br>for UDP a well-defined port may be defined<br>(protocol dependent, e.g. DHCP)<br>- remote IP addr -- provided<br>- remote port -- provided<br>3. ICMP (in general ICMP may be mapped only to a single DRB)<br>- local IP addr -- provided<br>(to inform SS about the local IP addr for this service)<br>- local port -- n/a (shall be set to omit)<br>- remote IP addr -- omit<br>- remote port -- n/a (shall be set to omit)<br><br>NOTE:<br>In case of broadcasts in UL the broadcast address shall match any local IP address;<br>in DL for broadcast services typically no remote IP address is specified in the routing table |
| DRB | IP_DrbInfo_Type | | |

**IP_RoutingTable_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **IP_RoutingTable_Type** |
| **Comment** | NOTE: configurations of DRBs within the same cell shall be mutual exclusive |
| record of IP_RoutingInfo_Type | |

## D.3.3 IP_SocketHandling

Handling of IP data and IP connections
NOTE 1:
In general IP connections are distuished by the tuple {protocol, local socket, remote socket};
this information is used at the interface between TTCN and the system adaptor.
It is up the the system adaptor implementation to associate the IP connection with the internal socket (file descriptor; implementation dependent)
NOTE 2:
In general the association of the IP connections to (internal) sockets and the routing table for the DRB mpping (as configured with IP_RoutingTable_Type) are independent from each other

## D.3.3.1 Socket_Common

**IP_SockOpt_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_SockOpt_Type** | |
| **Comment** | socket options acc. to the setsockopt system call (i.e. for level=SOL_SOCKET in case of Berkeley socket API);<br>NOTE:<br>only options being relevant for a specific applications (upon a socket) are configured by TTCN<br>other options (e.g. SO_REUSEADDR) are out of TTCN and therefore a matter of system adaptor implementation | |
| SO_BROADCAST | boolean | set to true when IP broadcast messages shall be allowed for a port;<br>this is required e.g. in case of DHCP |

**IP_SockOptList_Type**

| TTCN-3 Record of Type | |
|---|---|
| **Name** | **IP_SockOptList_Type** |
| **Comment** | |
| record of IP_SockOpt_Type | |

**IP_SocketError_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_SocketError_Type** | |
| **Comment** | used to indicate errors related to sockets;<br>the IP_Connection shall contain as much address information as available at the system adaptor | |
| InvalidAddress | Null_Type | TTCN error: e.g. invalid or incomplete address information |
| System | integer | system error caused by system call;<br>the integer value may be used for validation but shall not be evaluated by TTCN |

## D.3.3.2 TCP_Socket

TCP primitives used on the IP port

**TCP_Socket: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **TCP_Data_Type** | octetstring | data as sent/received with send()/recv() on a TCP socket |

**TCP_ConnectRequest_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **TCP_ConnectRequest_Type** | | |
| **Comment** | TCP client: -> 'connect' system call | | |
| SockOptList | IP_SockOptList_Type | | when there are no options to configure the list is empty |

**TCP_Listen_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **TCP_Listen_Type** | | |
| **Comment** | TCP server: -> 'listen' system call | | |
| SockOptList | IP_SockOptList_Type | | when there are no options to configure the list is empty |

**TCP_CtrlRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TCP_CtrlRequest_Type** | |
| **Comment** | | |
| ConnectReq | TCP_ConnectRequest_Type | request a 'connect' to a remote server<br><br>system calls (informative)<br>socket -- get file descriptor<br>(setsockopt) -- normally not needed<br>bind -- assign local IP addr (to cope with multiple IP addresses)<br>connect -- connect to the client<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory to distinguish different network adaptors<br>local port -- omit (ephemeral port will be assigned by the system)<br>remote IP addr -- mandatory<br>remote port -- mandatory |
| Listen | TCP_Listen_Type | establish a server at the local (SS) side<br><br>system calls (informative)<br>socket -- get file descriptor<br>(setsockopt) -- if needed<br>bind -- assign local IP addr and port<br>listen -- await incoming connection<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory to distinguish different network adaptors<br>local port -- mandatory<br>remote IP add -- omit<br>remote port -- omit |
| Close | Null_Type | close a connection<br><br>system calls (informative):<br>close<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory<br>local port -- mandatory<br>remote IP addr -- mandatory<br>remote port -- mandatory |

**TCP_DataRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TCP_DataRequest_Type** | |
| **Comment** | | |
| Send | TCP_Data_Type | send data<br><br>system calls (informative):<br>send or write<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory<br>local port -- mandatory<br>remote IP addr -- mandatory<br>remote port -- mandatory |

## TCP_CtrlIndication_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TCP_CtrlIndication_Type** | |
| **Comment** | | |
| ConnectCnf | Null_Type | confirm a 'connect' to a remote server<br><br>system calls (informative):<br>getsockname -- get local port (ephemeral port assiged by the system)<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory (as in corresponding TCP_ConnectRequest)<br>local port -- mandatory (if there is more than one connection to the same server the local port is necessary to distinguish the connections)<br>remote IP addr -- mandatory (as in corresponding TCP_ConnectRequest)<br>remote port -- mandatory (as in corresponding TCP_ConnectRequest) |
| Accept | Null_Type | sent by the SS when it 'accepts' an incoming connection<br><br>system calls (informative):<br>accept<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory (as in corresponding TCP_ListenRequest)<br>local port -- mandatory (as in corresponding TCP_ListenRequest)<br>remote IP addr -- mandatory (as gotten from 'accept')<br>remote port -- mandatory (as gotten from 'accept') |
| Close | Null_Type | indicate 'close' by the remote side<br><br>system calls (informative):<br>indicated by recv or read<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory<br>local port -- mandatory<br>remote IP addr -- mandatory<br>remote port -- mandatory |
| CloseCnf | Null_Type | Confirmation for 'close' request; necessary since for TCP there are IP packets to release the connection<br><br>system calls (informative):<br>close<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory<br>local port -- mandatory<br>remote IP addr -- mandatory<br>remote port -- mandatory |

**TCP_DataIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TCP_DataIndication_Type** | |
| **Comment** | | |
| Recv | TCP_Data_Type | receive data<br><br>system calls (informative):<br>recv or read<br><br>IP_Connection:<br>protocol -- tcp<br>local IP addr -- mandatory<br>local port -- mandatory<br>remote IP addr -- mandatory<br>remote port -- mandatory |

## D.3.3.3 UDP_Socket

UDP primitives used on the IP port.

NOTE: In principle a UDP socket may communicate with different remote entities;
therefore the system adaptor may associate the socket handle with the local socket only
(local IP address and local port)

**UDP_Socket: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **UDP_Data_Type** | octetstring | data as sent/received with sendto()/recvfrom() on a UDP socket |

**UDP_SocketReq_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **UDP_SocketReq_Type** | | |
| **Comment** | to establish a UDP server or to bind local port number | | |
| SockOptList | IP_SockOptList_Type | | e.g. to allow broadcast messages;<br>when there are no options to configure the list is empty |

**UDP_CtrlRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UDP_CtrlRequest_Type** | |
| **Comment** | | |
| SocketReq | UDP_SocketReq_Type | request the system adaptor to bind a socket to a local address;<br>this is needed in general when the system adaptor acts as<br>1. UDP server<br>2. UDP client when it uses a well-known port rather than an ephemeral port (this is e.g. for DHCP)<br>3. UDP client when a local address needs to be bond (e.g. when there are several local addresses)<br><br>system calls (informative):<br>socket -- get file descriptor<br>(setsockopt) -- needed e.g. to allow broad cast message<br>bind -- assign local IP address (to cope with multiple IP addresses) and local port (in case of well-known local port)<br><br>IP_Connection:<br>protocol -- udp<br>local IP addr -- mandatory (to distiguish multiple IP addresses)<br>local port -- optional (mandatory in case of a UDP server)<br>remote IP addr -- omit<br>remote port -- omit |
| Close | Null_Type | release local socket<br><br>system calls (informative):<br>close<br><br>IP_Connection:<br>protocol -- udp<br>local IP addr -- mandatory (to identify local socket)<br>local port -- mandatory (to identify local socket)<br>remote IP addr -- omit<br>remote port -- omit |

**UDP_DataRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UDP_DataRequest_Type** | |
| **Comment** | | |
| SendTo | UDP_Data_Type | send data to (any) remote socket;<br>NOTE:<br>To simplify implementation of the system adaptor the local socket shall be bond in any case (using 'SocketReq') to specify the local IP address before sending data;<br>(in general the sendto system call can be used without explicitly binding the socket before;<br>in this case the port gets implicitly bond to an ephemeral port and the default IP address is used)<br><br>system calls (informative):<br>sendto<br><br>IP_Connection:<br>protocol -- udp<br>local IP addr -- mandatory (to identify local socket)<br>local port -- mandatory (to identify local socket)<br>remote IP addr -- mandatory (to address remote socket)<br>remote port -- mandatory (to address remote socket) |

**UDP_CtrlIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UDP_CtrlIndication_Type** | |
| **Comment** | | |
| SocketCnf | Null_Type | confirm 'SocketReq' and tell TTCN about assignment of ephemeral port;<br><br>system calls (informative):<br>getsockname -- get local port (ephemeral port assigned by the system; not needed if local port is well-known)<br><br>IP_Connection:<br>protocol -- udp<br>local IP addr -- mandatory<br>local port -- mandatory (well-known or ephemeral port asssigned by the system)<br>remote IP addr -- omit<br>remote port -- omit |

**UDP_DataIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **UDP_DataIndication_Type** | |
| **Comment** | | |
| RecvFrom | UDP_Data_Type | receive data;<br><br>system calls (informative):<br>recvfrom -- get data and src addr<br><br>IP_Connection:<br>protocol -- udp<br>local IP addr -- mandatory (see note)<br>local port -- mandatory<br>remote IP addr -- mandatory (as gotten from recvfrom)<br>remote port -- mandatory (as gotten from recvfrom)<br><br>NOTE:<br>The UE may send a UDP packet as broadcast (IP Addr 255.255.255.255 - e.g. in case of DHCP)<br>SS shall consider a broadcast address as matching every IP for UL and DL<br>example:<br>- SS gets DHCPDISCOVER with DEST_Addr=255.255.255.255 DEST_Port=67, SRC_Addr=0.0.0.0 SRC_Port=68<br>- TTCN gets DHCPDISCOVER with local Addr=(255.255.255.255 Port=67), remote Addr=(0.0.0.0 Port=68)<br>- TTCN sends DHCPOFFER with local Addr=(local IP Addr Port=67), remote Addr=(255.255.255.255 Port=68) |

## D.3.3.4 ICMP_Socket

ICMP primitives used on the IP port.

NOTE: the local side is identified by the protocol and in general by the local IP address

## ICMP_Socket: Basic Type Definitions

| TTCN-3 Basic Types | | |
|---|---|---|
| **ICMP_Data_Type** | octetstring | data as sent/received with sendto()/recvfrom() on the raw socket;<br>NOTE:<br>the data may depend on the socket options (FFS);<br>in general it does not include the IP header and<br>the checksum of the ICMP packet needs to be calculated/checked in TTCN |

## ICMP_SocketReq_Type

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ICMP_SocketReq_Type** | | |
| **Comment** | to establish a raw socket to send/receive ICMP packets | | |
| SockOptList | IP_SockOptList_Type | | e.g. to set the IP_HDRINCL socket option (to include the IP header in the data buffer) -> FFS<br>when there are no options to configure the list is empty |

## ICMP_CtrlRequest_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ICMP_CtrlRequest_Type** | |
| **Comment** | | |
| SocketReq | ICMP_SocketReq_Type | request the system adaptor to open a raw socket (IPv4 or IPv6)<br><br>system calls (informative):<br>socket -- get file descriptor (IPPROTO_ICMP or IPPROTO_IPV6);<br>(setsockopt) -- optional; to set socket options<br>bind -- assign local IP address (to cope with multiple IP addresses)<br><br>IP_Connection:<br>protocol -- icmp or icmpv6<br>local IP addr -- mandatory (to distiguish multiple IP addresses)<br>local port -- omit (not applicable for ICMP)<br>remote IP addr -- omit<br>remote port -- omit (not applicable for ICMP) |
| Close | Null_Type | release local socket<br><br>system calls (informative):<br>close<br><br>IP_Connection:<br>protocol -- icmp or icmpv6<br>local IP addr -- mandatory (to identify local socket)<br>local port -- omit<br>remote IP addr -- omit<br>remote port -- omit |

### ICMP_DataRequest_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ICMP_DataRequest_Type** | |
| **Comment** | | |
| SendTo | ICMP_Data_Type | send datagram<br><br>system calls (informative):<br>sendto<br><br>IP_Connection:<br>protocol -- icmp or icmpv6<br>local IP addr -- mandatory (to identify local socket)<br>local port -- omit<br>remote IP addr -- mandatory<br>remote port -- omit |

### ICMP_CtrlIndication_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ICMP_CtrlIndication_Type** | |
| **Comment** | | |
| SocketCnf | Null_Type | confirm 'SocketReq'<br><br>system calls (informative):<br>(SocketCnf is sent when all system calls for SocketReq have been successful)<br><br>IP_Connection:<br>protocol -- icmp or icmpv6<br>local IP addr -- mandatory<br>local port -- omit<br>remote IP addr -- omit<br>remote port -- omit |

### ICMP_DataIndication_Type

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ICMP_DataIndication_Type** | |
| **Comment** | | |
| RecvFrom | ICMP_Data_Type | receive datagram<br><br>system calls (informative):<br>recvfrom -- get data and src addr<br><br>IP_Connection:<br>protocol -- icmp or icmpv6<br>local IP addr -- mandatory<br>local port -- omit<br>remote IP addr -- mandatory (as gotten from recvfrom)<br>remote port -- omit |

### D.3.3.5 Socket_Primitives

**IP_CtrlRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_CtrlRequest_Type** | |
| **Comment** | | |
| TCP | TCP_CtrlRequest_Type | |
| UDP | UDP_CtrlRequest_Type | |
| ICMP | ICMP_CtrlRequest_Type | |

**IP_DataRequest_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_DataRequest_Type** | |
| **Comment** | | |
| TCP | TCP_DataRequest_Type | |
| UDP | UDP_DataRequest_Type | |
| ICMP | ICMP_DataRequest_Type | |

**IP_CtrlIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_CtrlIndication_Type** | |
| **Comment** | | |
| TCP | TCP_CtrlIndication_Type | |
| UDP | UDP_CtrlIndication_Type | |
| ICMP | ICMP_CtrlIndication_Type | |
| Error | IP_SocketError_Type | |

**IP_DataIndication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_DataIndication_Type** | |
| **Comment** | | |
| TCP | TCP_DataIndication_Type | |
| UDP | UDP_DataIndication_Type | |
| ICMP | ICMP_DataIndication_Type | |

## D.3.4 System_Interface

**DRBMUX_CONFIG_REQ**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DRBMUX_CONFIG_REQ** | |
| **Comment** | NOTE 1:<br>There is just one primitive to configure the whole routing table.<br>It is not foreseen to add, remove or manipulate single entries but the table is managed in TTCN and completely configured on any change; (otherwise it might get complicated to identify single entries)<br>NOTE 2:<br>the SS's routing table shall be empty at the beginning and can be cleared by an empty record (DRBMUX_CONFIG_REQ.RoutingInfo = {})<br>NOTE 3:<br>In general a reconfiguration of the routing table during a test case would be necessary only if an ephemeral port is needed to distinguish different routing<br>(e.g. when there are several TCP connections of the same service routed to different DRBs) | |
| RoutingInfo | IP_RoutingTable_Type | |

### DRBMUX_COMMON_IND_CNF

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **DRBMUX_COMMON_IND_CNF** | |
| **Comment** | | |
| Confirm | Null_Type | confirm DRBMUX_CONFIG_REQ |
| Error | Null_Type | indication of errors at the DRB-MUX:<br>An Error shall be raised by the DRB-MUX e.g. in the following cases:<br>- in DL when there are IP packets which cannot be routed to any DRB<br>i.e. the IP packet does not match to any entry in the routing table or the corresponding RB is not configured<br>- in DL when there are several DRBs possible for routing in the same cell |

### IP_SOCKET_CTRL_REQ

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_SOCKET_CTRL_REQ** | | |
| **Comment** | | | |
| ConnectionId | IP_Connection_Type | | |
| Req | IP_CtrlRequest_Type | | |

### IP_SOCKET_DATA_REQ

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_SOCKET_DATA_REQ** | | |
| **Comment** | | | |
| ConnectionId | IP_Connection_Type | | |
| Ind | IP_DataRequest_Type | | |

### IP_SOCKET_CTRL_IND

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_SOCKET_CTRL_IND** | | |
| **Comment** | | | |
| ConnectionId | IP_Connection_Type | | |
| Ind | IP_CtrlIndication_Type | | |

### IP_SOCKET_DATA_IND

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IP_SOCKET_DATA_IND** | | |
| **Comment** | | | |
| ConnectionId | IP_Connection_Type | | |
| Ind | IP_DataIndication_Type | | |

### IP_SOCKET_REQ

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_SOCKET_REQ** | |
| **Comment** | | |
| CTRL | IP_SOCKET_CTRL_REQ | |
| DATA | IP_SOCKET_DATA_REQ | |

**IP_SOCKET_IND**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IP_SOCKET_IND** | |
| **Comment** | | |
| CTRL | IP_SOCKET_CTRL_IND | |
| DATA | IP_SOCKET_DATA_IND | |

**IP_CONTROL_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **IP_CONTROL_PORT** | |
| **Comment** | | |
| out | DRBMUX_CONFIG_REQ | |
| in | DRBMUX_COMMON_IND_CNF | |

**IP_SOCKET_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **IP_SOCKET_PORT** | |
| **Comment** | | |
| out | IP_SOCKET_REQ | |
| in | IP_SOCKET_IND | |

# D.4 NasEmu_AspTypes

System interface between NAS emulation and system adaptor

## D.4.1 System_Interface

**RRC_PDU_REQ**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RRC_PDU_REQ** | | |
| **Comment** | | | |
| Common | ReqAspCommonPart_Type | | CellId : identifier of the cell<br>RoutingInfo : SRB0, SRB1, SRB2<br>TimingInfo : Now in normal cases;<br>For latency tests TimingInfo can be set to the SFN/subframe in which the RRC messages shall be sent out<br>NOTE 1: if the RRC PDU is too long to be sent in one TTI the TimingInfo corresponds to the first TTI<br>NOTE 2: the TimingInfo is not changed by the NAS Emu (i.e. the timing info as coming from the test case (SRB_COMMON_REQ) is handed through by the NAS Emu)<br>ControlInfo<br>CnfFlag:=false;<br>FollowOnFlag<br>true: Indicates that the message(s) to be sent on the same TTI will follow<br>NOTE 1: If the TimingInfo is not the same for messages to be sent on the same TTI, the SS shall produce an error<br>NOTE 2: the follow on flag applies only for messages of the same SRB<br>**false: Indicates that no more message(s) will follow** |
| RrcPdu | RRC_MSG_Request_Type | | |

**RRC_PDU_IND**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **RRC_PDU_IND** | | |
| **Comment** | common ASP to receive PDUs from SRB0, SRB1 or SRB2 | | |
| Common | IndAspCommonPart_Type | | CellId : identifier of the cell<br>RoutingInfo : SRB0, SRB1, SRB2<br>TimingInfo : time when message has been received (frame and sub-frame number); this is handed through to the test case by the NAS emulation<br>**NOTE: normally an RRC PDU is expected in one TTI; nevertheless if it is spread over more than one TTIs TimingInfo shall refer to the end of the PDU i.e. to the last RLC PDU being received;**<br>Status : OK or RRC integrity error |
| RrcPdu | RRC_MSG_Indication_Type | | |

**NASEMU_SYSTEM_PORT**

| TTCN-3 Port Type | | |
|---|---|---|
| **Name** | **NASEMU_SYSTEM_PORT** | |
| **Comment** | NASEMU PTC: Port for Sending/Receiving data to/from the SYSTEM Interface | |
| out | RRC_PDU_REQ | |
| in | RRC_PDU_IND | |

# D.5 EUTRA_CommonDefs

## D.5.1 Common_Types

**Common_Types: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **RedundancyVersion_Type** | integer (0..3) | used in EUTRA_ASP_DrbDefs and EUTRA_ASP_Typedefs |
| **ContentionResolutionId_Type** | bitstring length(48) | used in EUTRA_ASP_DrbDefs and EUTRA_ASP_Typedefs |

**CellId_Type**

| TTCN-3 Enumerated Type | |
|---|---|
| **Name** | **CellId_Type** |
| **Comment** | |
| eutra_Cell_NonSpecific | |
| eutra_Cell1 | |
| eutra_Cell2 | |
| eutra_Cell3 | |
| eutra_Cell4 | |
| eutra_Cell6 | |
| eutra_Cell10 | |
| eutra_Cell11 | |
| eutra_Cell12 | |
| eutra_Cell13 | |
| eutra_Cell14 | |
| eutra_Cell23 | |
| eutra_CellA | |
| eutra_CellB | |
| eutra_CellC | |
| eutra_CellD | |
| eutra_CellE | |
| eutra_CellG | |
| eutra_CellH | |
| eutra_CellI | |
| eutra_CellJ | |
| eutra_CellK | |
| eutra_CellL | |
| eutra_CellM | |

**RRC_MSG_Request_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RRC_MSG_Request_Type** | |
| **Comment** | DL RRC PDU on CCCH or DCCH | |
| Ccch | DL_CCCH_Message | |
| Dcch | DL_DCCH_Message | |

**RRC_MSG_Indication_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RRC_MSG_Indication_Type** | |
| **Comment** | UL RRC PDU on CCCH or DCCH | |
| Ccch | UL_CCCH_Message | |
| Dcch | UL_DCCH_Message | |

## D.5.2 Common_Constants

**EUTRA_CommonDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_EUTRA_MaxNumberOfCells** | integer | 20 | Maximum number of cells;<br>in TS 36.508 in, clause 4.4.2 and 6.3.2.2 there are tables for cells being used in non-NAS and NAS test cases;<br>in both cases less than 20 cells are listed |

# D.5.3 RRC_Nested_Types

**RRC_Nested_Types: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **SiWindowLength_Type** | SystemInformationBlockType1.si_WindowLength | |
| **SiPeriodicity_Type** | SchedulingInfoList[0].si_Periodicity | |
| **M_TMSI_Type** | S_TMSI.m_TMSI | |
| **MME_GroupId_Type** | RegisteredMME.mmegi | |
| **PrioritizedBitRate_Type** | LogicalChannelConfig.ul_SpecificParameters.prioritisedBitRate | |
| **Dl_Bandwidth_Type** | CarrierBandwidthEUTRA.dl_Bandwidth | |
| **Ul_Bandwidth_Type** | CarrierBandwidthEUTRA.ul_Bandwidth | |
| **Ra_PreambleIndex_Type** | RACH_ConfigDedicated.ra_PreambleIndex | |
| **CipheringAlgorithm_Type** | SecurityAlgorithmConfig.cipheringAlgorithm | |
| **IntegrityProtAlgorithm_Type** | SecurityAlgorithmConfig.integrityProtAlgorithm | |

# D.5.4 ASP_CommonPart

Definition of ASP common parts for REQ-, CNF- and IND-ASPs

## D.5.4.1 ASP_CommonPart_Definitions

### D.5.4.1.1 Routing_Info

**EUTRA_CommonDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_MaxRB** | integer | maxDRB + 3 | DRBs + 3 SRBs |
| **tsc_SRB0** | integer | 0 | |
| **tsc_SRB1** | integer | 1 | |
| **tsc_SRB2** | integer | 2 | |
| **tsc_DRB1** | DRB_Identity | 1 | |
| **tsc_DRB2** | DRB_Identity | 2 | |
| **tsc_DRB3** | DRB_Identity | 3 | |
| **tsc_DRB4** | DRB_Identity | 4 | |
| **tsc_DRB5** | DRB_Identity | 5 | |
| **tsc_DRB6** | DRB_Identity | 6 | |
| **tsc_DRB7** | DRB_Identity | 7 | |
| **tsc_DRB8** | DRB_Identity | 8 | |

**Routing_Info: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **SRB_Identity_Type** | integer (tsc_SRB0, tsc_SRB1, tsc_SRB2) | SRB0 to be covered as well |

**RadioBearerId_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RadioBearerId_Type** | |
| **Comment** | | |
| Srb | SRB_Identity_Type | |
| Drb | DRB_Identity | |

**RoutingInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **RoutingInfo_Type** | |
| **Comment** | | |
| None | Null_Type | |
| RadioBearerId | RadioBearerId_Type | |

### D.5.4.1.2 Timing_Info

**Timing_Info: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **SystemFrameNumber_Type** | integer (0..1023) | |
| **SubFrameNumber_Type** | integer (0..9) | |

**SubFrameInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SubFrameInfo_Type** | |
| **Comment** | | |
| Number | SubFrameNumber_Type | |
| Any | Null_Type | no specific sub-frame (valid for REQ ASPs only) |

**SystemFrameNumberInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **SystemFrameNumberInfo_Type** | |
| **Comment** | | |
| Number | SystemFrameNumber_Type | |
| Any | Null_Type | no specific frame number (valid for REQ ASPs only) |

**SubFrameTiming_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **SubFrameTiming_Type** | | |
| **Comment** | | | |
| SFN | SystemFrameNumberInfo_Type | | |
| Subframe | SubFrameInfo_Type | | |

**TimingInfo_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **TimingInfo_Type** | |
| **Comment** | | |
| SubFrame | SubFrameTiming_Type | |
| Now | Null_Type | to be used in REQ ASPs when there is no 'activation time' |
| None | Null_Type | only to be used in SYSTEM_CTRL_CNF but not for EnquireTiming |

## D.5.4.2 REQ_ASP_CommonPart

**ReqAspControlInfo_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ReqAspControlInfo_Type** | | |
| **Comment** | | | |
| CnfFlag | boolean | | true => SS shall send CNF:<br>when the REQ is with no timing information (no activation time), SS shall send the confirmation when the configuration is done, i.e. when the test case may continue.<br>Example:<br>when there is a configuration follow by a send event it shall not be necessary to have a wait timer in between but the CNF triggers the send event.<br>If there are other triggers e.g. like the UE sending a message, CnfFlag shall be set to false by the test case to avoid racing conditions with the CNF and the signalling message.<br>When there is an activation time SS shall send the CNF after the configuration has been scheduled;<br>that means SS shall not wait until the activation time has been expired. |
| FollowOnFlag | boolean | | false => no further (related) information<br>true: further related information will be sent to SS (semantics depending on respective ASP) |

**ReqAspCommonPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ReqAspCommonPart_Type** | | |
| **Comment** | | | |
| CellId | CellId_Type | | |
| RoutingInfo | RoutingInfo_Type | | |
| TimingInfo | TimingInfo_Type | | |
| ControlInfo | ReqAspControlInfo_Type | | |

## D.5.4.3 CNF_ASP_CommonPart

**ConfirmationResult_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **ConfirmationResult_Type** | |
| **Comment** | | |
| Success | Null_Type | |
| Error | integer | may contain SS specific error code; this will not be evaluated by TTCN |

**CnfAspCommonPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **CnfAspCommonPart_Type** | | |
| **Comment** | | | |
| CellId | CellId_Type | | |
| RoutingInfo | RoutingInfo_Type | | |
| TimingInfo | TimingInfo_Type | | |
| Result | ConfirmationResult_Type | | |

## D.5.4.4 IND_ASP_CommonPart

**IntegrityErrorIndication_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IntegrityErrorIndication_Type** | | |
| **Comment** | | | |
| Nas | boolean | | NAS Integrity: received MAC does not match calculated MAC |
| Pdcp | boolean | | PDCP Integrity: received MAC does not match calculated MAC |

**ErrorIndication_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **ErrorIndication_Type** | | |
| **Comment** | | | |
| Integrity | IntegrityErrorIndication_Type | | Integrity error: received MAC does not match calculated MAC |
| System | integer | | any other error: may be SS specific error code; this will not be evaluated by TTCN;<br>e.g. an error shall be raised when the UE requests retransmission of an RLC PDU |

**IndicationStatus_Type**

| TTCN-3 Union Type | | |
|---|---|---|
| **Name** | **IndicationStatus_Type** | |
| **Comment** | | |
| Ok | Null_Type | |
| Error | ErrorIndication_Type | |

**IndAspCommonPart_Type**

| TTCN-3 Record Type | | | |
|---|---|---|---|
| **Name** | **IndAspCommonPart_Type** | | |
| **Comment** | | | |
| CellId | CellId_Type | | |
| RoutingInfo | RoutingInfo_Type | | |
| TimingInfo | TimingInfo_Type | | |
| Status | IndicationStatus_Type | | |

# D.6 CommonDefs

**CommonDefs: Constant Definitions**

| TTCN-3 Basic Types | | | |
|---|---|---|---|
| **tsc_UInt8Max** | integer | 255 | |
| **tsc_UInt16Max** | integer | 65535 | |
| **tsc_UInt32Max** | integer | 4294967295 | |

**CommonDefs: Basic Type Definitions**

| TTCN-3 Basic Types | | |
|---|---|---|
| **B1_Type** | bitstring length(1) | |
| **B2_Type** | bitstring length(2) | |
| **B3_Type** | bitstring length(3) | |
| **B4_Type** | bitstring length(4) | |
| **B5_Type** | bitstring length(5) | |
| **B6_Type** | bitstring length(6) | |
| **B7_Type** | bitstring length(7) | |
| **B7_15_Type** | bitstring length(7..15) | **NOTE: length restriction can only be a range but not two destinct lengths** |
| **B8_Type** | bitstring length(8) | |
| **B10_Type** | bitstring length(10) | |
| **B11_Type** | bitstring length(11) | |
| **B12_Type** | bitstring length(12) | |
| **B15_Type** | bitstring length(15) | |
| **B32_Type** | bitstring length(32) | |
| **B128_Type** | bitstring length(128) | |
| **B256_Type** | bitstring length(256) | |
| **B128_Key_Type** | B128_Type | 128 bit security key |
| **Null_Type** | boolean (true) | dummy type for 'typeless' fields in unions |
| **Dummy_Type** | boolean (true) | dummy type for temporary purposes only |
| **UInt16_Type** | integer (0 .. tsc_UInt16Max) | |
| **UInt32_Type** | integer (0 .. tsc_UInt32Max) | |
| **Char1_Type** | charstring length (1) | |

# D.7 References to TTCN-3

**References to TTCN-3**

| References to TTCN-3 | | |
|---|---|---|
| **EUTRA_ASP_TypeDefs** | CommonEUTRA_Defs/EUTRA_ASP_TypeDefs.ttcn | Rev 2960 |
| **EUTRA_ASP_DrbDefs** | CommonEUTRA_Defs/EUTRA_ASP_DrbDefs.ttcn | Rev 2684 |
| **IP_AspTypes** | IP_PTC/IP_AspTypes.ttcn | Rev 2942 |
| **NasEmu_AspTypes** | NasEmulation/NasEmu_AspTypes.ttcn | Rev 1800 |
| **EUTRA_CommonDefs** | CommonEUTRA_Defs/EUTRA_CommonDefs.ttcn | Rev 2791 |
| **CommonDefs** | Common/CommonDefs.ttcn | Rev 2683 |

# Annex E (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2008-05 | | | | | Creatiion of draft TS | | 0.0.2 |
| 2008-08 | | | | | Add test models | 0.0.2 | 0.1.0 |
| 2008-10 | | | | | Add ASPs and state model | 0.1.1 | 0.3.0 |
| 2008-12 | | | | | Add details of UL/DL scheduling and cell configurations | 0.4.0 | 0.5.0 |
| 2009-02 | | | | | Change naming conventions, add more design considerations | 0.5.0 | 1.0.0 |
| 2009-03 | RAN#43 | RP-090271 | | | Presentation for Information | 1.0.0 | 1.0.2 |
| 2009-03 | | | | | Add Upper tester interface | 1.0.2 | 1.1.0 |
| 2009-04 | | | | | Improved DL scheduling | 1.1.0 | 1.2.0 |
| 2009-06 | | | | | Add normative annex D for ASP definitions | 1.2.0 | 1.3.0 |
| 2009-08 | | | | | General update | 1.3.0 | 1.4.0 |
| 2009-09 | | | | | Style /format check from ETSI EditHelp | 1.4.0 | 1.4.1 |
| 2009-09 | RAN#45 | RP-090753 | | | Presentation of v2.0.0 for approval | 1.4.1 | 2.0.0 |
| 2009-09 | | | | | Updated to 8.0.0 with no change | 2.0.0 | 8.0.0 |
| 2009-12 | RAN#46 | RP-091122 | 0001 | - | LTE ASP clarifications and update | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | RP-091119 | 0002 | - | CR to 36.523-3: Add new e-mail agreed LTE TTCN test cases in the TC list of Annex A and update Annex D | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090180 | 0003 | - | Resubmission of GCF WI 81 LTE RRC test case 8.1.2.1 on wk42 TTCN | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090139 | 0004 | - | Addition of GCF WI 81 LTE RRC test case 8.1.1.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090144 | 0005 | - | Addition of GCF WI 81 LTE RRC test case 8.1.3.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090163 | 0006 | - | Addition of GCF WI 82 EUTRA NAS test case 9.2.1.1.2 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090141 | 0007 | - | Addition of GCF WI 81 LTE MAC test case 7.1.1.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090160 | 0008 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090156 | 0009 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.2 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090154 | 0010 | - | Addition of GCF WI 82 EPC test case 9.2.2.2.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090165 | 0011 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.3 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090171 | 0012 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.3 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090176 | 0013 | - | Addition of GCF WI 82 EPC test case 9.3.2.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090174 | 0014 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.7 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090178 | 0015 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.6 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090198 | 0016 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.3.1 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090204 | 0017 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.3.4 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090202 | 0018 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.3.3 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090200 | 0019 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.3.2 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090196 | 0020 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.4.2 | 8.0.0 | 8.1.0 |
| 2009-12 | RAN#46 | R5s090194 | 0021 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.4.1 | 8.0.0 | 8.1.0 |
| 2010-03 | RAN#47 | R5-100103 | 0090 | - | An additional option for IP address allocation in test cases using UE test mode | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5-101049 | 0081 | - | Add a new clause for postamble in a UTRA/GERAN cell | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5-101050 | 0082 | 2 | Routine maintenance of TS 36.523-3 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | RP-100147 | 0022 | 1 | CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (prose), Annex A | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090209 | 0076 | - | Addition of GCF WI 81 LTE Idle Mode test case 6.1.2.2 on wk42 TTCN | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090210 | 0075 | - | Addition of GCF WI 82 EPC test case 9.1.3.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090212 | 0078 | - | Addition of GCF WI 82 EPC test case 9.2.3.1.5 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090214 | 0077 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.15 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090217 | 0072 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.5 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090219 | 0073 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.17 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090222 | 0074 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.20 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090306 | 0045 | - | Addition of GCF WI 81 LTE RRC test case 8.5.4.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090310 | 0038 | - | Addition of GCF WI-82 EPC test case 9.1.2.1 | 8.1.0 | 8.2.0 |

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| 2010-03 | RAN#47 | R5s090314 | 0030 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090316 | 0049 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.2 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090318 | 0042 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.3 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090320 | 0041 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090322 | 0028 | - | Correction to test step f_GetPDNAddress | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090331 | 0024 | - | Resubmission of GCF WI-81 LTE RRC test case 8.2.2.1 on ATS_wk47 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090333 | 0025 | - | Resubmission of GCF WI-81 LTE RRC test case 8.2.2.2 on ATS_wk47 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090335 | 0023 | - | Resubmission of GCF WI-81 LTE RRC test case 8.2.3.1 on ATS_wk47 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090337 | 0027 | - | Correction to EUTRA MAC test cases 7.1.3.3 and 7.1.3.7 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090340 | 0040 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.5.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090342 | 0039 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.5.2 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090345 | 0043 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.1.2 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090347 | 0048 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.2 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090349 | 0033 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.3 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090351 | 0034 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090353 | 0035 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.5 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090355 | 0047 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.7 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090357 | 0032 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.2.9 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090359 | 0050 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090361 | 0026 | - | Correction of GCF WI 81 EUTRA RLC test case 7.2.3.2 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090362 | 0031 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.13 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090364 | 0054 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090366 | 0046 | - | Addition of GCF WI 82 EPC test case 9.3.1.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090368 | 0029 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.5 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090373 | 0037 | - | TTCN corrections from LTE ATS_wk51 regression testing | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090375 | 0056 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.8 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090377 | 0055 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.6 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s090379 | 0036 | - | Correction to EPC test case 9.2.3.1.5 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100001 | 0044 | - | Correction to EUTRA RLC test case 7.2.3.17 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100002 | 0052 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.14 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100004 | 0059 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.6 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100006 | 0050 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.7 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100008 | 0056 | - | Addition of GCF WI 82 LTE NAS test case 9.2.1.1.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100012 | 0053 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.1.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100014 | 0051 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.9 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100016 | 0058 | - | Addition of GCF WI 81 EUTRA RLC test case 7.1.4.1 | 8.1.0 | 8.2.0 |

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|---|---|---|---|---|---|---|---|
| 2010-03 | RAN#47 | R5s100018 | 0053 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100020 | 0052 | - | Summary of regression errors in wk51 LTE ATS | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100021 | 0051 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100024 | 0054 | - | Addition of GCF WI-082 EPC test case 13.1.1 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100029 | 0057 | - | Addition of GCF WI 81 EUTRA Idle Mode test case 6.1.2.4 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100031 | 0058 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.10 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100039 | 0055 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.18 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100041 | 0057 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.7 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100043 | 0070 | - | Addition of GCF WI 81 LTE MAC test case 7.1.4.10 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100047 | 0071 | - | Corrections of GCF WI 81 EUTRA RLC test cases 7.2.3.1, 7.2.3.4, and 7.2.3.5. | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100049 | 0059 | - | Regression CR for LTE wk03 ATS | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100053 | 0079 | - | Correction of GCF WI 81 EUTRA RLC test case 7.2.3.8 | 8.1.0 | 8.2.0 |
| 2010-03 | RAN#47 | R5s100054 | 0080 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.15 | 8.1.0 | 8.2.0 |
| 2010-06 | RAN#48 | RP-100515 | 0084 | - | CR to 36.523-3: Add new verified and e-mail agreed TTCN test cases in the TC lists in 36.523-3 (prose), Annex A | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5-103845 | 0141 | - | Specification of default UL grant type and exception TC list | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5-103846 | 0142 | - | Routine maintenance of TS 36.523-3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5-103847 | 0143 | - | Align the postambles with the new specified UTRA test end states and UE attach implementation capabilities | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100057 | 0085 | - | Addition of GCF WI-081 RRC test case 8.2.1.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100065 | 0086 | - | Correction of GCF WI 81 EUTRA RLC test case 7.2.2.5.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100068 | 0092 | - | Regression CR for LTE wk07 ATS | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100072 | 0091 | - | Correction to EPC test case 9.2.2.2.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100073 | 0090 | - | Correction to LTE MAC test case 7.1.2.3 and 7.1.4.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100074 | 0087 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.3.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100076 | 0089 | - | Corrections to GCF WI-81 EUTRA RLC test cases 7.2.2.1, 7.2.2.3 and 7.2.2.5.1. | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100077 | 0088 | - | Correction to 'EUTRA_NASSteps.ttcn' module (here: APN IE) | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100078 | 0113 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.8 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100080 | 0112 | - | Addition of GCF WI 81 EUTRA NAS test case 7.2.3.16 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100082 | 0109 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.1.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100086 | 0108 | - | Addition of GCF WI 82 EPC test case 9.1.2.4 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100088 | 0107 | - | Addition of GCF WI 82 EPC test case 9.1.2.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100090 | 0106 | - | Addition of GCF WI 82 EPC test case 9.2.3.1.8 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100092 | 0110 | - | Addition of GCF WI 82 EPC test case 9.1.4.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100094 | 0105 | - | Addition of GCF WI 82 EPC test case 9.3.1.7a | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100096 | 0104 | - | Addition of GCF WI 82 EPC test case 9.3.1.7 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100098 | 0111 | - | Addition of GCF WI 82 EPC test case 9.1.3.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100100 | 0093 | - | Addition of GCF WI 81 EUTRA RAB test case 12.2.1 | 8.2.0 | 8.3.0 |

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|---|---|---|---|---|---|---|---|
| 2010-06 | RAN#48 | R5s100102 | 0103 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.4.16 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100104 | 0099 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.10 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100106 | 0102 | - | Addition of GCF WI -081 test case 8.2.1.3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100109 | 0131 | - | Addition of GCF WI-082 EUTRA EPS test case 9.4.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100111 | 0101 | - | Addition of GCF WI 82 EPC NAS test case 9.4.3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100113 | 0100 | - | Addition of GCF WI 82 EPC test case 9.4.4 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100116 | 0094 | - | Regression CR for LTE wk11 ATS | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100117 | 0098 | - | Addition of GCF WI 82 EPC test case 9.4.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100127 | 0097 | - | Resubmission of GCF WI 82 EPC test case 9.1.2.3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100130 | 0095 | - | Resubmission of GCF WI 81 EUTRA MAC test case 7.1.4.8 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100132 | 0096 | - | Addition of GCF WI 82 EPC test case 9.2.2.1.6 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100135 | 0136 | - | Baseline upgrade to December-09 Rel-8 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100136 | 0130 | - | Correction to the test step f_TestcaseIsL2Testcase | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100137 | 0129 | - | Correction to PDCCH candidate selection based on channel bandwidth under test | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100138 | 0127 | - | Addition of GCF WI-081 MAC test case 7.1.2.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100140 | 0128 | - | Regression CR for LTE/SAE ATS_10wk11 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100141 | 0125 | - | Correction to GCF WI 81 EUTRA MAC test case 7.1.3.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100142 | 0126 | - | Correction to EUTRA RLC test case 7.2.3.10 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100143 | 0118 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.9 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100145 | 0119 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.3.13 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100147 | 0122 | - | Addition of GCF WI 81 EUTRA PDCP test case 7.3.6.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100149 | 0120 | - | Addition of GCF WI 81 EUTRA RRC test case 8.3.1.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100151 | 0121 | - | Addition of GCF WI 81 EUTRA RRC test case 8.5.1.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100153 | 0123 | - | Addition of GCF WI 82 EPC EMM test case 9.2.2.1.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100155 | 0117 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.7.1.1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100157 | 0116 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.7.1.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100159 | 0114 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.7.1.3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100161 | 0115 | - | Addition of GCF WI 81 EUTRA MAC test case 7.1.7.1.4 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100163 | 0124 | - | Correction to MME Group ID to set MSB to 1 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100169 | 0132 | - | Correction of GCF WI-082 EPC test cases 9.1.2.3, 9.1.2.4 and 9.1.2.5 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100172 | 0133 | - | Further regression CR for LTE/SAE 10wk11 ATS | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100176 | 0135 | - | Addition of GCF WI 81 EUTRA RRC test case 8.3.1.2 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100178 | 0137 | - | Addition of GCF WI 81 EUTRA RRC test case 8.2.4.3 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100180 | 0138 | - | Addition of GCF WI 81 EUTRA RLC test case 7.2.2.11 | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100182 | 0139 | - | Regression CR for LTE wk11 ATS | 8.2.0 | 8.3.0 |
| 2010-06 | RAN#48 | R5s100183 | 0134 | - | Corrections to EUTRA RLC and PDCP test cases | 8.2.0 | 8.3.0 |

# History

| Document history | | |
|---|---|---|
| V8.0.0 | November 2009 | Publication |
| V8.1.0 | April 2010 | Publication |
| V8.2.0 | July 2010 | Publication |
| V8.3.0 | July 2010 | Publication |
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