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Contents

Foreword

This Technical Specification has been produced by the 3GPP.

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where:

x the first digit:

1 presented to TSG for information;

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

z the third digit is incremented when editorial only changes have been incorporated in the specification.

1 Scope

This document establishes the minimum RF characteristics of the TDD mode of UTRA.

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.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] ITU-R Recommendation SM.329-7 “Spurious emissions”

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the definitions apply.

Power Setting - The value of the control signal, which determines the desired transmitter, output Power. Typically, the power setting would be altered in response to power control commands

Maximum Power Setting - The highest value of the Power control setting which can be used.

Maximum output Power This refers to the measure of power when averaged over the transmit timeslot at the maximum power setting.

Peak Power - The instantaneous power of the RF envelope which is not expected to be exceeded for [99.9%] of the time.

Maximum peak power - The peak power observed when operating at a given maximum output power.

Average Power - The average transmitter output power obtained over any specified time interval, including periods with no transmission. *<Editors: This definition would be relevant when considering realistic deployment scenarios where the power control setting may vary. >*

Maximum average power The average transmitter output power obtained over any specified time interval, including periods with no transmission, when the transmit time slots are at the maximum power setting. *<Editors: The average power at the maximum power setting would also be consistent with defining a long term average power>*

Zero distance - Connected to the antenna connector of the BS using an interconnection of negligible delay

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

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

ACIR	Adjacent Channel Interference Ratio
ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
BER	Bit Error Rate
BS	Base Station
CW	Continuous wave (unmodulated signal)
DL	Down link (forward link)
$DPCH_o$	A mechanism used to simulate an individual intracell interferer in the cell with one code and a spreading factor of 16
$\frac{DPCH_o\_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the $DPCH_o$ to the total transmit power spectral density of all users in the cell in one timeslot as measured at the BS antenna connector
EIRP	Effective Isotropic Radiated Power
FDD	Frequency Division Duplexing
FER	Frame Error Rate
I_{oc}	The power spectral density of a band limited white noise source (simulating interference form other cells) as measured at the BS antenna connector.
$\hat{I}_{or}$	The received power spectral density of all users in the cell in one timeslot as measured at the BS antenna connector
PPM	Parts Per Million
RSSI	Received Signal Strength Indicator
SIR	Signal to Interference ratio
TDD	Time Division Duplexing
TPC	Transmit Power Control
UE	User Equipment
UL	Up link (reverse link)
UTRA	UMTS Terrestrial Radio Access

4 General

4.1 Measurement uncertainty

The requirements given in this specification are absolute. Compliance with the requirements is determined by comparing the measured value with the specified limit, without making allowance for measurment uncertainty.

4.2 Base station classes

The requirements in this specification apply to base station intended for general-purpose applications in co-ordinated network operation.

In the future further classes of base stations may be defined; the requirements for these may be different than for general-purpose applications.

5 Frequency bands and channel arrangement

5.1 General

The information presented in this section is based on a chip rate of 3.84 Mcps.

Note

1. Other chip rates may be considered in future releases.

5.2 Frequency bands

UTRA/TDD is designed to operate in the following bands;

a) 1900 – 1920 MHz: Uplink and downlink transmission
2010 – 2025 MHz Uplink and downlink transmission

b)* 1850 – 1910 MHz: Uplink and downlink transmission
1930 – 1990 MHz: Uplink and downlink transmission

c)* 1910 – 1930 MHz: Uplink and downlink transmission

* Used in ITU Region 2

Additional allocations in ITU region 2 are FFS.

Deployment in existing and other frequency bands is not precluded.

The co-existence of TDD and FDD in the same bands is still under study in WG4.

5.3 TX–RX frequency separation

No TX-RX frequency separation is required as Time Division Duplex (TDD) is employed. Each TDMA frame consists of 15 timeslots where each timeslot can be allocated to either transmit or receive.

5.4 Channel arrangement

5.4.1 Channel spacing

The nominal channel spacing is 5 MHz, but this can be adjusted to optimise performance in a particular deployment scenario.

5.4.2 Channel raster

The channel raster is 200 kHz, which means that the carrier frequency must be a multiple of 200 kHz.

5.4.3 Channel number

The carrier frequency is designated by the UTRA absolute radio frequency channel number (UARFCN). The value of the UARFCN in the IMT2000 band is defined as follows:

$N_t = 5 * (F \text{ MHz})$ $0.0 \leq F \leq 3276.6$ MHz where F is the carrier frequency in MHz

6 Transmitter characteristics

6.1 General

Unless detailed the transmitter characteristic are specified at the antenna connector.

6.2 Base station output power

Output power, Pout, of the base station is the mean power of one carrier delivered to a load with resistance equal to the nominal load impedance of the transmitter during one slot.

6.2.1 Base station maximum output power

Maximum output power, Pmax, of the base station is the mean power level per carrier that the manufacturers has declared to be available at the antenna connector.

6.2.1.1 Minimum Requirement

In normal conditions, the base station maximum output power shall remain within +2 dB and –2 dB of the manufacturer's rated power.

In extreme conditions, the Base station maximum output power shall remain within +2.5 dB and –2.5 dB of the manufacturer's rated power.

6.3 Frequency stability

Frequency stability is ability of the BS to transmit at the assigned carrier frequency.

6.3.1 Minimum Requirement

The modulated carrier frequency of the BS shall be accurate to within ± 0.05 PPM for RF frequency generation.

6.4 Output power dynamics

Power control is used to limit the interference level. The transmitter uses a quality-based power control on the downlink.

6.4.1 Inner loop power control

Inner loop power control is the ability of the BS transmitter to adjust its output power in response to the UL received signal.

For inner loop correction on the Downlink Channel, the base station adjusts its mean output power level in response to each valid power control bit received from the UE on the Uplink Traffic Channel. Inner loop control is based on SIR measurements at the UE receiver and the corresponding TPC commands are generated by the UE.

6.4.2 Power control steps

The power control step is the step change in the DL transmitter output power in response to a TPC message from the UE.

6.4.2.1 Minimum Requirement

Down link (DL) 1, 2, 3 dB

The tolerance of the transmitter output power and the greatest average rate of change in mean power due to the power control step shall be within the range shown in Table 6.1.

Table 6.1: power control step size tolerance

Step size	Tolerance	Range of average rate of change in mean power per 10 steps	
		minimum	maximum
1dB	+/-0.5dB	+/-8dB	+/-12dB
2dB	+/-0.75dB	+/-16dB	+/-24dB
3dB	+/-1dB	+/-24dB	+/-36dB

6.4.3 Power control dynamic range

The power control dynamic range is the difference between the maximum and the minimum transmit output power for a specified reference condition

6.4.3.1 Minimum Requirement

Down link (DL) power control dynamic range 30 dB

6.4.4 Minimum transmit power

The minimum controlled output power of the BS is when the power control setting is set to a minimum value. This is when the power control indicates a minimum transmit output power is required.

6.4.4.1 Minimum Requirement

Down link (DL) minimum transmit power is set to: Maximum output power – 30dB

6.4.5 Primary CCPCH power

Primary CCPCH power is the transmission power of the common control physical channel averaged over the transmit timeslot. Primary CCPCH power is signalled over the BCH.

The error between the BCH-broadcast value of the Primary CCPCH power and the Primary CCPCH power shall not exceed the values in table 6.x

Table 6.2: Errors between Primary CCPCH power and the broadcast value

Total power in slot, dB	PCCPCH power tolerance
Pmax-3 < P ≤ Pmax	+/- 2.5 dB
Pmax-6 < P ≤ Pmax-3	+/- 3.5 dB
Pmax-13 < P ≤ Pmax-6	+/- 5 dB

6.5 Transmit ON/OFF power

6.5.1 Transmit OFF power

The transmit OFF power state is when the BS does not transmit. This parameter is defined as maximum output transmit power within the channel bandwidth when the transmitter is OFF.

6.5.1.1 Minimum Requirement

The requirement of transmitOFF power shall be better than –33dBm measured with a filter that has a Root Raised Cosine (RRC) filter response with a roll off α=0.22 and a bandwidth equal to the chip rate.

6.5.2 Transmit ON/OFF Time mask

The time mask transmit ON/OFF defines the ramping time allowed for the BS between transmit OFF power and transmit ON power.

6.5.2.1 Minimum Requirement

The transmit power level versus time should meet the mask specified in figure 1.

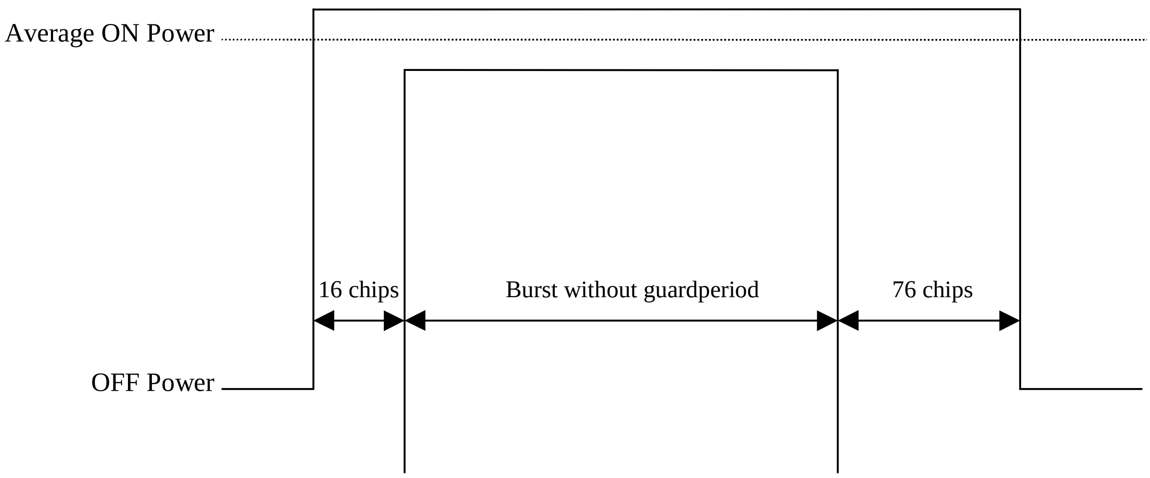


Figure 6.1: Transmit ON/OFF template

6.6 Output RF spectrum emissions

6.6.1 Occupied bandwidth

Occupied bandwidth is a measure of the bandwidth containing 99% of the total integrated power for transmitted spectrum and is centered on the assigned channel frequency. The occupied channel bandwidth is less than 5 MHz based on a chip rate of 3.84 Mcps.

6.6.2 Out of band emission

Out of band emissions are unwanted emissions immediately outside the [channel] bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out of band emission limit is specified in terms of a spectrum emission mask and adjacent channel power ratio for the transmitter.

6.6.2.1 Spectrum emission mask

The mask defined in Table 6.3 to 6.6 below may be mandatory in certain regions. In other regions this mask may not be applied.

For regions where this clause applies, the requirement shall be met by a base station transmitting on a single RF carrier configured in accordance with the manufacturer's specification. Emissions shall not exceed the maximum level specified by the mask in the frequency range with offset Δf from 2.5 MHz to Δf_{max} from the carrier frequency. The maximum offset Δf_{max} is 12.5 MHz.

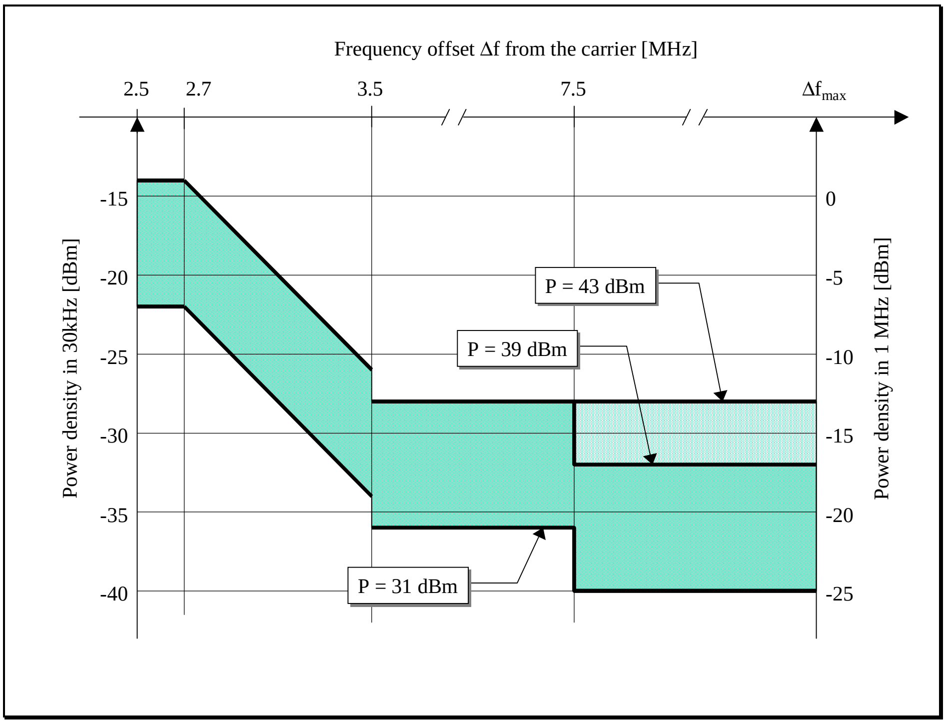


Table 6.3: Spectrum emission mask values, BS maximum output power P ≥ 43 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	-14 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	- 14 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf ≤ Δf_{max} MHz	-13 dBm	1 MHz [2]

Table 6.4: Spectrum emission mask values, BS maximum output power 39 ≤ P < 43 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	-14 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	-14 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf < 7.5 MHz	-13 dBm	1 MHz [2]
7.5 ≤ Δf ≤ Δf_{max} MHz	P - 56 dBm	1 MHz [2]

Table 6.5: Spectrum emission mask values, BS maximum output power 31 ≤ P < 39 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	P - 53 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	P - 53 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf < 7.5 MHz	P - 52 dBm	1 MHz [2]
7.5 ≤ Δf ≤ Δf_{max} MHz	P - 56 dBm	1 MHz [2]

Table 6.6: Spectrum emission mask values, BS maximum output power P < 31 dBm

Frequency offset Δf	Maximum level	Measurement bandwidth
2.5 ≤ Δf < 2.7 MHz	-22 dBm	30 kHz [1]
2.7 ≤ Δf < 3.5 MHz	-22 - 15·(Δf - 2.7) dBm	30 kHz [1]
3.5 ≤ Δf < 7.5 MHz	-21 dBm	1 MHz [2]
7.5 ≤ Δf ≤ Δf_{max} MHz	-25 dBm	1 MHz [2]

Notes:

1. The first and last measurement positions with a 30 kHz filter are 2.515 MHz and 3.485 MHz
2. The first and last measurement positions with a 1 MHz filter are 4 MHz and (Δf_{max} – 500 kHz)

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the transmitted power to the power measured after a receive filter in the adjacent channel(s). Both the transmitted and the received power are measured through a matched filter (Root Raised Cosine and roll-off 0.22) with a noise power bandwidth equal to the chip rate.

6.6.2.2.1 Minimum Requirement

The ACLR shall be better than the value specified in Table 6.2.

Table 6.7: BS ACLR

BS adjacent channel offset	ACLR limit
± 5 MHz	45 dB
± 10 MHz	55 dB

6.6.2.2.2 Requirement in case of operation in proximity to TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is operated in proximity to another TDD BS or FDD BS on an adjacent frequency, the ACLR shall be better than the value specified in Table 6.8.

Table 6.8: BS ACLR in case of operation in proximity

BS adjacent channel offset	ACLR limit
± 5 MHz	70 dB
± 5 MHz	70 dB

The requirement is based on the assumption that the coupling loss between the base stations is at least 84dB.

6.6.2.2.3 Requirement in case of co-siting with TDD BS or FDD BS operating on an adjacent frequency

In case the equipment is co-sited to another TDD BS or FDD BS on an andjacent frequency, the ACLR is specified in terms of the absolute transmit power level of the BS. The maximum power level shall not exceed the limit in Table 6.9.

Table 6.9: BS ACLR in case of co-siting

BS adjacent channel offset	Maximum Level	Measurement Bandwidth
± 5 MHz	-80 dBm	3.84 MHz
± 10 MHz	-80 dBm	3.84 MHz

6.6.2.3 Protection outside a licensee’s frequency block

This requirement is applicable if protection is required outside a licensee’s defined frequency block.

6.6.2.3.1 Minimum requirement

This requirement applies for frequencies outside the licensee’s frequency block, up to an offset of 12.5MHz from a carrier frequency.

The power of any emission shall be attenuated below the transmit power (P) by at least 43 + 10 log (P)dB.

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz or greater. However, in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier centre frequency and one above the carrier centre frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee’s frequency block edges, both upper and lower, as the design permits.

The measurements of emission power shall be mean power.

6.6.3 Spurious emissions

Spurious emissions are emissions which are caused by unwanted transmitter effects such as harmonics emission, parasitic emission, intermodulation products and frequency conversion products, but exclude out of band emissions. This is measured at the base station RF output port.

Unless otherwise stated, all requirements are measured as mean power.

6.6.3.1 Mandatory Requirements

The requirements of either subclause 6.6.3.1.1 or subclause 6.6.3.1.2 shall apply whatever the type of transmitter considered (single carrier or multi-carrier). It applies for all transmission modes foreseen by the manufacturer’s.

Either requirement applies at frequencies within the specified frequency ranges which are more than 12.5MHz under the first carrier frequency used or more than 12.5 MHz above the last carrier frequency used.

6.6.3.1.1 Spurious emissions (Category A)

The following requirements shall be met in cases where Category A limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

6.6.3.1.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.10: BS Mandatory spurious emissions limits, Category A

Band	Minimum requirement	Measurement Bandwidth	Note
9kHz – 150kHz	-13 dBm	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz		10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz		100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz – 12.75 GHz		1 MHz	Upper frequency as in ITU SM.329-7, s2.6

6.6.3.1.2 Spurious emissions (Category B)

The following requirements shall be met in cases where Category B limits for spurious emissions, as defined in ITU-R Recommendation SM.329-7 [1], are applied.

6.6.3.1.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.11: BS Mandatory spurious emissions limits, Category B

Band	Maximum Level	Measurement Bandwidth	Note
9kHz – 150kHz	-36dBm	1 kHz	Bandwidth as in ITU SM.329-7, s4.1
150kHz – 30MHz	- 36 dBm	10 kHz	Bandwidth as in ITU SM.329-7, s4.1
30MHz – 1GHz	-36 dBm	100 kHz	Bandwidth as in ITU SM.329-7, s4.1
1GHz – 12.75 GHz	-30 dBm	1 MHz	Upper frequency as in ITU SM.329-7, s2.6

6.6.3.2 Co-existence with GSM 900

6.6.3.2.1 Operation in the same geographic area

This requirement may be applied for the protection of GSM 900 MS in geographic areas in which both GSM 900 and UTRA are deployed.

[This requirement assumes the scenario described in 25.942.] For different scenarios, the manufacturer may declare a different requirement.

6.6.3.2.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.12: BS Spurious emissions limits for BS in geographic coverage area of GSM 900

Band	Maximum Level	Measurement Bandwidth	Note
921 – 960MHz	-47 dBm	100 kHz	

6.6.3.2.2 Co-located base stations

This requirement may be applied for the protection of GSM 900 BTS receivers when GSM 900 BTS and UTRA BS are co-located.

6.6.3.2.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.13: BS Spurious emissions limits for protection of the BS receiver

Band	Maximum Level	Measurement Bandwidth	Note
876 – 915 MHz	–98 dBm	100 kHz	

6.6.3.3 Co-existence with DCS 1800

6.6.3.3.1 Operation in the same geographic area

This requirement may be applied for the protection of DCS 1800 MS in geographic areas in which both DCS 1800 and UTRA are deployed.

[This requirement assumes the scenario described in 25.942.] For different scenarios, the manufacturer may declare a different requirement.

6.6.3.3.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.14: BS Spurious emissions limits for BS in geographic coverage area of DCS 1800

Band	Maximum Level	Measurement Bandwidth	Note
1805 – 1880MHz	-57 dBm	100 kHz	

6.6.3.3.2 Co-located basestations

This requirement may be applied for the protection of DCS 1800 BTS receivers when DCS 1800 BTS and UTRA BS are co-located.

6.6.3.3.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.15: BS Spurious emissions limits for BS co-located with DCS 1800 BTS

Band	Maximum Level	Measurement Bandwidth	Note
1710 – 1785 MHz	-98 dBm	100 kHz	

6.6.3.4 Co-existence with UTRA-FDD

6.6.3.4.1 Operation in the same geographic area

This requirement may be applied to geographic areas in which both UTRA-TDD and UTRA-FDD are deployed.

6.6.3.4.1.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.16: BS Spurious emissions limits for BS in geographic coverage area of UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-32 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm	1 MHz	

6.6.3.4.2 Co-located base stations

This requirement may be applied for the protection of UTRA-TDD BS receivers when UTRA-TDD BS and UTRA FDD BS are co-located.

6.6.3.4.2.1 Minimum Requirement

The power of any spurious emission shall not exceed:

Table 6.17: BS Spurious emissions limits for BS co-located with UTRA-FDD

Band	Maximum Level	Measurement Bandwidth	Note
1920 – 1980 MHz	-86 dBm	1 MHz	
2110 – 2170 MHz	-52 dBm,	1 MHz	

6.7 Transmit intermodulation

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna.

The transmit intermodulation level is the power of the intermodulation products when a CDMA modulated interference signal is injected into the antenna connector at a level of 30 dB lower than that of the subject signal. The frequency of the interference signal shall be ±5 MHz, ±10 MHz and ±15 MHz offset from the subject signal.

6.7.1. Minimum Requirement

The Transmit intermodulation level shall not exceed the out of band or the spurious emission requirements of section 6.6.2 and 6.6.3.

6.8 Transmit modulation

6.8.1 Transmit pulse shape filter

The transmit pulse-shaping filter is a root-raised cosine (RRC) with roll-off α =0.22 in the frequency domain. The impulse response of the chip impulse filter $RC_0(t)$ is

$$RC_0(t) = \frac{\sin\left(\pi \frac{t}{T_C}(1-\alpha)\right) + 4\alpha \frac{t}{T_C} \cos\left(\pi \frac{t}{T_C}(1+\alpha)\right)}{\pi \frac{t}{T_C}\left(1 - \left(4\alpha \frac{t}{T_C}\right)^2\right)}$$

Where the roll-off factor α =0.22 and the chip duration: $T_C = \frac{1}{chiprate} \approx 0.26042 \mu s$

6.8.2 Modulation Accuracy

The modulation accuracy is a measure of the difference between the measured waveform and the theoretical modulated waveform (the error vector). It is the square root of the ratio of the mean error vector power to the mean reference signal power expressed as %. The measurement interval is one timeslot.

6.8.2.1 Minimum Requirement

The Modulation accuracy shall not be worse than 12.5 %.

6.8.3 Peak Code Domain Error

The code domain error is computed by projecting the error vector power onto the code domain at the maximum spreading factor. The error power for each code is defined as the ratio to the mean power of the reference waveform expressed in dB. And the Peak Code Domain Error is defined as the maximum value for Code Domain Error. The measurement interval is one timeslot.

6.8.3.1 Minimum Requirement

The peak code domain error shall not exceed -28 dB.

7 Receiver characteristics

7.1 General

The requirements in this clause 7 assume that the receiver is not equipped with diversity. For receivers with diversity, the requirements apply to each antenna connector separately, with the other one(s) terminated or disabled .The requirements are otherwise unchanged.

7.2 Reference sensitivity level

The reference sensitivity is the minimum receiver input power measured at the antenna connector at which the FER/BER does not exceed the specific value indicated in section 7.2.1.

7.2.1 Minimum Requirement

For the measurement channel specified in Annex A, the reference sensitivity level and performance of the BS shall be as specified in table 7.1 below.

Table 7.1: BS reference sensitivity levels

Data rate	BS reference sensitivity level (dBm)	FER/BER
12.2 kbps	-110 dBm	BER shall not exceed 0.001

7.2.2 Maximum Frequency Deviation for Receiver Performance

The need for such a requirement is for further study.

7.3 Dynamic range

The receiver dynamic range is the input power range at each BS antenna connector over which the BER does not exceed a specific rate.

The static BER reference performance as specified in clause 7.2.1 should be met over a receiver input range of 30 dB above the specified reference sensitivity level for 12.2 kbps channel.

7.4 Adjacent Channel Selectivity (ACS)

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel.ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.4.1 Minimum Requirement

The BER shall not exceed 0.001 for the parameters specified in table 7.2.

Table 7.2 : Adjacent channel selectivity

Parameter	**Level**	**Unit**
Data rate	12.2	kbps
Wanted signal	Reference sensitivity level	dBm

	+ 6dB	
Interfering signal	–52	dBm
Fuw (Modulated)	5	MHz

7.5 Blocking characteristics

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at is assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels. The blocking performance shall apply at all frequencies as specified in the table below, using a 1MHz step size..

The static reference performance as specified in clause 7.2.1 should be met with a wanted and an interfering signal coupled to BS antenna input using the following parameters.

Table 7.3 (a): Blocking requirements for operating bands defined in 5.2(a)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1900 – 1920 MHz, 2010 – 2025 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1880 – 1900 MHz, 1990 – 2010 MHz, 2025 – 2045 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1920 – 1980 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1 < 1880 MHz, 1980 – 1990 MHz, 2045 < 12750 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

Table 7.3(b) : Blocking requirements for operating bands defined in 5.2(b,c)

Center Frequency of Interfering Signal	Interfering Signal Level	Wanted Signal Level	Minimum Offset of Interfering Signal	Type of Interfering Signal
1850 – 1990 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1830 – 1850 MHz 1990 – 2010 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
1920 – 1980 MHz	-40 dBm	<REFSENS> + 6 dB	10 MHz	WCDMA signal with one code
<1830, 1930 – 2000 MHz, > 2045 MHz	-15 dBm	<REFSENS> + 6 dB	—	CW carrier

7.6 Intermodulation characteristics

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receiver a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

The static reference performance as specified in clause 7.2.1 should be met when the following signals are coupled to BS antenna input.

- A wanted signal at the assigned channel frequency, 6 dB above the static reference level.
- Two interfering signals with the following parameters.

Table 7.4 : Intermodulation requirement

Interfering Signal Level	Offset	Type of Interfering Signal
- 48 dBm	10 MHz	CW signal
- 48 dBm	20 MHz	WCDMA signal with one code

7.7 Spurious emissions

The spurious emissions power is the power of emissions generated or amplified in a receiver that appear at the BS antenna connector.

7.7.1 Minimum Requirement

The spurious emission shall be:

(a) Less than -78 dBm/3.84 MHz at the BS antenna connector, for frequencies within the UTRA/TDD band and the UTRA/FDD BS receive band.

(b) Less than -57 dBm/100 kHz at the BS antenna connector, for frequencies bands from 9kHz to 1GHz.

(c) Less than -47 dBm/100 kHz at the BS antenna connector, for frequencies bands from 1GHz to 12.75GHz.

8 Performance requirement

8.1 General

Performance requirements for the BS are specified for the measurement channels defined in Annex A and the propagation conditions in Annex B. The requirements only apply to those measurement channels that are supported by the base station.

The requirements only apply to a base station with dual receiver antenna diversity. The required $\hat{I}_{or}/I_{oc}$ shall be applied separately at each antenna port.

Table 8.1: Summary of Base Station performance targets

Physical channel	Measurement channel	Static	Multi-path Case 1	Multi-path Case 2	Multi-path Case 3
		Performance metric			
DCH	12.2 kbps	BLER<10^{-2}	BLER<10^{-2}	BLER<10^{-2}	BLER<10^{-2}
	64 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
	144 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
	384 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}
					-
RACH					

8.2 Demodulation in static propagation conditions

8.2.1 Demodulation of DCH

The performance requirement of DCH in static propagation conditions is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified $\hat{I}_{or}/I_{oc}$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.2.1.1 Minimum requirement

For the parameters specified in Table 8.2 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.3.

Table 8.2: Parameters in static propagation conditions

Parameters	Unit	Test 1	Test 2	Test 3	Test 4
Number of $DPCH_o$		6	4	0	0
$\frac{DPCH_o\_E_c}{I_{or}}$	dB	-9	-9.5	0	0

I	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.3: Performance requirements in AWGN channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER Required E_b/N_0
1	-1.9	10^{-2}
2	-0.3	10^{-1}
	0.0	10^{-2}
3	0.0	10^{-1}
	0.2	10^{-2}
4	-0.5	10^{-1}
	-0.3	10^{-2}

8.3 Demodulation of DCH in multipath fading conditions

8.3.1 Multipath fading Case 1

The performance requirement of DCH in multipath fading Case 1 is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified $\hat{I}_{or}/I_{oc}$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.1.1 Minimum requirement

For the parameters specified in Table 8.4 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.5.

Table 8.4: Parameters in multipath Case 1 channel

Parameters	**Unit**	**Test 1**	**Test 2**	**Test 3**	**Test 4**
Number of $DPCH_o$		6	4	0	0
$\frac{DPCH_o\_E_c}{I_{or}}$	dB	-9	-9.5	0	0
I	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.5: Performance requirements in multipath Case 1 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER

1	6.3	10^{-2}
2	5.5	10^{-1}
	9.4	10^{-2}
3	5.6	10^{-1}
	9.4	10^{-2}
4	5.5	10^{-1}
	8.7	10^{-2}

8.3.2 Multipath fading Case 2

The performance requirement of DCH in multipath fading Case 2 is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified $\hat{I}_{or}/I_{oc}$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.2.1 Minimum requirement

For the parameters specified in Table 8.6 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.7.

Table 8.6: Parameters in multipath Case 2 channel

Parameters	Unit	Test 1	Test 2	Test 3	Test 4
Number of $DPCH_o$		2	0	0	0
$\frac{DPCH_o\_E_c}{I_{or}}$	dB	-6	0	0	0
I	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.7: Performance requirements in multipath Case 2 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER
1	0.1	10^{-2}
2	0.4	10^{-1}
	2.8	10^{-2}
3	3.6	10^{-1}
	6.0	10^{-2}
4	3.0	10^{-1}
	5.4	10^{-2}

8.3.3 Multipath fading Case 3

The performance requirement of DCH in multipath fading Case 3 is determined by the maximum Block Error Rate (BLER) allowed when the receiver input signal is at a specified $\hat{I}_{or}/I_{oc}$ limit. The BLER is calculated for each of the measurement channels supported by the base station.

8.3.3.1 Minimum requirement

For the parameters specified in Table 8.8 the BLER should not exceed the piece-wise linear BLER curve specified in Table 8.9.

Table 8.8: Parameters in multipath Case 3 channel

Parameters	**Unit**	**Test 1**	**Test 2**	**Test 3**	**Test 4**
Number of $DPCH_o$		2	0	0	0
$\frac{DPCH_o\_E_c}{I_{or}}$	dB	-6	0	0	0
I	dBm/3.84 MHz	-60			
Information Data Rate	Kbps	12.2	64	144	384

Table 8.9: Performance requirements in multipath Case 3 channel.

Test Number	$\frac{\hat{I}_{or}}{I_{oc}}$ [dB]	BLER	
1	-0.6	10^{-2}	
2	0.7	10^{-1}	
	2.4	10^{-2}	
	3.8	10^{-3}	
3	3.9	10^{-1}	
	5.9	10^{-2}	
	7.3	10^{-3}	
4	2.8	10^{-1}	
	4.2	10^{-2}	
	4.8	10^{-3}	

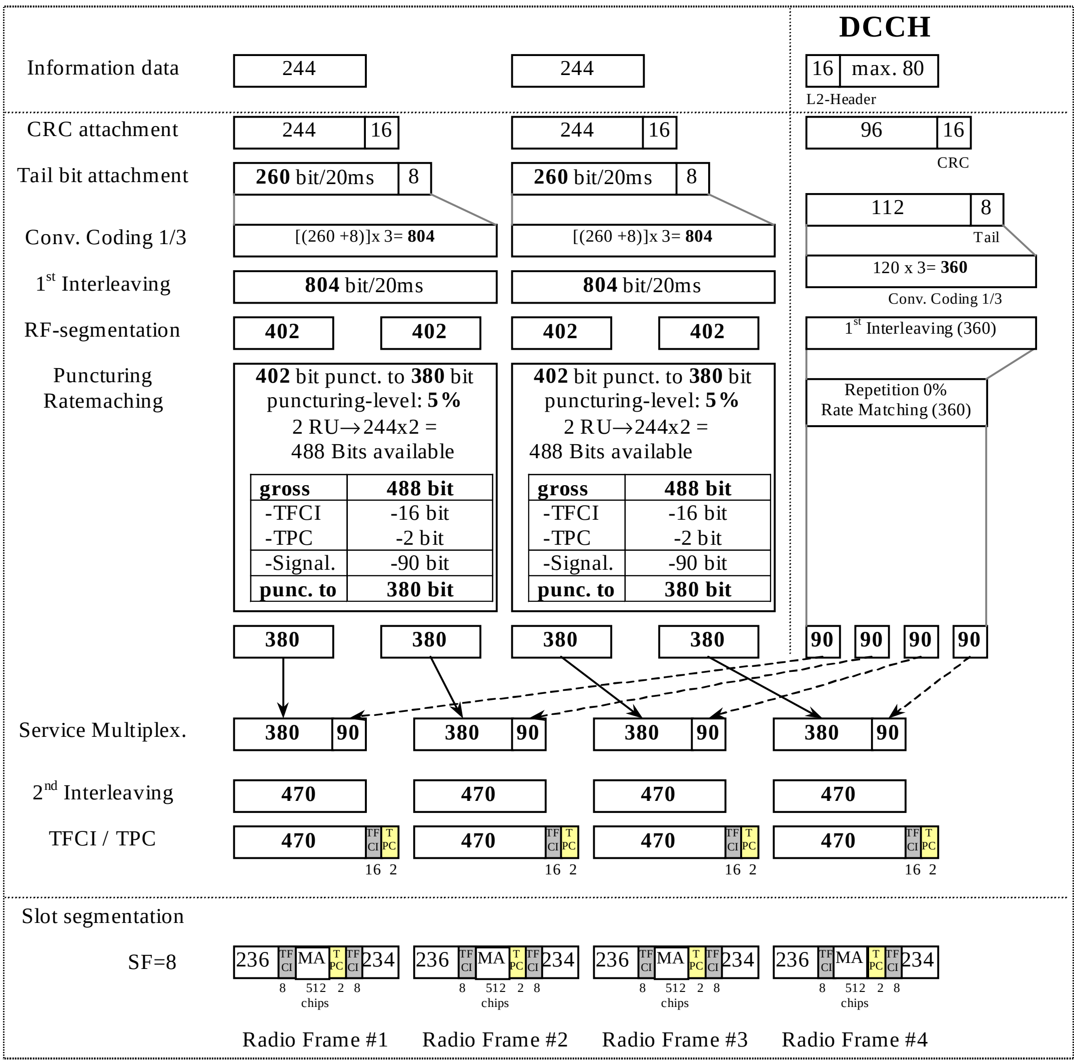
Annex A (normative): Measurement Channels

A.1 General

A.2 Reference measurement channel

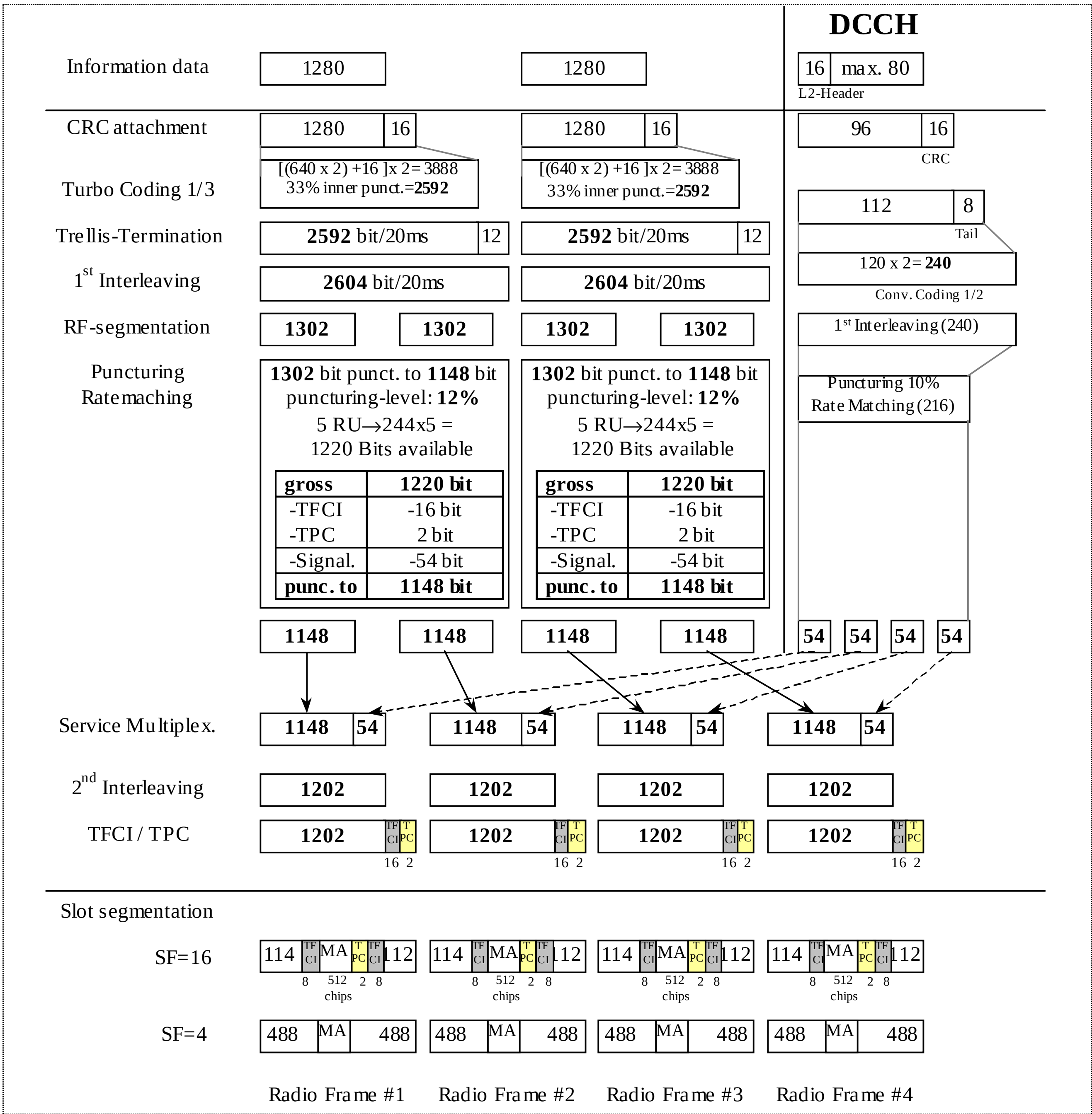
A.2.1 UL reference measurement channel (12.2 kbps)

Parameter	
Information data rate	12.2 kbps
RU´s allocated	2 RU
Midamble	**512** chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate 1/3 : DCH / DCCH	5% / 0%



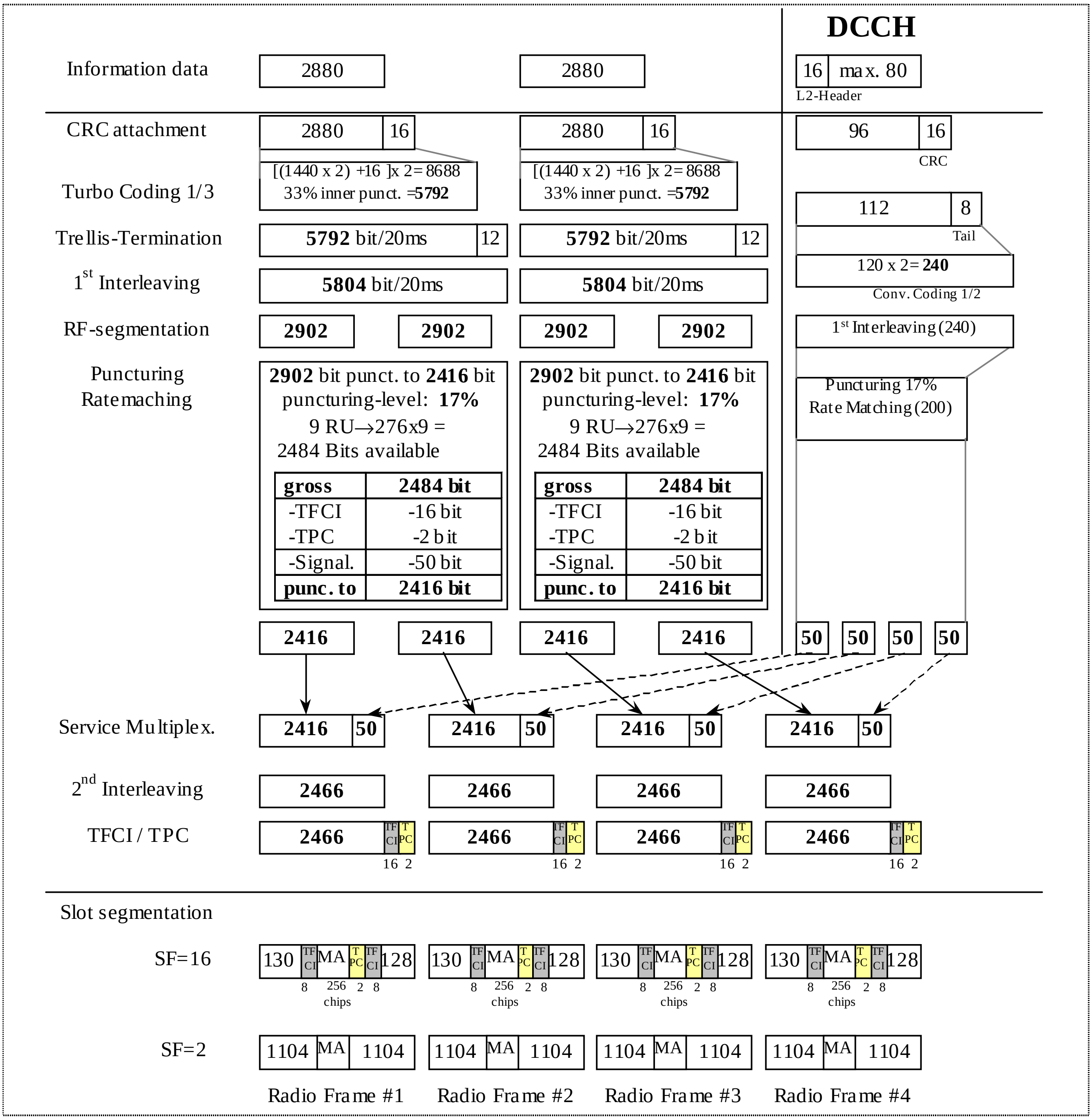
A.2.2 UL reference measurement channel (64 kbps)

Parameter	
Information data rate	64 kbps
RU´s allocated	1 SF4 + 1 SF16 = 5RU
Midamble	512 chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate : 1/3 DCH / ½ DCCH	41.2% / 10%



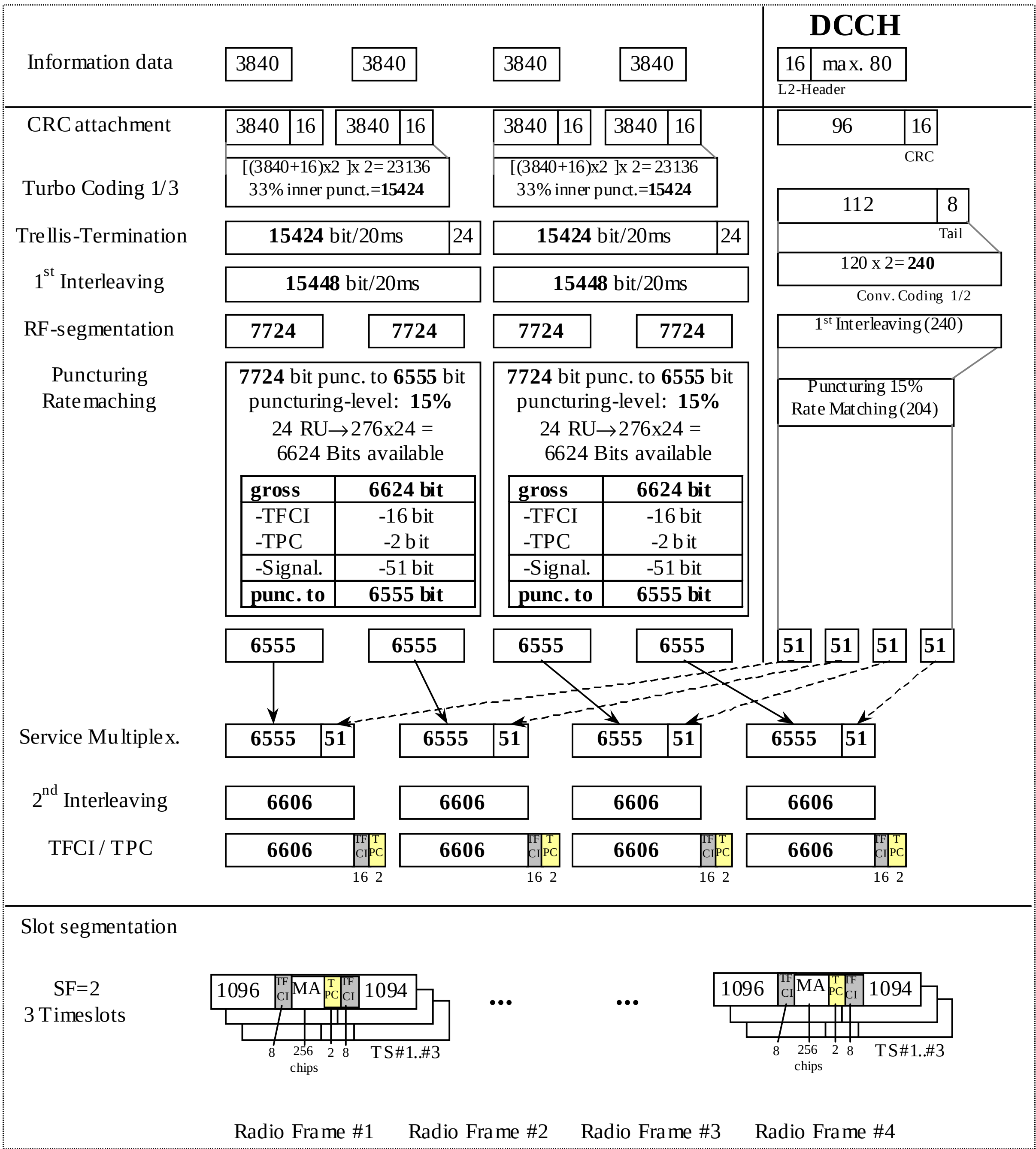
A.2.3 UL reference measurement channel (144 kbps)

Parameter	
Information data rate	144 kbps
RU´s allocated	1 SF2 + 1 SF16 = 9RU
Midamble	256 chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate : 1/3 DCH / ½ DCCH	44.4% / 16.6%



A.2.4 UL reference measurement channel (384 kbps)

Parameter	
Information data rate	384 kbps
RU´s allocated	8*3TS = 24RU
Midamble	256 chips
Interleaving	20 ms
Power control	2 Bit/user
TFCI	16 Bit/user
Inband signalling DCCH	2 kbps
Puncturing level at Code rate : 1/3 DCH / ½ DCCH	43.4% / 15.3%



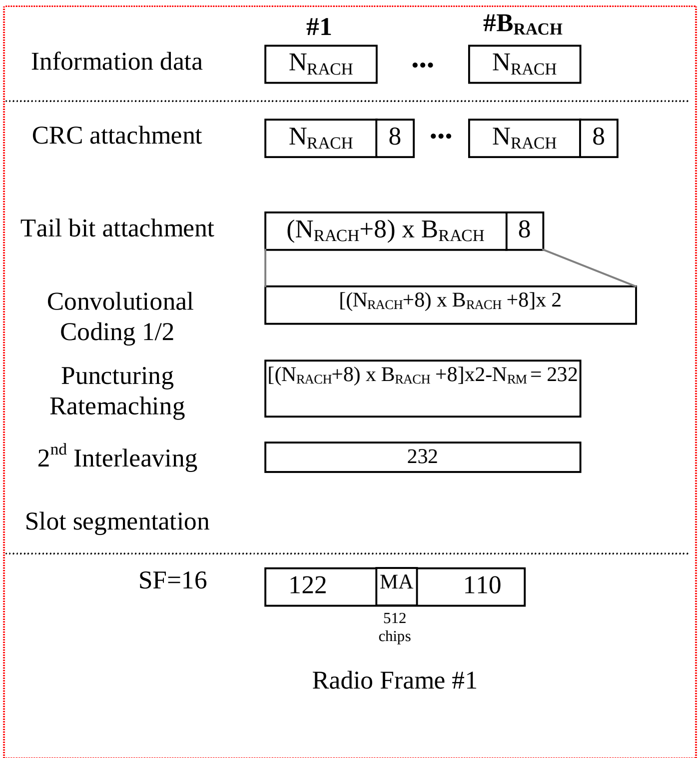
A.2.5 RACH reference measurement channel

Parameter	
Information data rate e.g. 2 TBs (B_{RACH}=2): **SF16:** 0% puncturing rate at CR=1/2 10% puncturing rate at CR=1/2 $N_{RACH} = \frac{\frac{232 + N_{RM}}{2} - 8}{B_{RACH}} - 8$ **SF8:** 0% puncturing rate at CR=1/2 10% puncturing rate at CR=1/2 $N_{RACH} = \frac{\frac{464 + N_{RM}}{2} - 8}{B_{RACH}} - 16$	 46 bits per frame and TB 53 bits per frame and TB 96 bits per frame and TB 109 bits per frame and TB
RU´s allocated	1 RU
Midamble	**512** chips
Power control	0 bit
TFCI	0 bit

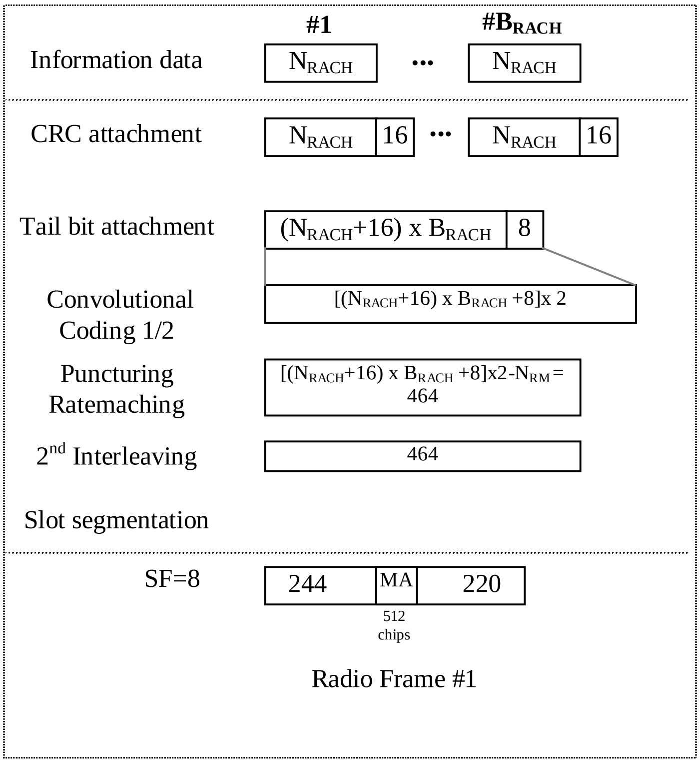
N_{RACH} = number of bits per TB

B_{RACH} = number of TBs

A.2.5.1 RACH mapped to 1 code SF16



A.2.5.2 RACH mapped to 1 code SF8



Annex B (normative): Propagation conditions

B.1 Static propagation condition

The propagation for the static performance measurement is an Additive White Gaussian Noise (AWGN) environment. No fading and multi-paths exist for this propagation model.

B.2 Multi-path fading propagation conditions

Table B1 shows propagation conditions that are used for the performance measurements in multi-path fading environment. All taps have classical Doppler spectrum.

Table B1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, 120 km/h	
Relative Delay [ns]	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**	**Relative Delay [ns]**	**Average Power [dB]**
0	0	0	0	0	0
976	-10	976	0	260	-3
		12000	0	521	-6
				781	-9

Annex C (informative): Change request history

CRs approved at TSG#6

Doc-1st-	Spec	CR	Re	Phas	Subject	Cat	Versio	Versio
RP-99780	25.105	002		R99	Primary CCPCH Power for TDD-mode	C	3.0.0	3.1.0
RP-99780	25.105	003		R99	BS Maximum input level (TDD)	C	3.0.0	3.1.0
RP-99780	25.105	001		R99	Corrections to 25.105 version 3.0.0	F	3.0.0	3.1.0
RP-99779	25.105	006		R99	Open item list in Annex D of 25.105 v3.0.0	D	3.0.0	3.1.0
RP-99780	25.105	004		R99	Receiver spurious emissions for BS TDD	C	3.0.0	3.1.0
RP-99780	25.105	005		R99	Power control in UTRA TDD	C	3.0.0	3.1.0
RP-99780	25.105	002	3	R99	TDD Base station power accuracy of PCCPCH	C	3.0.0	3.1.0
RP-99780	25.105	007	-	R99	Change of propagation conditions	C	3.0.0	3.1.0
RP-99780	25.105	008		R99	Timing Advance Requirements	F	3.0.0	3.1.0
RP-99781	25.105	009		R99	Transmit Template	B	3.0.0	3.1.0
RP-99781	25.105	010		R99	Performance Requirements	B	3.0.0	3.1.0
RP-99780	25.105	011		R99	Corrections for BS TDD Blocking	F	3.0.0	3.1.0
RP-99780	25.105	012		R99	Corrections to 25.105 v.3.0.0 (change ME to	F	3.0.0	3.1.0
RP-99780	25.105	013		R99	Synchronization Requirement	C	3.0.0	3.1.0
RP-99780	25.105	014		R99	Update of ITU Region 2 Specific Specifications	C	3.0.0	3.1.0
RP-99780	25.105	015		R99	Clarification of Antenna Diversity receiver	F	3.0.0	3.1.0
RP-99780	25.105	016		R99	Spurious Emission in 25.105	F	3.0.0	3.1.0
RP-99780	25.105	017		R99	ACLR	C	3.0.0	3.1.0
RP-99781	25.105	018		R99	BS TDD Spurious Emission Requirements for	B	3.0.0	3.1.0

History

Document history		
V3.1.0	January 2000	Publication