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Contents

Foreword

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1 Scope

The present document establishes the minimum RF characteristics of the FDD mode of UTRA for the User Equipment (UE).

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.
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[1] TS 25.213: "Gain factor β". (see subclause 4.2.1)

[2] ITU-R Recommendation SM.329-7: "Spurious emissions".

[3] ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following 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 average power at the maximum power setting.
Average power:	
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 transmit power:	The average transmitter output power obtained over any specified time interval, including periods with no transmission.
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.

3.2 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
AICH	Acquisition Indication Channel
BS	Base Station
BER	Bit Error Ratio
BLER	Block Error Ratio
CW	Continuous Wave (un-modulated signal)
CPICH	Common Pilot Channel
DCH	Dedicated Channel, which is mapped into Dedicated Physical Channel.
DL	Down Link (forward link)
DTX	Discontinuous Transmission
DPCH	Dedicated Physical Channel
$DPCH\_E_c$	Average energy per PN chip for DPCH.
$\frac{DPCH\_E_c}{I_{or}}$	The ratio of the transmit energy per PN chip of the DPCH to the total transmit power spectral density at the BS antenna connector.
EIRP	Effective Isotropic Radiated Power
E_b	Average energy per information bit for the PCCPCH, SCCPCH and DPCH, at the UE antenna connector.
$\frac{E_b}{N_t}$	The ratio of combined received energy per information bit to the effective noise power spectral density for the PCCPCH, SCCPCH and DPCH at the UE antenna connector. Following items are calculated as overhead: pilot, TPC, TFCI, CRC, tail, repetition, convolution coding and turbo coding.
E_c	Average energy per PN chip.
$\frac{E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for different fields or physical channels to the total transmit power spectral density.
FACH	Forward Access Channel
FDD	Frequency Division Duplexing
FDR	False transmit format Detection Ratio
F_{uw}	Frequency of unwanted signal. This is specified in bracket in terms of an absolute frequency(s) or a frequency offset from the assigned channel frequency.
Information Data Rate	Rate of the user information, which must be transmitted over the Air Interface. For example, output rate of the voice codec.
I_o	The total received power spectral density, including signal and interference, as measured at the UE antenna connector.
I_{oc}	The power spectral density of a band limited white noise source (simulating interference from other cells) as measured at the UE antenna connector.
I_{or}	The total transmit power spectral density of the down link at the base station antenna connector.
$\hat{I}_{or}$	The received power spectral density of the down link as measured at the UE antenna connector.
ISCP	Given only interference is received, the average power of the received signal after de-spreading to the code and combining. Equivalent to the RSCP value but now only interference is received instead of signal.
MER	Message Error Ratio
N_t	The effective noise power spectral density at the UE antenna connector.
OCNS	Orthogonal Channel Noise Simulator, a mechanism used to simulate the users or control signals on the other orthogonal channels of a Forward link.
$OCNS\_E_c$	Average energy per PN chip for the OCNS.
$\frac{OCNS\_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the OCNS to the total transmit power spectral density.
PCCPCH	Primary Common Control Physical Channel
PCH	Paging Channel
$PCCPCH\frac{E_c}{I_o}$	The ratio of the received PCCPCH energy per chip to the total received power spectral density at the UE antenna connector.

$\frac{PCCPCH\_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the PCCPCH to the total transmit power spectral density.
PICH	Paging Indicator Channel
PPM	Parts Per Million
RACH	Random Access Channel
RSCP	Given only signal power is received, the average power of the received signal after de-spreading and combining
RSSI	Received Signal Strength Indicator
SCH	Synchronisation Channel consisting of Primary and Secondary synchronisation channels
SCCPCH	Secondary Common Control Physical Channel.
$SCCPCH\_E_c$	Average energy per PN chip for SCCPCH.
SIR	Signal to Interference ratio
SSDT	Site Selection Diversity Transmission
TDD	Time Division Duplexing
TFCI	Transport Format Combination Indicator
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 the present document make no allowance for measurement uncertainty. Where the measurement uncertainty can be determined, the test limit shall be relaxed from the value given in the present document. See Annex F of 34.121. Where the measurement uncertainty cannot reasonably be determined, the "Shared Risk" principle is applied, i.e. the test limit is not relaxed.

The Shared Risk principle is defined in ETR 028.

4.2 Power Classes

For UE power classes 1 and 2, a number of RF parameter are not specified. It is intended that these are part of a later release.

5 Frequency bands and channel arrangement

5.1 General

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

NOTE: Other chip rates may be considered in future releases.

5.2 Frequency bands

UTRA/FDD is designed to operate in either of the following paired bands:

(a) 1920 – 1980 MHz: Up-link (Mobile transmit, base receive)
2110 – 2170 MHz: Down-link (Base transmit, mobile receive)

(b)* 1850 – 1910 MHz: Up-link (Mobile transmit, base receive)
1930 – 1990 MHz: Down-link (Base transmit, mobile receive)

* Used in Region 2.

Additional allocations in ITU region 2 are FFS.

Deployment in other frequency bands is not precluded.

5.3 TX–RX frequency separation

(a) The minimum transmit to receive frequency separation is 134.8 MHz and the maximum value is 245.2 MHz and all UE(s) shall support a TX –RX frequency separation of 190 MHz when operating in the paired band defined in subclause 5.2(a).

(b) When operating in the paired band defined in subclause 5.2 (b), all UE(s) shall support a TX-RX frequency separation of 80 MHz.

(c) UTRA/FDD can support both fixed and variable transmit to receive frequency separation.

(d) The use of other transmit to receive frequency separations in existing or other frequency bands shall not be precluded.

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 centre frequency must be an integer 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:

Table 5.1: UTRA Absolute Radio Frequency Channel Number

Uplink	$N_u = 5 * (F_{uplink}$ MHz)	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where F_{uplink} is the uplink frequency in MHz
Downlink	$N_d = 5 * (F_{downlink}$ MHz)	0.0 MHz ≤ F_{uplink} ≤ 3276.6 MHz where $F_{downlink}$ is the downlink frequency in MHz

6 Transmitter characteristics

6.1 General

Unless detailed the transmitter characteristic are specified at the antenna connector of the UE. For UE with integral antenna only, a reference antenna with a gain of 0 dBi is assumed. Transmitter characteristics for UE(s) with multiple antennas/antenna connectors are FFS.

The UE antenna performance has a significant impact on system performance, and minimum requirements on the antenna efficiency are therefore intended to be included in future versions of the present document. It is recognised that different requirements and test methods are likely to be required for the different types of UE.

All the parameters in clause 6 are defined using the UL reference measurement channel (12.2 kbps) specified in subclause A.2.1 and unless stated with the UL power control ON

6.2 Transmit power

6.2.1 UE maximum output power

The following Power Classes define the maximum output power.

Table 6.1: UE Power Classes

Power Class	Maximum output power	Tolerance
1	+33 dBm	+1/-3 dB
2	+27 dBm	+1/-3 dB
3	+24 dBm	+1/-3 dB
4	+21 dBm	± 2 dB

NOTE: The tolerance of the maximum output power is below the prescribed value even for the multi-code transmission mode.

6.3 Frequency stability

The UE modulated carrier frequency shall be accurate to within ± 0.1 PPM compared to carrier frequency received from the BS. These signals will have an apparent error due to BS frequency error and Doppler shift. In the later case, signals from the BS must be averaged over sufficient time that errors due to noise or interference are allowed for within the above ± 0.1 PPM figure.

Table 6.2: Frequency stability

AFC	Frequency stability
ON	within ± 0.1 PPM

6.4 Output power dynamics

Power control is used to limit the interference level.

6.4.1 Open loop power control

Open loop power control is the ability of the UE transmitter to sets its output power to a specific value. The open loop power control tolerance is given in Table 6.3

6.4.1.1 minimum requirement

The UE open loop power is defined as the average power in a timeslot or ON power duration, whichever is available, and they are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

Table 6.3: Open loop power control

Normal conditions	± 9 dB
Extreme conditions	± 12 dB

6.4.2 Inner loop power control in the uplink

Inner loop power control in the Uplink is the ability of the UE transmitter to adjust its output power in accordance with one or more TPC commands received in the downlink.

6.4.2.1 Power control steps

The power control step is the change in the UE transmitter output power in response to a single TPC command, TPC_cmd, derived at the UE.

6.4.2.1.1 Minimum requirement

The UE transmitter shall have the capability of changing the output power with a step size of 1, 2 and 3 dB according to the value of Δ_{TPC} or $\Delta_{RP\text{-}TPC}$, in the slot immediately after the TPC_cmd can be derived

(a) The transmitter output power step due to inner loop power control shall be within the range shown in Table 6.4.

(b) The transmitter average output power step due to inner loop power control shall be within the range shown in Table 6.5. Here a TPC_cmd group is a set of TPC_cmd values derived from a corresponding sequence of TCP commands of the same duration.

The inner loop power is defined as the relative power differences between averaged power of original (reference) timeslot and averaged power of the target timeslot without transient duration. (Figures 6.2 and 6.3) They are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

Table 6.4: Transmitter power control range

TPC_ cmd	Transmitter power control range					
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+ 1	+0.5 dB	+1.5 dB	+1 dB	+3 dB	+1.5 dB	+4.5 dB
0	-0.5 dB	+0.5 dB	-0.5 dB	+0.5 dB	-0.5 dB	+0.5 dB
-1	-0.5 dB	-1.5 dB	-1 dB	-3 dB	-1.5 dB	-4.5 dB

Table 6.5: Transmitter average power control range

TPC_ cmd group	Transmitter power control range after 10 equal TPC_ cmd groups				Transmitter power control range after 7 equal TPC_ cmd groups	
	1 dB step size		2 dB step size		3 dB step size	
	Lower	Upper	Lower	Upper	Lower	Upper
+1	+8 dB	+12 dB	+16 dB	+24 dB	+16 dB	+26 dB
0	-1 dB	+1 dB	-1 dB	+1 dB	-1 dB	+1 dB
-1	-8 dB	-12 dB	-16 dB	-24 dB	-16 dB	-26 dB
0,0,0,0,+1	+6 dB	+14 dB	N/A	N/A	N/A	N/A
0,0,0,0,-1	-6 dB	-14 dB	N/A	N/A	N/A	N/A

6.4.3 Minimum transmit output power

The minimum controlled output power of the UE is when the power control setting is set to a minimum value. This is when both the inner loop and open loop power control indicate a minimum transmit output power is required.

6.4.3.1 Minimum requirement

The minimum transmit power is defined as an averaged power in a time slot measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate. The minimum transmit power shall be better than –50 dBm.

6.4.4 Out-of-synchronisation handling of output power

The UE shall monitor the DPCCH quality in order to detect a loss of the signal on Layer 1, as specified in TS 25.214. The thresholds Q_{out} and Q_{in} specify at what DPCCH quality levels the UE shall shut its power off and when it may turn its transmitter on respectively. The thresholds are not defined explicitly, but are defined by the conditions under which the UE shall shut its transmitter off and turn it on, as stated in this subclause.

6.4.4.1 Requirement

The parameters in Table 6.6 are defined using the DL reference measurement channel (12.2) kbps specified in subclause A.3.1 and with static propagation conditions.

Table 6.6: DCH parameters for test of Out-of-synch handling

Parameter	Unit	Value
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
$\frac{DPDCH\_E_c}{I_{or}}$	dB	See figure 6.1: Before point A -16.6 After point A Not defined
$\frac{DPCCH\_E_c}{I_{or}}$	dB	See figure 6.1
Information Data Rate	kbps	12.2
TFCI	-	on

The conditions for when the UE shall shut its transmitter on and when it may turn it on are defined by the parameters in Table 6.6 together with the DPCH power level as defined in Figure 6.1.

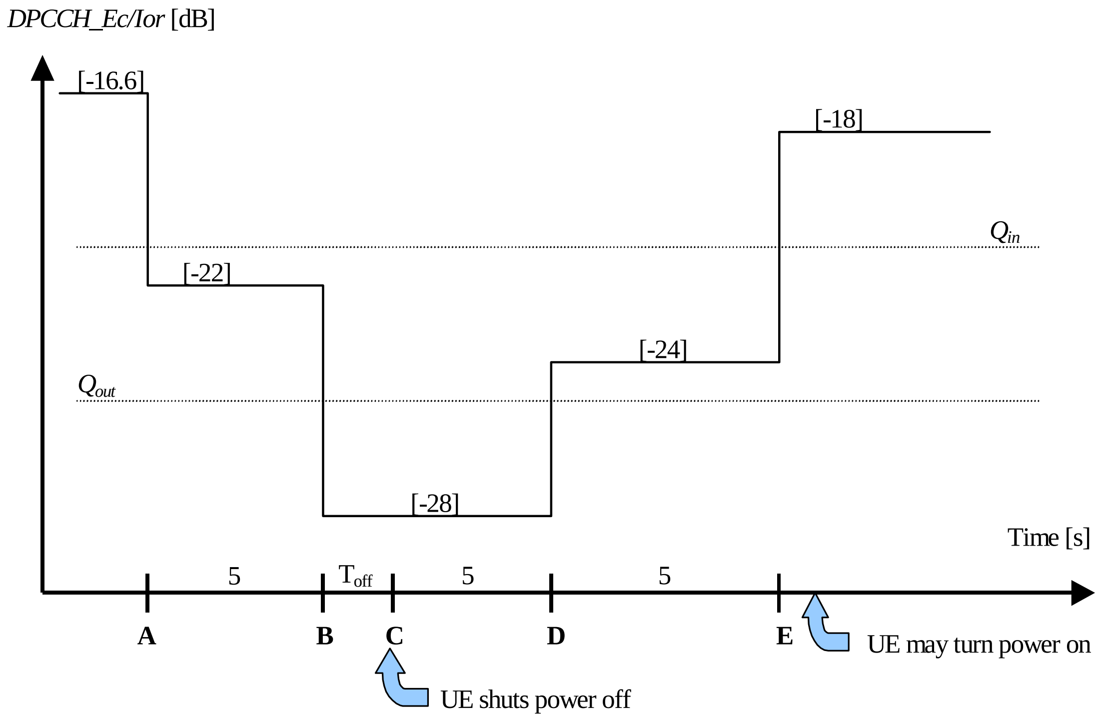

Figure 6.1: Conditions for out-of-synch handling in the UE. The indicated thresholds Q_{out} and Q_{in} are only informative

The requirements for the UE are that:

1. The UE shall not shut its transmitter off before point B.
2. The UE shall shut its transmitter off before point C, which is Toff = [200] ms after point B.
3. The UE shall not turn its transmitter on between points C and E.
4. The UE may turn its transmitter on after point E.

6.5 Transmit ON/OFF power

6.5.1 Transmit OFF power

The transmit OFF power state is when the UE does not transmit except during UL DTX mode. This parameter is defined as the maximum output transmit power within the channel bandwidth when the transmitter is OFF.

6.5.1.1 Minimum requirement

The transmit OFF power is defined as an averaged power at least in a timeslot duration measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate. The requirement for the transmit OFF power shall be better than –56 dBm.

6.5.2 Transmit ON/OFF Time mask

The time mask for transmit ON/OFF defines the ramping time allowed for the UE between transmit OFF power and transmit ON power. Possible ON/OFF scenarios are RACH ,CPCH or UL slotted mode.

6.5.2.1 Minimum requirement

The transmit power levels versus time should meet the mask specified in figure 6.2. and the signal is measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

On power is defined as either case as follows. The specification depends on each possible case.

- First preamble of RACH: Open loop accuracy (6.4.1).
- During preamble ramping of the RACH and compressed mode: Accuracy depending on size of the power step.(6.5.3).
- Power step to Maximum Power: Maximum power accuracy (6.2.1).

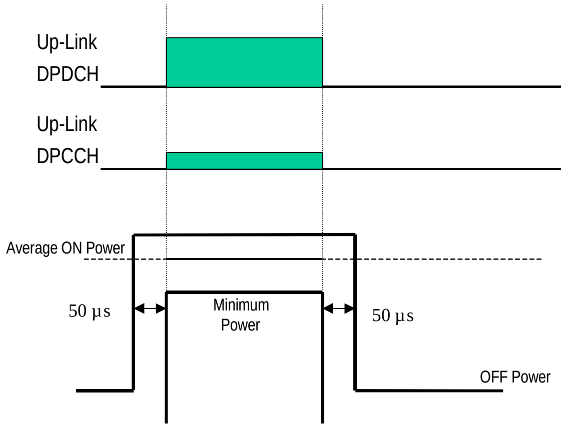

Figure 6.2: Transmit ON/OFF template

6.5.3 Change of TFC

A change of TFC (Transport Format Combination) in uplink means that the power in the uplink varies according to the change in data rate. DTX, where the DPCH is turned off, is a special case of variable data, which is used to minimise the interference between UE(s) by reducing the UE transmit power when voice, user or control information is not present.

6.5.3.1 Minimum requirement

A change of output power is required when the TFC, and thereby the data rate, is changed. The ratio of the amplitude between the DPDCH codes and the DPCCH code will vary. The power step due to a change in TFC shall be calculated in the UE so that the power transmitted on the DPCCH shall follow the inner loop power control. The power step shall then be rounded to the closest integer dB value. The accuracy of the power step, given the step size is specified in Table 6.7. The power change by TFC is defined as the relative power differences between the averaged power of original (reference) timeslot and the averaged power of target timeslot without transient duration. And they are measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

Table 6.7: Transmitter power step tolerance

Power control step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
1	+/- 0.5 dB
2	+/- 1.0 dB
3	+/- 1.5 dB
$4 \le \Delta P \le 10$	+/- 2 dB
$11 \le \Delta P \le 15$	+/- 3 dB
$16 \le \Delta P \le 20$	+/- 4 dB
$21 \le \Delta P$	+/- 6 dB

The transmit power levels versus time should meet the mask specified in figure 6.3. When power increases the power step shall be performed before the frame boundary, when power decreases the power step shall be performed after the frame boundary.

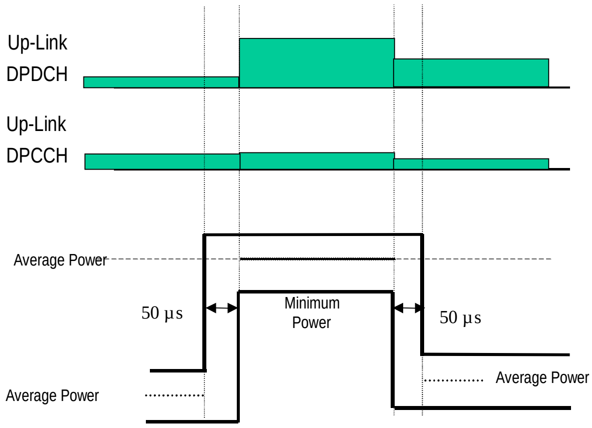

Figure 6.3: Transmit template during TFC change

6.5.4 Power setting in uplink compressed mode

Compressed mode in uplink means that the power in uplink is changed.

6.5.4.1 Minimum requirement

A change of output power is required during uplink compressed frames since the transmission of data is performed in a shorter interval. The ratio of the amplitude between the DPDCH codes and the DPCCH code will also vary. The power step due to compressed mode shall be calculated in the UE so that the energy transmitted on the pilot bits during each transmitted slot shall follow the inner loop power control. Thereby the power step during the transmitted part of a compressed frame shall be such that the power on the DPCCH follows the inner loop power control with an additional power offset during a compressed frame of $N_{pilot,N} / N_{pilot,C}$ where $N_{pilot,C}$ is the number of pilot bits per slot when in compressed mode, and $N_{pilot,N}$ is the number of pilot bits per slot in normal mode.

The power step shall then be rounded to the closest integer dB value. The accuracy of the power step, given the step size is specified in Table 6.6 in subclause 6.5.3.1. The power step is defined as the relative power differences between the average power of original (reference) timeslot and the averaged power of target timeslot. During the compress mode, the average should be done in only either power ON duration. The relative power is measured with a filter that has a Root-Raised Cosine (RRC) filter response with a roll off $\alpha = 0.22$ and a bandwidth equal to the chip rate.

The transmit power levels versus time shall meet the mask specified in figure 6.4. When power increases the power step shall be performed before the actual slot boundary, when power decreases the power step shall be performed after the actual slot boundary.

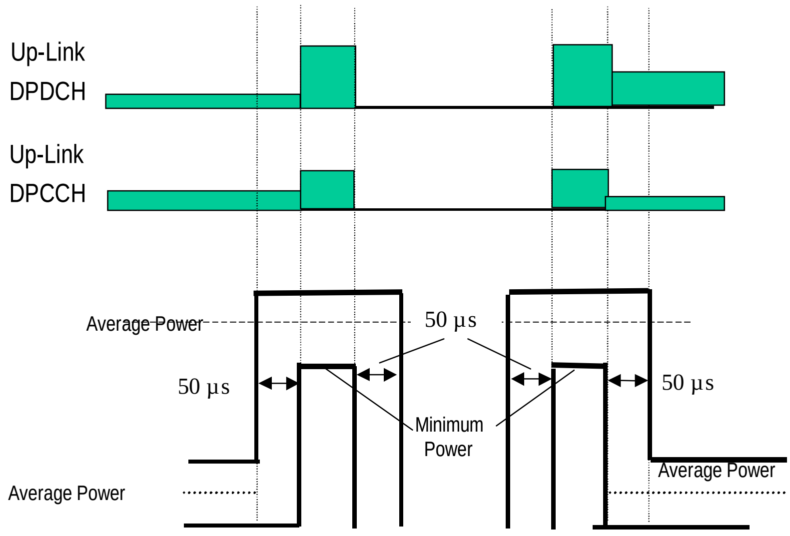

Figure 6.4: Transmit template during Compressed mode

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 of the transmitted spectrum, centered on the assigned channel frequency. The occupied channel bandwidth shall be 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 nominal channel 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 Leakage power Ratio.

6.6.2.1 Spectrum emission mask

The spectrum emission mask of the UE applies to frequencies, which are between 2.5 MHz and 12.5 MHz away from the UE centre carrier frequency. The out of channel emission is specified relative to the UE output power measured in a 3.84 MHz bandwidth.

6.6.2.1.1 Minimum requirement

The power of any UE emission shall not exceed the levels specified in Table 6.8

Table 6.8: Spectrum Emission Mask Requirement

Frequency offset from carrier Δf	Minimum requirement	Measurement bandwidth
2.5 - 3.5 MHz	-35 -15*(Δf – 2.5) dBc	30 kHz *
3.5 - 7.5 MHz	-35- 1*(Δf-3.5) dBc	1 MHz *
7.5 - 8.5 MHz	-39 - 10*(Δf – 7.5) dBc	1 MHz *
8.5 - 12.5 MHz	-49 dBc	1 MHz *

Note *:

1. The first and last measurement position with a 30 kHz filter is 2.515 MHz and 3.485 MHz.
2. The first and last measurement position with a 1 MHz filter is 4 MHz and 12 MHz.
3. The lower limit shall be –50 dBm/3.84 MHz or which ever is higher.

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 in an adjacent channel. Both the transmitted power and the adjacent channel power are measured with a filter that has a Root-Raised Cosine (RRC) filter response with roll-off α =0.22 and a bandwidth equal to the chip rate.

6.6.2.2.1 Minimum requirement

If the adjacent channel power is greater than –50dBm then the ACLR shall be higher than the value specified in Table 6.9.

Table 6.9: UE ACLR

Power Class	Adjacent channel relative to UE channel	ACLR limit
3	+ 5 MHz or – 5 MHz	33 dB
3	+ 10 MHz or – 10 MHz	43 dB
4	+ 5 MHz or – 5 MHz	33 dB
4	+ 10 MHz or –10 MHz	43 dB

NOTE 1: The requirement shall still be met in the presence of switching transients.

NOTE 2: The ACLR requirements reflect what can be achieved with present state of the art technology.

NOTE 3: Requirement on the UE shall be reconsidered when the state of the art technology progresses.

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.

The frequency boundary and the detailed transitions of the limits between the requirement for out band emissions and spectrum emissions are based on ITU-R Recommendations SM.329.

6.6.3.1 Minimum requirement

These requirements are only applicable for frequencies, which are greater than 12.5 MHz away from the UE centre carrier frequency.

Table 6.10: General spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
9 kHz ≤ f < 150 kHz	1 kHz	-36 dBm
150 kHz ≤ f < 30 MHz	10 kHz	-36 dBm
30 MHz ≤ f < 1000 MHz	100 kHz	-36 dBm
1 GHz ≤ f < 12.75 GHz	1 MHz	-30 dBm

Table 6.11: Additional spurious emissions requirements

Frequency Bandwidth	Resolution Bandwidth	Minimum requirement
1893.5 MHz <f<1919.6 MHz	300 kHz	-41 dBm
925 MHz ≤ f ≤ 935 MHz	100 kHz	-67 dBm *
935 MHz < f ≤ 960 MHz	100 kHz	-79 dBm *
1805 MHz ≤ f ≤ 1880 MHz	100 kHz	-71 dBm *

NOTE *: The measurements are made on frequencies which are integer multiples of 200 kHz. As exceptions, up to five measurements with a level up to the applicable requirements defined in Table 6.9 are permitted for each UARFCN used in the measurement.

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.

6.7.1 Minimum requirement

User Equipment(s) transmitting in close vicinity of each other can produce intermodulation products, which can fall into the UE, or BS receive band as an unwanted interfering signal. The UE intermodulation attenuation is defined by the ratio of the output power of the wanted signal to the output power of the intermodulation product when an interfering CW signal is added at a level below the wanted signal. Both the wanted signal power and the IM product power are measured with a filter that has a Root-Raised Cosine (RRC) filter response with roll-off α =0.22 and a bandwidth equal to the chip rate.

The requirement of transmitting intermodulation for a carrier spacing of 5 MHz is prescribed in Table 6.12.

Table 6.12: Transmit Intermodulation

Interference Signal Frequency Offset	5MHz	10MHz
Interference CW Signal Level	-40dBc	
Intermodulation Product	-31dBc	-41dBc

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 is $= \frac{1}{chiprate} \approx 0.26042 \mu s$

6.8.2 Error Vector Magnitude

The Error Vector Magnitude 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 a %. The measurement interval is one power control group (timeslot).

6.8.2.1 Minimum requirement

The Error Vector Magnitude shall not exceed 17.5 % for the parameters specified in Table 6.13.

Table 6.13: Parameters for Error Vector Magnitude/Peak Code Domain Error

Parameter	Unit	Level
UE Output Power	dBm	≥ –20
Operating conditions		Normal conditions
Power control step size	dB	1

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 vector for each power code is defined as the ratio to the mean power of the reference waveform expressed in dB. The peak code domain error is defined as the maximum value for the code domain error. The measurement interval is one power control group (timeslot)

The requirement for peak code domain error is only applicable for multi-code transmission.

6.8.3.1 Minimum requirement

The peak code domain error shall not exceed -15 dB at spreading factor 4 for the parameters specified in Table 6.13. The requirements are defined using the UL reference measurement channel specified in subclause A.2.6.

7 Receiver characteristics

7.1 General

Unless otherwise stated the receiver characteristics are specified at the antenna connector of the UE. For UE(s) with an integral antenna only, a reference antenna with a gain of 0 dBi is assumed. UE with an integral antenna may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna. Receiver characteristics for UE(s) with multiple antennas/antenna connectors are FFS.

The UE antenna performance has a significant impact on system performance, and minimum requirements on the antenna efficiency are therefore intended to be included in future versions of the present document. It is recognised that different requirements and test methods are likely to be required for the different types of UE.

All the parameters in clause 7 are defined using the DL reference measurement channel (12.2 kbps) specified in subclause A.3.1 and unless stated are with DL power control OFF.

7.2 Diversity characteristics

A suitable receiver structure using coherent reception in both channel impulse response estimation and code tracking procedures is assumed. Three forms of diversity are considered to be available in UTRA/FDD.

Table 7.1: Diversity characteristics for UTRA/FDD

Time diversity	Channel coding and interleaving in both up link and down link
Multi-path diversity	Rake receiver or other suitable receiver structure with maximum combining. Additional processing elements can increase the delay-spread performance due to increased capture of signal energy.
Antenna diversity	Antenna diversity with maximum ratio combing in the base station and optionally in the mobile stations. Possibility for downlink transmit diversity in the base station.

7.3 Reference sensitivity level

The reference sensitivity is the minimum receiver input power measured at the antenna port at which the Bit Error Ratio (BER) does not exceed a specific value.

7.3.1 Minimum requirement

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

Table 7.2: Test parameters for reference sensitivity

Parameter	Unit	Level
DPCH_Ec	dBm/3.84 MHz	-117
$\hat{I}_{or}$	dBm/3.84 MHz	-106.7

7.4 Maximum input level

This is defined as the maximum receiver input power at the UE antenna port, which does not degrade the specified BER performance.

7.4.1 Minimum requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.3.

Table 7.3: Maximum input level

Parameter	Unit	Level
$\frac{DPCH\_Ec}{I_{or}}$	dB	-19
$\hat{I}_{or}$	dBm/3.84 MHz	-25

NOTE: Since the spreading factor is large (10log(SF)=21dB), the majority of the total input signal consists of the OCNS interference.

7.5 Adjacent Channel Selectivity (ACS)

Adjacent Channel Selectivity (ACS) is a measure of a receiver's ability to receive a W-CDMA signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the centre frequency of the assigned channel. ACS is the ratio of the receive filter attenuation on the assigned channel frequency to the receive filter attenuation on the adjacent channel(s).

7.5.1 Minimum requirement

The ACS shall be better than the value indicated in Table 7.4 for the test parameters specified in Table 7.5 where the BER shall not exceed 0.001.

Table 7.4: Adjacent Channel Selectivity

Power Class	Unit	ACS
3	dB	33
4	dB	33

Table 7.5: Test parameters for Adjacent Channel Selectivity

Parameter	Unit	Level
DPCH_Ec	dBm/3.84 MHz	-103
$\hat{I}_{or}$	dBm/3.84 MHz	-92.7
I_{oac} (modulated)	dBm/3.84 MHz	-52
F_{uw} (offset)	MHz	+5 or -5

7.6 Blocking characteristics

The blocking characteristic is a measure of the receiver's ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the spurious response or the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit. The blocking performance shall apply at all frequencies except those at which a spurious response occur.

7.6.1 Minimum requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.6 and Table 7.7. For Table 7.7 up to (24) exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a 1 MHz step size.

Table 7.6: In-band blocking

Parameter	Unit	Offset	Offset
DPCH_Ec	dBm/3.84 MHz	-114	-114
$\hat{I}_{or}$	dBm/3.84 MHz	-103.7	-103.7
$I_{blocking}$ (modulated)	dBm/3.84 MHz	-56	-44
F_{uw} (offset)	MHz	+10 or –10	+15 or –15

Table 7.7: Out of band blocking

Parameter	Unit	Band 1	Band 2	Band 3
DPCH_Ec	dBm/3.84 MHz	-114	-114	-114
$\hat{I}_{or}$	dBm/3.84 MHz	-103.7	-103.7	-103.7
$I_{blocking}$ (CW)	dBm	-44	-30	-15
F_{uw} For operation in frequency bands as defined in subclause 5.2(a)	MHz	2050<f <2095 2185<f <2230	2025 <f <2050 2230 <f <2255	1< f <2025 2255<f<12750
F_{uw} For operation in frequency bands as defined in subclause 5.2(b)	MHz	1870<f <1915 2005<f <2050	1845 <f <1870 2050 <f <2075	1< f <1845 2075<f<12750

Note:

1. For operation in bands referenced in 5.2(a), from 2095<f<2110 MHz and 2170<f<2185 MHz, the appropriate in-band blocking or adjacent channel selectivity in subclause 7.5.1 shall be applied.

2. For operation in bands referenced in 5.2(b), 1915<f<1930 MHz and 1990<f<2005 MHz, the appropriate in-band blocking or adjacent channel selectivity in subclause 7.5.1 shall be applied.

7.7 Spurious response

Spurious response is a measure of the receiver's ability to receive a wanted signal on its assigned channel frequency without exceeding a given degradation due to the presence of an unwanted CW interfering signal at any other frequency at which a response is obtained i.e. for which the blocking limit is not met.

7.7.1 Minimum requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.8.

Table 7.8: Spurious Response

Parameter	Unit	Level
DPCH_Ec	dBm/3.84 MHz	-114
$\hat{I}_{or}$	dBm/3.84 MHz	-103.7
$I_{blocking}$ (CW)	dBm	-44
F_{uw}	MHz	Spurious response frequencies

7.8 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.

7.8.1 Minimum requirement

The BER shall not exceed 0.001 for the parameters specified in Table 7.9.

Table 7.9: Receive intermodulation characteristics

Parameter	Unit	Level
DPCH_Ec	dBm/3.84 MHz	-114
$\hat{I}_{or}$	dBm/3.84 MHz	-103.7
I_{ouw1} (CW)	dBm	-46
I_{ouw2} (modulated)	dBm/3.84 MHz	-46
F_{uw1} (offset)	MHz	10
F_{uw2} (offset)	MHz	20

7.9 Spurious emissions

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

7.9.1 Minimum requirement

The spurious emission shall be:

1) Less than –60 dBm/3.84 MHz at the UE antenna connector, for frequencies within the UE receive band. In URA_PCH-, Cell_PCH- and IDLE- stage the requirement applies also for UE transmit band.

2) Less than –57 dBm/100 kHz at the UE antenna connector, for frequencies band from 9 kHz to 1 GHz.

3) Less than –47 dBm/100 kHz at the UE antenna connector, for frequencies band from 1 GHz to 12.75 GHz.

8 Performance requirement

8.1 General

The performance requirements for the UE in this subclause are specified for the measurement channels specified in Annex A, the propagation conditions specified in Annex B and the Down link Physical channels specified in Annex C. Unless stated DL power control is OFF.

Table 8.1: Summary of UE performance targets

Meas. Channels	Information Data Rate	Static	Multi-path Case 1	Multi-path Case 2	Multi-path Case 3	Multi-path Case 4	Moving	Birth / Death
		Propagation conditions / Performance metric						
PCH	128 kbps	MER< 10^{-2}	-	-	-		-	-
FACH	128 kbps	MER< 10^{-2}	-	-	-		-	-
DCH	12.2 kbps	BLER< 10^{-2}	BLER< 10^{-2}	BLER< 10^{-2}	BLER< 10^{-2}		BLER<	BLER<
	64 kbps	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}	BLER< 10^{-1}, 10^{-2}, 10^{-3}		BLER<	BLER<
	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}		-	-

8.2 Demodulation in static propagation conditions

8.2.1 Demodulation of Paging Channel (PCH)

The receive characteristics of the paging channel in the static environment is determined by the Paging Message Error Ratio (MER). MER is measured at the data rate specified for the paging channel. The UE sleep mode has an upper limit after which it must up wake up and demodulate the paging channel and associated paging messages.

8.2.1.1 Minimum requirement

For the parameters specified in Table 8.2 the MER shall not exceed the piece-wise linear MER curve specified by the points in Table 8.3.

Table 8.2: PCH parameters in static propagation conditions

Parameter	Unit	Value
$\frac{DPCH\_E_c}{I_{or}}$	dB	
$\frac{SCCPCH\_E_c}{I_{or}}$	dB	
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
Paging Data Rate		
$PCH\quad E_b/N_t$	dB	

Table 8.3: PCH requirement in static propagation conditions

$PCH\quad E_b/N_t$	MER
TBD	TBD
TBD	TBD
TBD	TBD

8.2.2 Demodulation of Forward Access Channel (FACH)

The receive characteristics of the Forward Access Channel (FACH) in the static environment are determined by the average message error Ratio (MER). MER is measured at the data rate specified for the FACH.

8.2.2.1 Minimum requirement

For the parameters specified in Table 8.4 the MER shall not exceed the piece-wise linear MER curve specified by the points in table 8.5.

Table 8.4: FACH parameters in static propagation conditions

Parameter	Unit	Value
$\frac{DPCH\_E_c}{I_{or}}$	dB	
$\cancel{SCCPCH\_E_c}$	dB	
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
Control Data Rate	?	
$FACH\quad E_b/N_t$	dB	

Table 8.5: FACH requirements in static propagation conditions

$FACH \quad E_b/N_t$	MER
TBD	TBD
TBD	TBD
TBD	TBD

8.2.3 Demodulation of Dedicated Channel (DCH)

The receive characteristic of the Dedicated Channel (DCH) in the static environment is determined by the Block Error Ratio (BLER). BLER is specified for each individual data rate of the DCH. DCH is mapped into the Dedicated Physical Channel (DPCH).

8.2.3.1 Minimum requirement

For the parameters specified in Table 8.6 the BLER shall not exceed the piece-wise linear BLER curve specified by the points in table 8.7.

NOTE: The performance requirements for 384kbps will be replaced with new value using 10ms TTI measurement channel defined in subclause A.3.5.

Table 8.6: DCH parameters in static propagation conditions

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\hat{I}_{or}/I_{oc}$	dB	-1			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.7: DCH requirements in static propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-16.6 dB	10^{-2}
2	-13.1 dB	10^{-1}
	-12.8 dB	10^{-2}
3	-9.9 dB	10^{-1}
	-9.8 dB	10^{-2}
4	-5.6 dB	10^{-1}
	-5.5 dB	10^{-2}

8.3 Demodulation of DCH in multi-path fading propagation conditions

8.3.1 Single Link Performance

The receive characteristics of the Dedicated Channel (DCH) in different multi-path fading environments are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into in Dedicated Physical Channel (DPCH).

8.3.1.1 Minimum requirement

For the parameters specified in Table 8.8, 8.10 and 8.12 the BLER shall not exceed the associated piece-wise linear BLER curves specified by the points in Table 8.9, 8.11 and 8.13.

NOTE: The performance requirements for 384kbps will be replaced with new value using 10ms TTI measurement channel defined in subclause A.3.5.

Table 8.8: Test Parameters for DCH in multi-path fading propagation conditions (Case 1)

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.9: Test requirements for DCH in multi-path fading propagation conditions (Case 1)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-15.0 dB	10^{-2}
2	-13.9 dB	10^{-1}
	-10.0 dB	10^{-2}
3	-10.6 dB	10^{-1}
	-6.8 dB	10^{-2}
4	-6.3 dB	10^{-1}
	-2.2 dB	10^{-2}

Table 8.10: DCH parameters in multi-path fading propagation conditions (Case 2)

Parameter	Unit	Test 5	Test 6	Test 7	Test 8
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.11: DCH requirements in multi-path fading propagation (Case 2)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
5	-7.7 dB	10^{-2}
6	-6.4 dB	10^{-1}
	-2.7 dB	10^{-2}
7	-8.1 dB	10^{-1}
	-5.1 dB	10^{-2}
8	-5.5 dB	10^{-1}
	-3.2 dB	10^{-2}

Table 8.12: DCH parameters in multi-path fading propagation conditions (Case 3)

Parameter	Unit	Test 9	Test 10	Test 11	Test 12
$\hat{I}_{or}/I_{oc}$	dB	-3	-3	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.13: DCH requirements in multi-path fading propagation conditions (Case 3)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
9	-11.8 dB	10^{-2}
10	-8.1 dB	10^{-1}
	-7.4 dB	10^{-2}
	-6.8 dB	10^{-3}
11	-9.0 dB	10^{-1}
	-8.5 dB	10^{-2}
	-8.0 dB	10^{-3}
12	-6.0 dB	10^{-1}
	-5.5 dB	10^{-2}
	-5.0 dB	10^{-3}

8.4 Demodulation of DCH in moving propagation conditions

8.4.1 Single link performance

The receive single link performance of the Dedicated Traffic Channel (DCH) in dynamic moving propagation conditions are determined by the Block Error Ratio (BLER) values. BLER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into Dedicated Physical Channel (DPCH).

8.4.1.1 Minimum requirement

For the parameters specified in Table 8.14 the BLER shall not exceed the piece-wise linear BLER curve specified in points in Table 8.15.

Table 8.14: DCH parameters in moving propagation conditions

Parameter	Unit	Test 1	Test 2
$\hat{I}_{or}/I_{oc}$	dB	-1	
I_{oc}	dBm/3.84 MHz	-60	
Information Data Rate	kbps	12.2	64

Table 8.15: DCH requirements in moving propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-14.5 dB	10^{-2}
2	-10.9 dB	10^{-2}

8.5 Demodulation of DCH in birth-death propagation conditions

8.5.1 Single link performance

The receive single link performance of the Dedicated Traffic Channel (DCH) in dynamic birth-death propagation conditions are determined by the Block Error Ratio (BLER) values. BER is measured for the each of the individual data rate specified for the DPCH. DCH is mapped into Dedicated Physical Channel (DPCH).

8.5.1.1 Minimum requirement

For the parameters specified in Table 8.16, the BLER shall not exceed the piece-wise linear BLER curve in the points in Table 8.17.

Table 8.16: DCH parameters in birth-death propagation conditions

Parameter	Unit	Test 1	Test 2
$\hat{I}_{or}/I_{oc}$	dB	-1	
I_{oc}	dBm/3.84 MHz	-60	
Information Data Rate	kbps	12.2	64

Table 8.17: DCH requirements in birth-death propagation conditions

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-12.6 dB	10^{-2}
2		10^{-2}

8.6 Demodulation of DCH in Base Station Transmit diversity modes

8.6.1 Demodulation of DCH in open-loop transmit diversity mode

The receive characteristic of the Dedicated Channel (DCH) in open loop transmit diversity mode is determined by the Block Error Ratio (BLER). DCH is mapped into in Dedicated Physical Channel (DPCH).

8.6.1.1 Minimum requirement

For the parameters specified in Table 8.18 the BLER shall not exceed the associated piece-wise linear BLER curve specified by the points in Table 8.19

Table 8.18: Test parameters for DCH reception in an open loop transmit diversity scheme. (Propagation condition: Case 1)

Parameter	Unit	Test 1
$\hat{I}_{or}/I_{oc}$	dB	9
I_{oc}	dBm/3.84 MHz	-60
Information data rate	kbps	12.2

Table 8.19: Test requirements for DCH reception in open loop transmit diversity scheme

Test Number	$\frac{DPCH\_E_c}{I_{or}}$ (antenna 1/2)	BLER
1	[-16.8 dB]	10^{-2}

8.6.2 Demodulation of DCH in closed loop transmit diversity mode

The receive characteristic of the dedicated channel (DCH) in closed loop transmit diversity mode is determined by the Block Error Ratio (BLER). DCH is mapped into in Dedicated Physical Channel (DPCH).

8.6.2.1 Minimum requirement

For the parameters specified in Table 8.20 the BLER shall not exceed the associated piece-wise linear BLER curves specified by the points in Table 8.21.

Table 8.20: Test Parameters for DCH Reception in closed loop transmit diversity mode (Propagation condition: Case 1)

Parameter	Unit	Test 1 (Mode 1)	Test 2 (Mode 2)
$\hat{I}_{or}/I_{oc}$	dB	9	9
I_{oc}	dBm/3.84 MHz	-60	-60
Information data rate	kbps	12.2	12.2
Feedback error rate	%	4	4

Table 8.21: Test requirements for DCH reception in closed loop transmit diversity mode

Test Number	$\frac{DPCH\_E_c}{I_{or}}$ (see note)	BLER
1	-17.5 dB	10^{-2}
2	-17.8 dB	10^{-2}
NOTE: This is the total power from both antennas. Power sharing between antennas are feedback mode dependent as specified in TS25.214.		

8.6.3 Demodulation of DCH in Site Selection Diversity Transmission Power Control mode

The bit error characteristics of UE receiver is determined in Site Selection Diversity Transmission power control (SSDT) mode. Two BS emulators are required for this performance test. The delay profiles of signals received from different base stations are assumed to be the same but time shifted by 10 chip periods (2604 ns).

8.6.3.1 Minimum Requirements

DCH parameters are specified in Table 8.22. The downlink physical channels and their relative power to Ior are the same as those specified in clause C.3 irrespective of BSs and the test cases. In Test 1 and Test 3, the received powers at UE from two BSs are the same, while 3dB offset is given to one that comes from one of BSs for Test 2 and Test 4 as specified in Table 8.22. For the parameters specified in Table 8.22, the BLER shall not exceed the value at the DPCH_Ec/Ior specified in Table 8.23.

Table 8.22: DCH parameters in multi-path propagation conditions during SSDT mode (Propagation condition: Case 1)

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{CPICH\_E_c}{I_{or}}$ (for Cell 1)	dB	-10	-13	-10	-10
$\frac{CPICH\_E_c}{I_{or}}$ (for Cell 2)	dB	-10	-10	-10	-13
$\frac{DPCH\_E_{c1}}{I_{or}} / \frac{DPCH\_E_{c2}}{I_{or}}$ *	dB	0	-3	0	+3
$\hat{I}_{or1}/I_{oc}$	dB	0	-3	0	0
$\hat{I}_{or2}/I_{oc}$	dB	0	0	0	-3
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	12.2	12.2	12.2
Number of FBI bits assigned to "S" Field		1	1	2	2
Code word Set		Long	Long	Short	Short

*NOTE: DPCH_Ec/Ior value applies whenever DPDCH in the cell is transmitted.

Table 8.23: DCH requirements in multi-path propagation conditions during SSDT Mode

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	-7.5 dB	10^{-2}
2	-6.5 dB	10^{-2}
3	-10.5 dB	10^{-2}
4	-9.2 dB	10^{-2}

8.7 Demodulation in Handover conditions

8.7.1 Inter-Cell Soft Handover Performance

The bit error rate characteristics of UE is determined during an inter-cell soft handover. During the soft handover a UE receives signals from different Base Stations. A UE has to be able to demodulate two PCCPCH channels and to combine the energy of DCH channels. Delay profiles of signals received from different Base Stations are assumed to be the same but time shifted by 10 chips.

The receive characteristics of the different channels during inter-cell handover are determined by the average Block Error Ratio (BLER) values.

8.7.1.1 Minimum requirement

For the parameters specified in Table 8.24, the BLER shall not exceed the piece-wise linear BLER curve specified by the points in Table 8.25.

Table 8.24: DCH parameters in multi-path propagation conditions during Soft Handoff (Case 3)

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\hat{I}_{or1}/I_{oc}$ and $\hat{I}_{or2}/I_{oc}$	dB	0	0	3	6
I_{oc}	dBm/3.84 MHz	-60			
Information data Rate	kbps	12.2	64	144	384

Table 8.25: DCH requirements in multi-path propagation conditions during Soft Handoff (Case 3)

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER
1	[-15.2 dB]	10^{-2}
2	[-11.8 dB]	10^{-1}
	[-11.3 dB]	10^{-2}
3	[-9.6 dB]	10^{-1}
	[-9.2 dB]	10^{-2}
4	[-6.0 dB]	10^{-1}
	[-5.5 dB]	10^{-2}

8.8 Power control in downlink

Power control in the downlink is the ability of the UE receiver to converge to required link quality set by the network while using as low power as possible in downlink . Additional performance requirements are expected to be added to this subclause.

8.8.1 Power control in the downlink, constant BLER target

8.8.1.1 Minimum requirements

For the parameters specified in Table 8.26 the downlink $\frac{DPCH\_E_c}{I_{or}}$ power shall be below the specified value in Table 8.27 and the measured BLER value shall be as required in Table 8.27.

NOTE: Power control in downlink is ON during the test.

Table 8.26: Test parameter for downlink power control

Parameter	Unit	Test 1	Test 2
$\hat{I}_{or}/I_{oc}$	dB	9	-1
I_{oc}	dBm/3.84 MHz	-60	
Information Data Rate	kbps	12.2	
Target quality value on DTCH	BLER	0.01	
Propagation condition		Case 4	

Table 8.27: Requirements in downlink power control

Parameter	Unit	Test 1	Test 2
$\frac{DPCH\_E_c}{I_{or}}$	dB	-16.0	-9.0
Measured quality on DTCH	BLER	FFS	FFS
Confidence level for measured quality and $\frac{DPCH\_E_c}{I_{or}}$	%	90	

8.9 Downlink compressed mode

Downlink compressed mode is used to create gaps in the downlink transmission, to allow the UE to make measurements on other frequencies.

8.9.1 Single link performance

The receiver single link performance of the Dedicated Traffic Channel (DCH) in compressed mode is determined by the Block Error Ratio (BLER), average power in the downlink and the maximum power in the uplink.

The compressed mode parameters are given in clause A.5.

8.9.1.1 Minimum requirements

For the parameters specified in Table 8.30 the average downlink $DPCH\_E_c$ power shall be below the specified value for the reported BLER shown in Table 8.31. The uplink DPDCH power shall be below the specified value.

NOTE: Inner loop power control is ON during the test.

Table 8.28: Void

Table 8.29: Void

Table 8.30: Test parameter for downlink compressed mode

Parameter	Unit	Test 1
$\hat{I}_{or}/I_{oc}$	dB	9
I_{oc}	dBm/3.84 MHz	-60
Information Data Rate	kbps	12.2
TFCI	-	On
Propagation condition		Case 2

Table 8.31: Requirements in downlink compressed mode

Parameter	Unit	Test 1
$\frac{DPCH\_E_c}{I_{or}}$	dB	
Target quality		
Downlink BLER		
Uplink DPDCH	dBm	[Maximum power/slot]
Confidence level	%	

8.10 Blind transport format detection

Performance of Blind transport format detection is determined by the Block Error Ratio (BLER) values and by the measured average transmitted DPCH_Ec/Ior value.

8.10.1 Minimum requirement

For the parameters specified in Table 8.32 the BLER and FDR shall not exceed the piece-wise linear BLER curve specified by the points in table 8.33.

Table 8.32: Test parameters for Blind transport format detection

Parameter	Unit	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
$\hat{I}_{or}/I_{oc}$	dB	-1			-3		
I_{oc}	dBm/3.84 MHz	-60					
Information Data Rate	kbps	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)	12.2 (rate 1)	7.95 (rate 2)	1.95 (rate 3)
propagation condition	-	static			multi-path fading case 3		
TFCI	-	off					

Table 8.33: The Requirements for DCH reception in Blind transport format detection

Test Number	$\frac{DPCH\_E_c}{I_{or}}$	BLER	FDR
1	[-17.7dB]	10^{-2}	10^{-4}
2	[-17.8dB]	10^{-2}	10^{-4}
3	[-18.4dB]	10^{-2}	10^{-4}
4	[-13dB]	10^{-2}	10^{-4}
5	[-13.2dB]	10^{-2}	10^{-4}
6	[-13.8dB]	10^{-2}	10^{-4}

* The value of DPCH_Ec/Ior, Ioc, and Ior/Ioc are defined in case of DPCH is transmitted

NOTE: In this test, 9 different Transport Format Combinations (table 8.34) are sent during the call set up procedure, so that the UE has to detect the correct transport format from these 9 candidates.

Table 8.34: Transport format combinations informed during the call set up procedure in the test

	1	2	3	4	5	6	7	8	9
DTCH	12.2k	10.2k	7.95k	7.4k	6.7k	5.9k	5.15k	4.75k	1.95k
DCCH					2.4k				

Annex A (normative): Measurement channels

A.1 General

The measurement channels in this annex are defined to derive the requirements in clauses 6, 7 and 8. The measurement channels represent example configuration of radio access bearers for different data rates.

The measurement channel for 12.2 kbps shall be supported by any UE both in up- and downlink. Support for other measurement channels is depending on the UE Radio Access capabilities.

A.2 UL reference measurement channel

A.2.1 UL reference measurement channel (12.2 kbps)

The parameters for the 12.2 kbps UL reference measurement channel are specified in Table A.1 and Table A.2. The channel coding for information is shown in figure A.1.

Table A.1: UL reference measurement channel physical parameters (12.2 kbps)

Parameter	Unit	Level
Information bit rate	kbps	12.2
DPDCH	kbps	60
DPCCH	kbps	15
DPCCH Slot Format #i	-	0
DPCCH/DPDCH power ratio	dB	-5.46
TFCI	-	On
Repetition	%	23
NOTE: Slot Format #2 is used for closed loop tests in subclause 8.6.2.		

Table A.2: UL reference measurement channel, transport channel parameters (12.2 kbps)

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

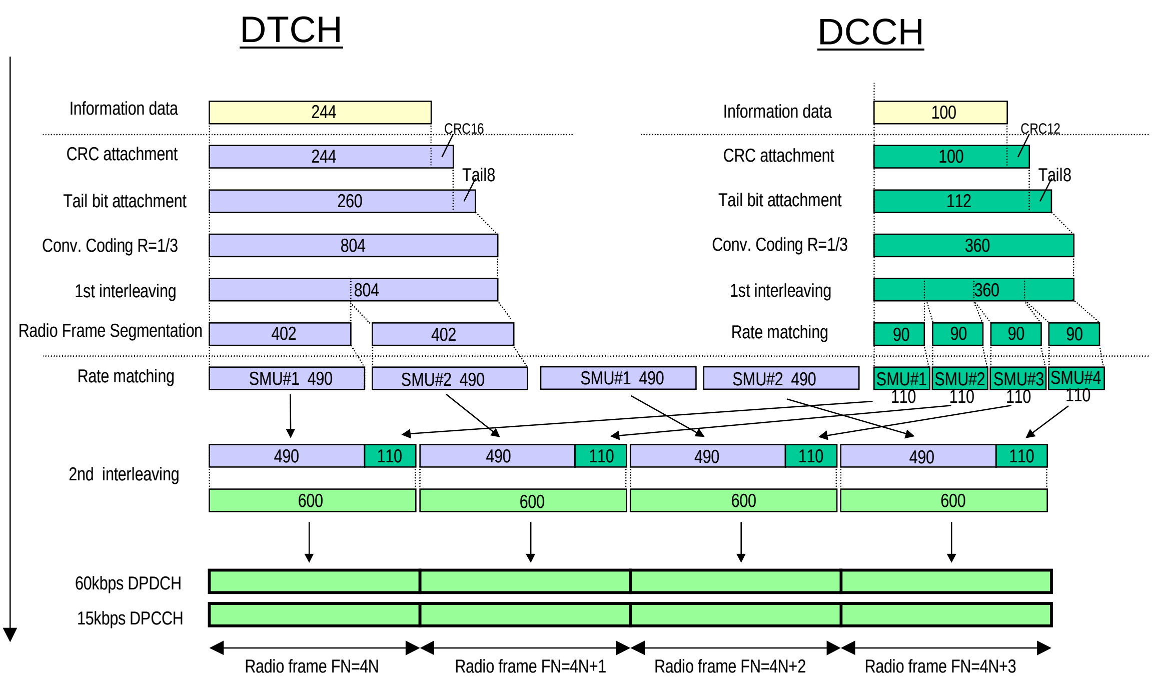

Figure A.1 (Informative): Channel coding of UL reference measurement channel (12.2 kbps)

A.2.2 UL reference measurement channel (64 kbps)

The parameters for the 64 kbps UL reference measurement channel are specified in Table A.3 and Table A.4. The channel coding for information is shown in figure A.2. This measurement channel is not currently used in TS 25.101 but can be used for future requirements.

Table A.3: UL reference measurement channel (64 kbps)

Parameter	Unit	Level
Information bit rate	kbps	64
DPDCH	kbps	240
DPCCH	kbps	15
DPCCH Slot Format #i	-	0
DPCCH/DPDCH power ratio	dB	-9.54
TFCI	-	On
Repetition	%	18

Table A.4: UL reference measurement channel, transport channel parameters (64 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	1280	100
Transport Block Set Size	1280	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

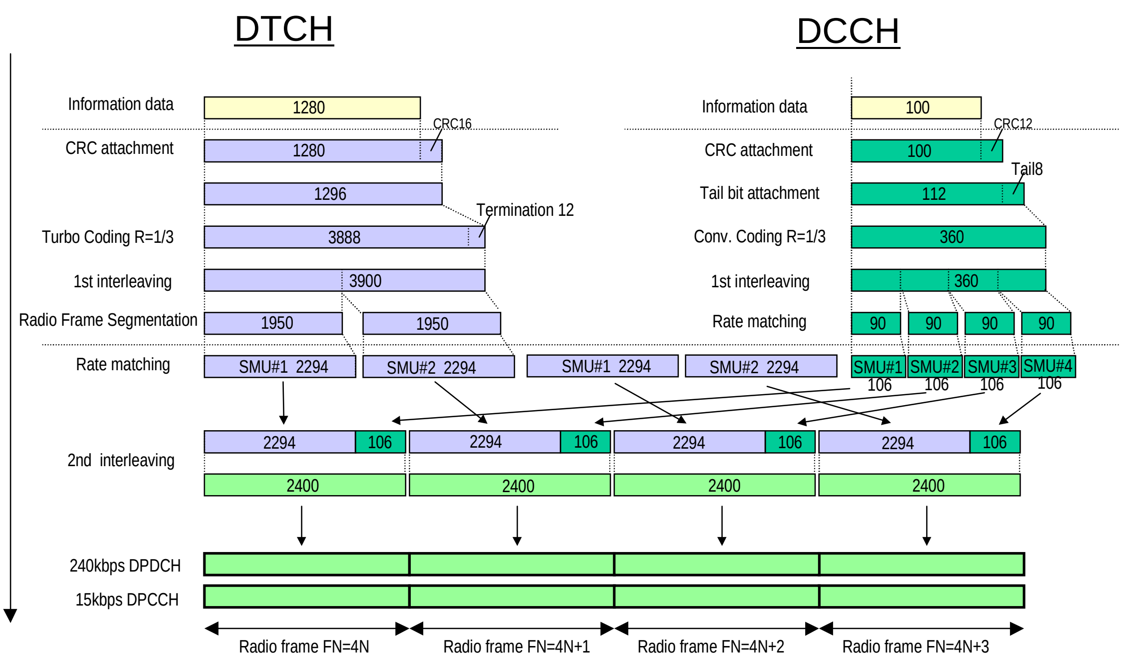

Figure A.2 (Informative): Channel coding of UL reference measurement channel (64 kbps)

A.2.3 UL reference measurement channel (144 kbps)

The parameters for the 144 kbps UL reference measurement channel are specified in Table A.5 and Table A.6. The channel coding for information is shown in Figure A.3. This measurement channel is not currently used in the present document but can be used for future requirements.

Table A.5: UL reference measurement channel (144 kbps)

Parameter	Unit	Level
Information bit rate	kbps	144
DPDCH	kbps	480
DPCCH	kbps	15
DPCCH Slot Format #i	-	0
DPCCH/DPDCH power ratio	dB	-11.48
TFCI	-	On
Repetition	%	8

Table A.6: UL reference measurement channel, transport channel parameters (144kbps)

Parameters	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	2880	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

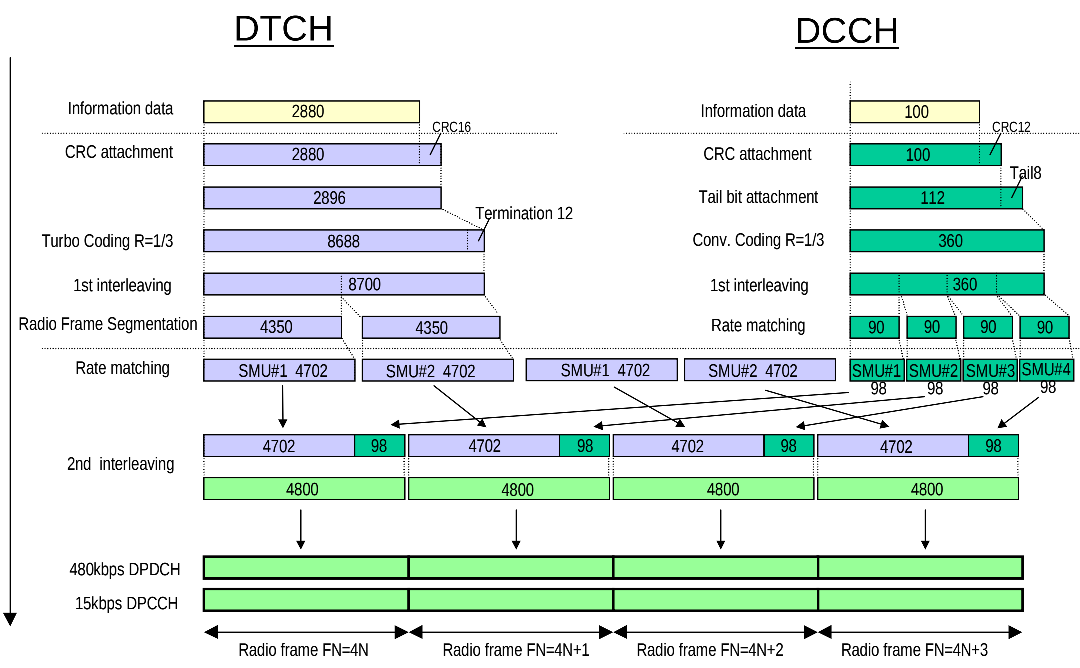

Figure A.3 (Informative): Channel coding of UL reference measurement channel (144 kbps)

A.2.4 UL reference measurement channel (384 kbps, 20ms TTI)

The parameters for the 384 kbps UL reference measurement channel (TTI-20ms) are specified in Table A.7 and Table A.8 The channel coding for information is shown in Figure A.4. This measurement channel is not currently used in TS 25.101 but can be used for future requirements.

NOTE: The measurement channel for 384kbps with 20ms TTI will be deleted, and the new 384kbps measurement channel defined in subclause A.2.5 will be used.

Table A.7: UL reference measurement channel (384 kbps)

Parameter	Unit	Level
Information bit rate	kbps	384
DPDCH	kbps	960
DPCCH	kbps	15
DPCCH Slot Format #i	-	0
DPCCH/DPDCH power ratio	dB	-11.48
TFCI	-	On
Puncturing	%	18

Table A.8: UL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

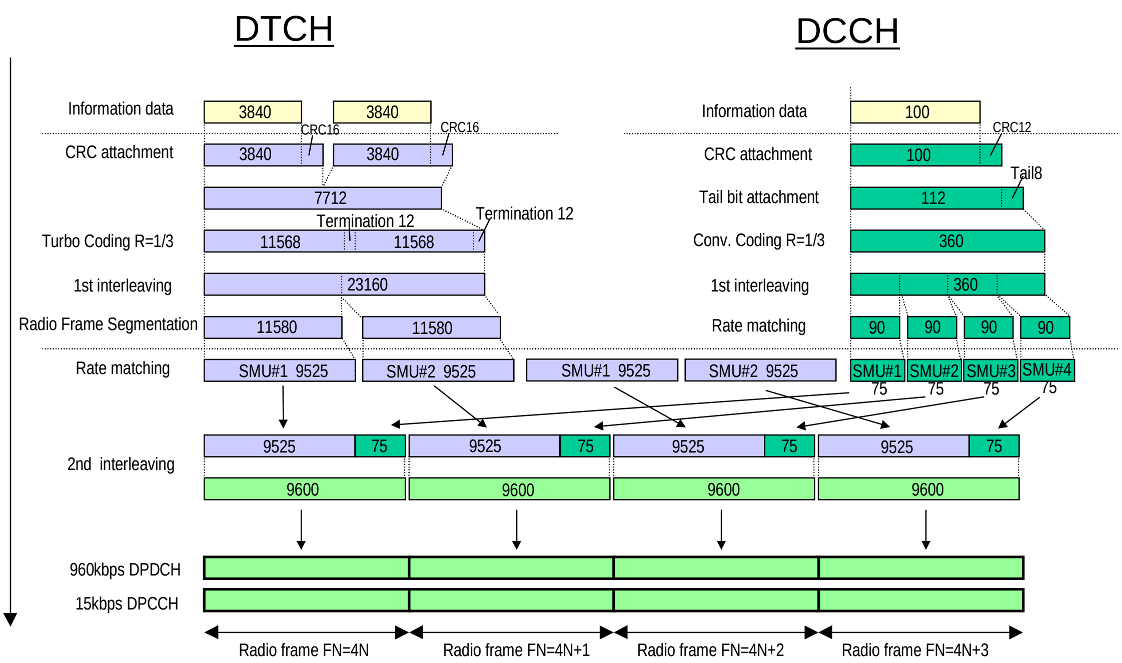

Figure A.4 (Informative): Channel coding of UL reference measurement channel (384 kbps)

A.2.5 UL reference measurement channel (384 kbps)

The parameters for the 384 kbps UL reference measurement channel are specified in Table A.9 and Table A.10. The channel coding for information is shown in Figure A.5. This measurement channel is not currently used in TS 25.101 but can be used for future requirements.

Table A.9: UL reference measurement channel (384 kbps)

Parameter	Unit	Level
Information bit rate	kbps	384
DPDCH	kbps	960
DPCCH	kbps	15
DPCCH/DPDCH power ratio	dB	-11.48
TFCI	-	On
Puncturing	%	18

Table A.10: UL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	3840	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

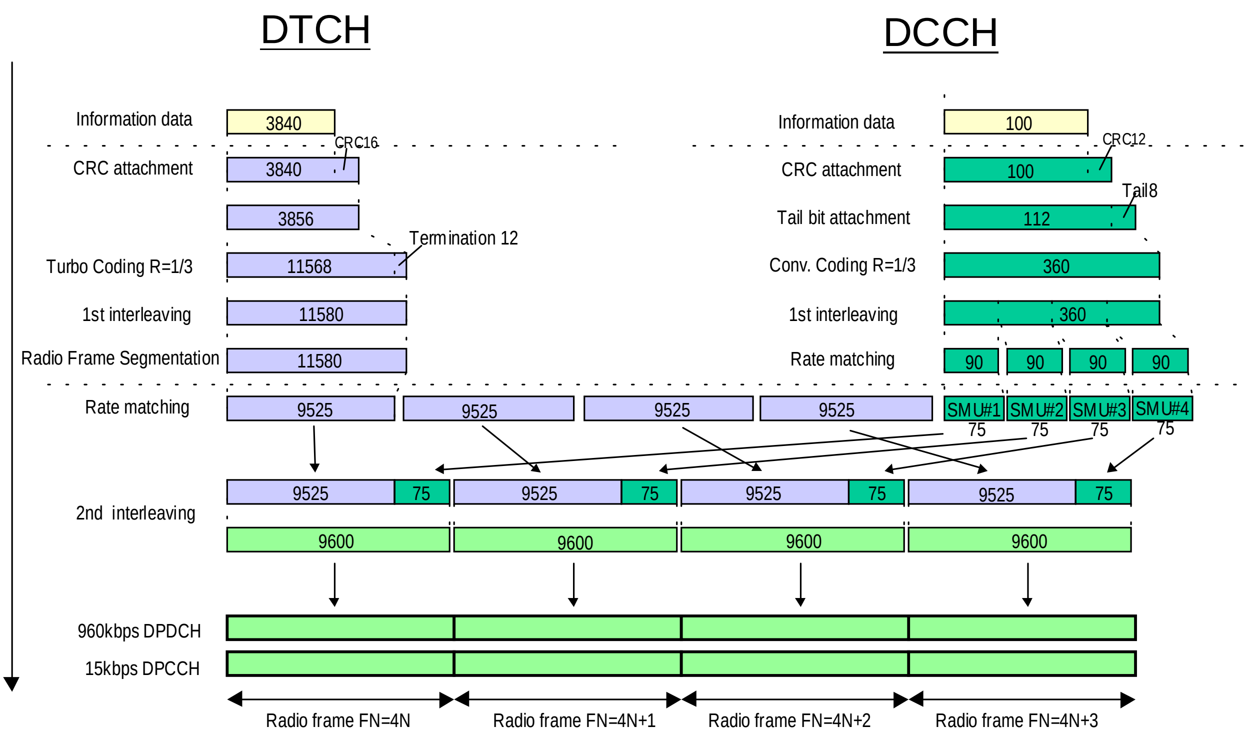

Figure A.5 (Informative): Channel coding of UL reference measurement channel (384 kbps)

A.2.6 UL reference measurement channel (768 kbps)

The parameters for the UL measurement channel for 768 kbps are specified in Table A.11 and Table A.12.

Table A.11: UL reference measurement channel, physical parameters (768 kbps)

Parameter	Unit	Level
Information bit rate	kbps	2*384
$DPDCH_1$	kbps	960
$DPDCH_2$	kbps	960
DPCCH	kbps	15
DPCCH/DPDCH power ratio	dB	-11.48
TFCI	-	On
Puncturing	%	18

Table A.12: UL reference measurement channel, transport channel parameters (768 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12

A.3 DL reference measurement channel

A.3.1 DL reference measurement channel (12.2 kbps)

The parameters for the 12.2 Kbps DL reference measurement channel are specified in Table A.13 and Table A.14. The channel coding is shown for information in figure A.6.

Table A.13: DL reference measurement channel physical parameters (12.2 kbps)

Parameter	Unit	Level
Information bit rate	kbps	12.2
DPCH	ksps	30
Slot Format #i	-	11
TFCI	-	On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	14.5

Table A.14: DL reference measurement channel, transport channel parameters (12.2 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	244	100
Transport Block Set Size	244	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

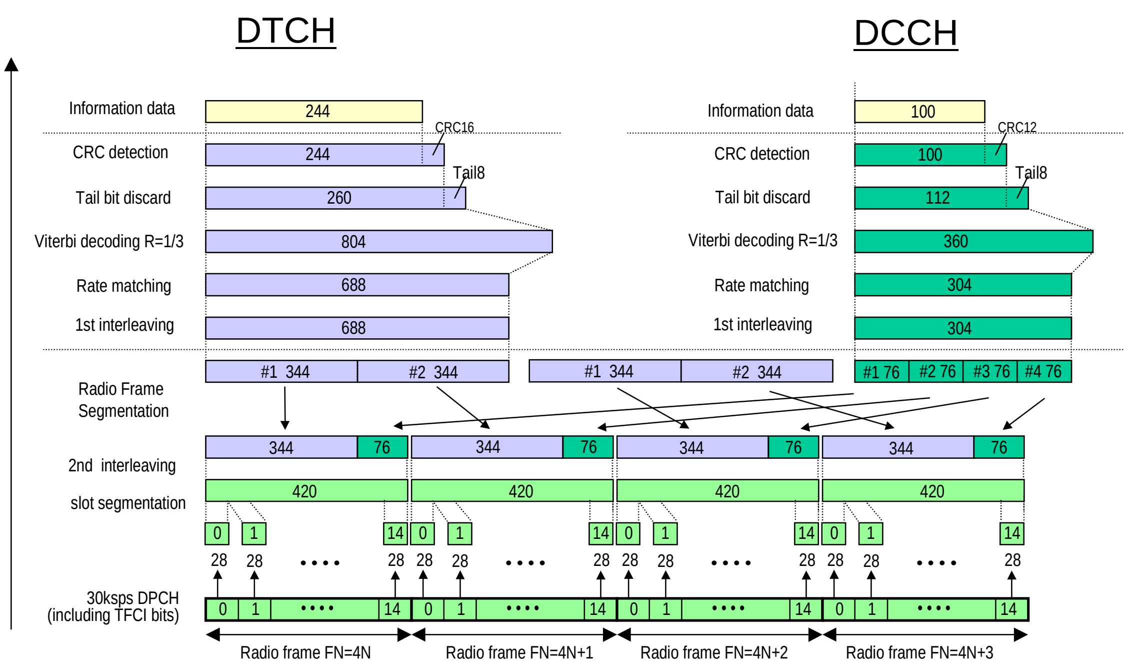

Figure A.6 (Informative): Channel coding of DL reference measurement channel (12.2 kbps)

A.3.2 DL reference measurement channel (64 kbps)

The parameters for the DL reference measurement channel for 64 kbps are specified in Table A.15 and Table A.16. The channel coding is shown for information in Figure A.7.

Table A.15: DL reference measurement channel physical parameters (64 kbps)

Parameter	Unit	Level
Information bit rate	kbps	64
DPCH	ksps	120
Slot Format #i	-	13
TFCI	-	On
Power offsets PO1, PO2 and PO3	dB	0
Repetition	%	2.9

Table A.16: DL reference measurement channel, transport channel parameters (64 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	1280	100
Transport Block Set Size	1280	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

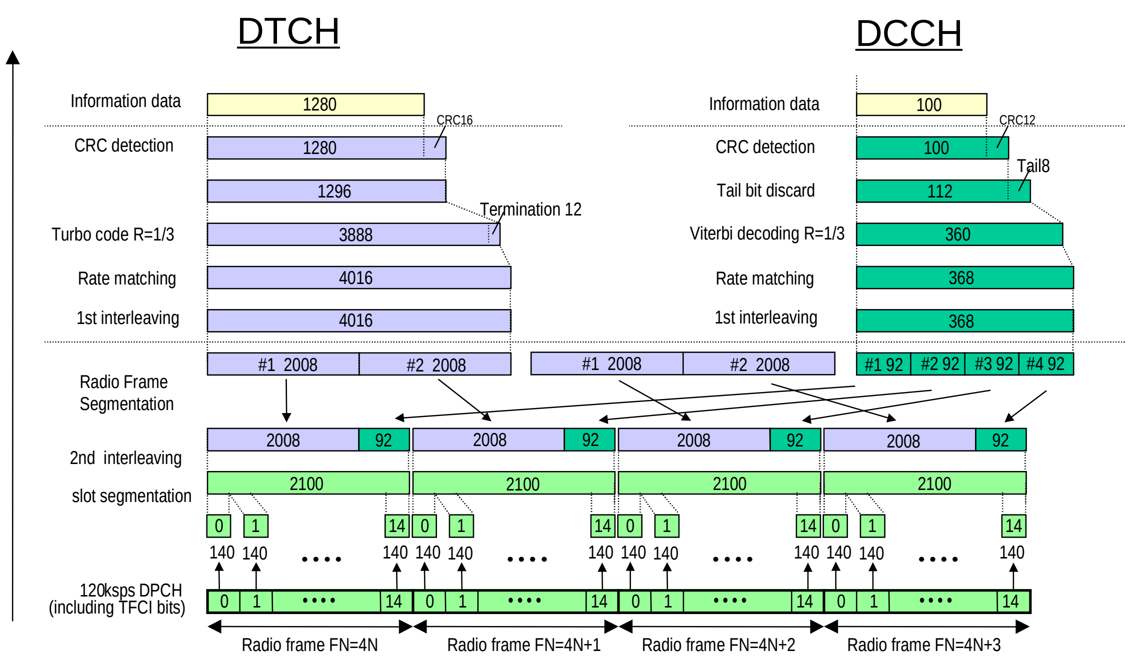

Figure A.7 (Informative): Channel coding of DL reference measurement channel (64 kbps)

A.3.3 DL reference measurement channel (144 kbps)

The parameters for the DL measurement channel for 144 kbps are specified in Table A.17 and Table A.18. The channel coding is shown for information in Figure A.8.

Table A.17: DL reference measurement channel physical parameters (144 kbps)

Parameter	Unit	Level
Information bit rate	kbps	144
DPCH	ksps	240
Slot Format #i	-	14
TFCI	-	On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	2.7

Table A.18: DL reference measurement channel, transport channel parameters (144 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	2880	100
Transport Block Set Size	2880	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

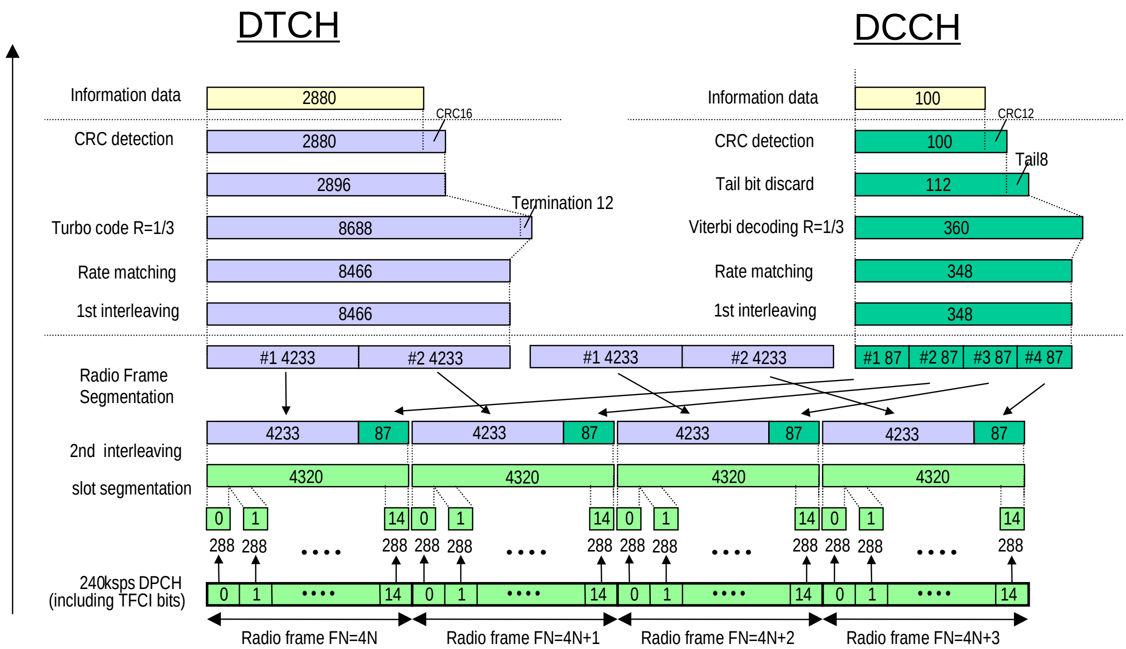

Figure A.8 (Informative): Channel coding of DL reference measurement channel (144 kbps)

A.3.4 DL reference measurement channel (384 kbps, 20ms TTI)

The parameters for the DL measurement channel for 384 kbps (20ms TTI) are specified in Table A.19 and Table A.20. The channel coding is shown for information in Figure A.9.

NOTE: The measurement channel for 384 kbps with 20ms-TTI will be deleted, and new 384kbps measurement channel defined in subclause A.3.5 will be used.

Table A.19: DL reference measurement channel, physical parameters (384 kbps)

Parameter	Unit	Level
Information bit rate	kbps	384
DPCH	ksps	480
Slot Format #i	-	15
TFCI		On
Power offsets PO1, PO2 and PO3	dB	0
Puncturing	%	22

Table A.20: DL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	7680	100
Transmission Time Interval	20 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	fixed

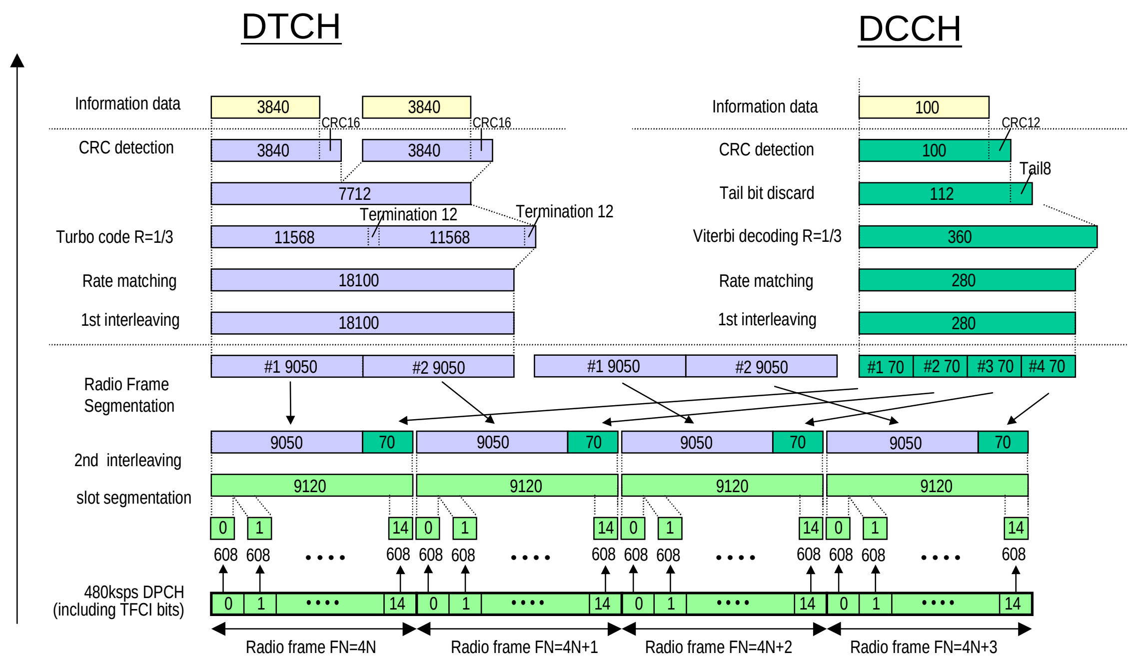

Figure A.9 (Informative): Channel coding of DL reference measurement channel (384 kbps)

A.3.5 DL reference measurement channel (384 kbps)

The parameters for the DL measurement channel for 384 kbps are specified in Table A.21 and Table A.22. The channel coding is shown for information in Figure A.10

Table A.21: DL reference measurement channel, physical parameters (384 kbps)

Parameter	Unit	Level
Information bit rate	kbps	384
DPCH	ksps	480
TFCI		On
Puncturing	%	22

Table A.22: DL reference measurement channel, transport channel parameters (384 kbps)

Parameter	DTCH	DCCH
Transport Channel Number	1	2
Transport Block Size	3840	100
Transport Block Set Size	3840	100
Transmission Time Interval	10 ms	40 ms
Type of Error Protection	Turbo Coding	Convolution Coding
Coding Rate	1/3	1/3
Static Rate Matching parameter	1.0	1.0
Size of CRC	16	12
Position of TrCH in radio frame	fixed	Fixed

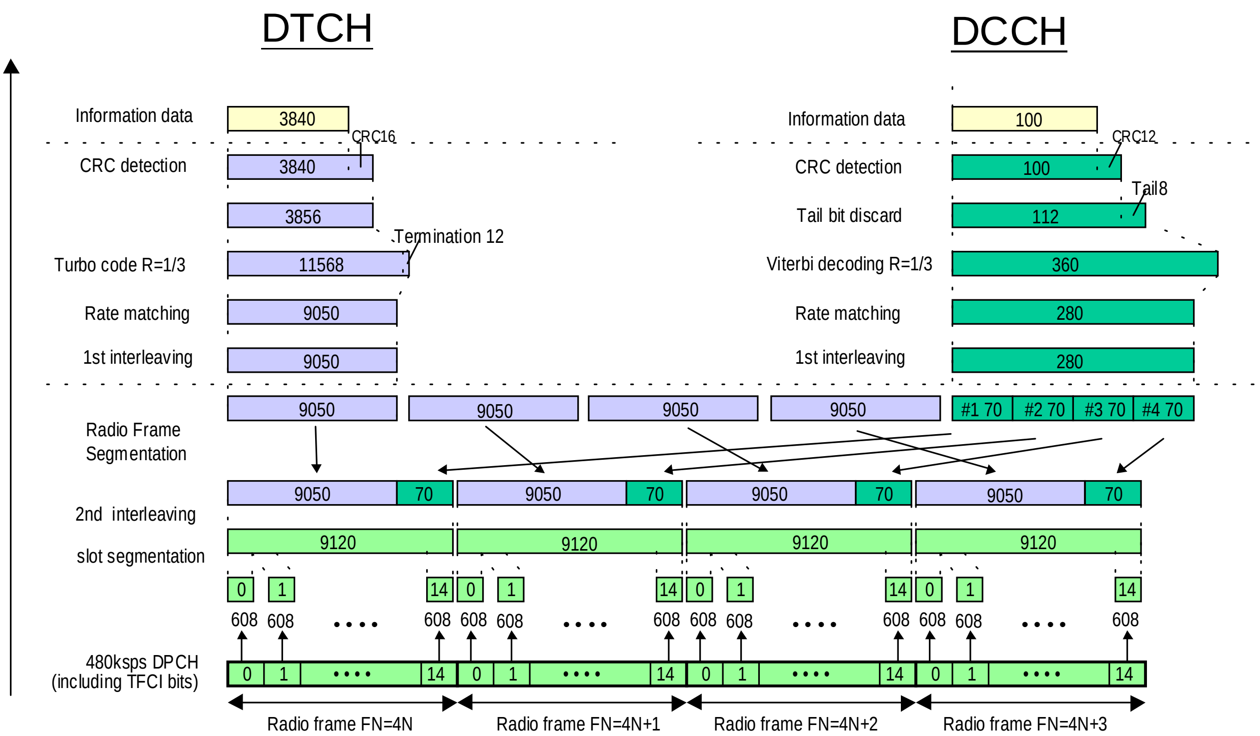

Figure A.10 (Informative): Channel coding of DL reference measurement channel (384 kbps)

A.4 DL reference measurement channel for BTFD performance requirements

The parameters for DL reference measurement channel for BTFD are specified in Table A.23 and Table A.24. The channel coding for information is shown in figures A.11, A.12, and A13.

Table A.23: DL reference measurement channel physical parameters for BTFD

Parameter	Unit	Rate 1	Rate 2	Rate 3
Information bit rate	kbps	12.2	7.95	1.95
DPCH	ksps		30	
TFCI	-		Off	
Repetition	%		5	

Table A.24: DL reference measurement channel, transport channel parameters for BTFD

Parameter	DTCH			DCCH
	Rate 1	Rate 2	Rate 3	
Transport Channel Number	1			2
Transport Block Size	244	159	39	96
Transport Block Set Size	244	159	39	96
Transmission Time Interval	20 ms			40 ms
Type of Error Protection	Convolution Coding			Convolution Coding
Coding Rate	1/3			1/3
Static Rate Matching parameter	1.0			1.0
Size of CRC	12			16
Position of TrCH in radio frame	fixed			fixed

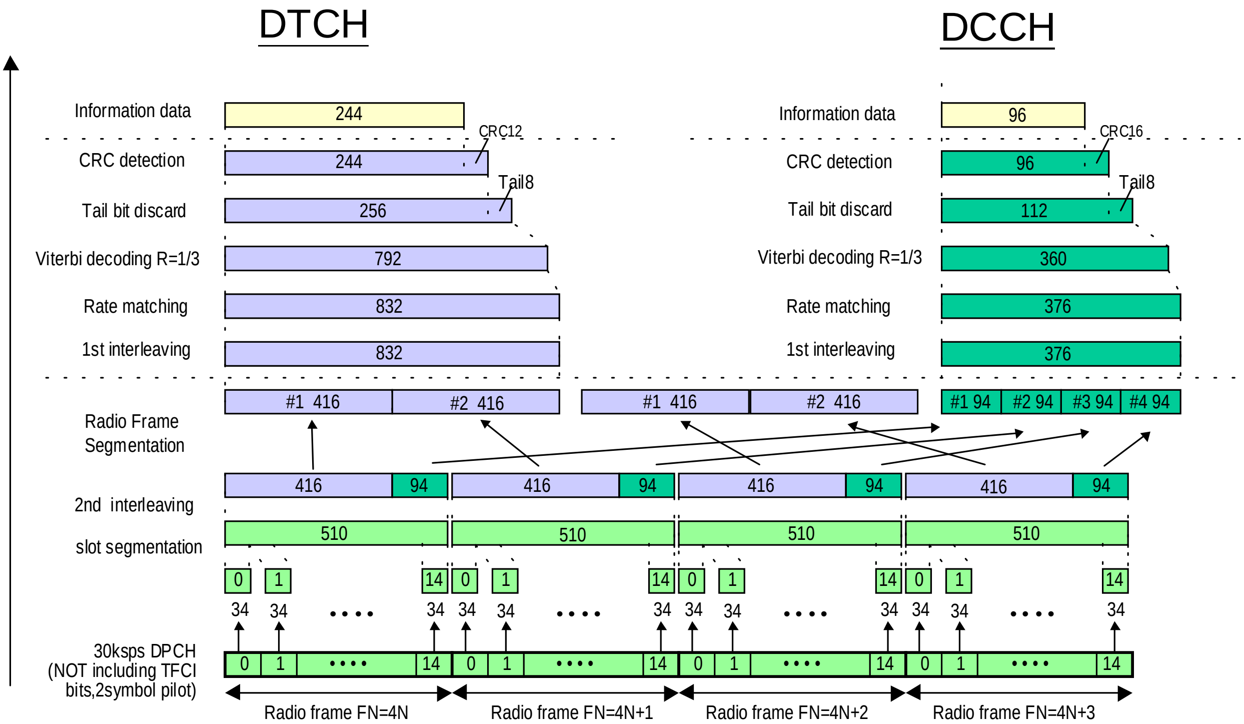

Figure A.11 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 1)

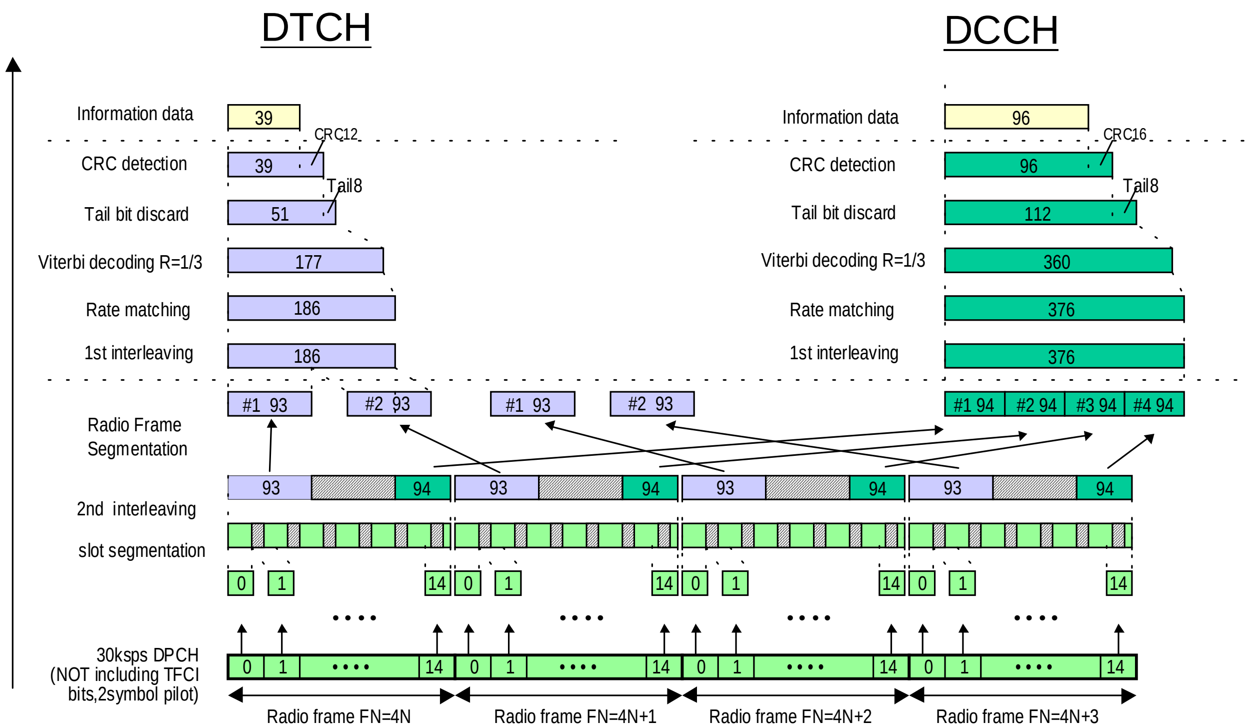

Figure A.12 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 2)

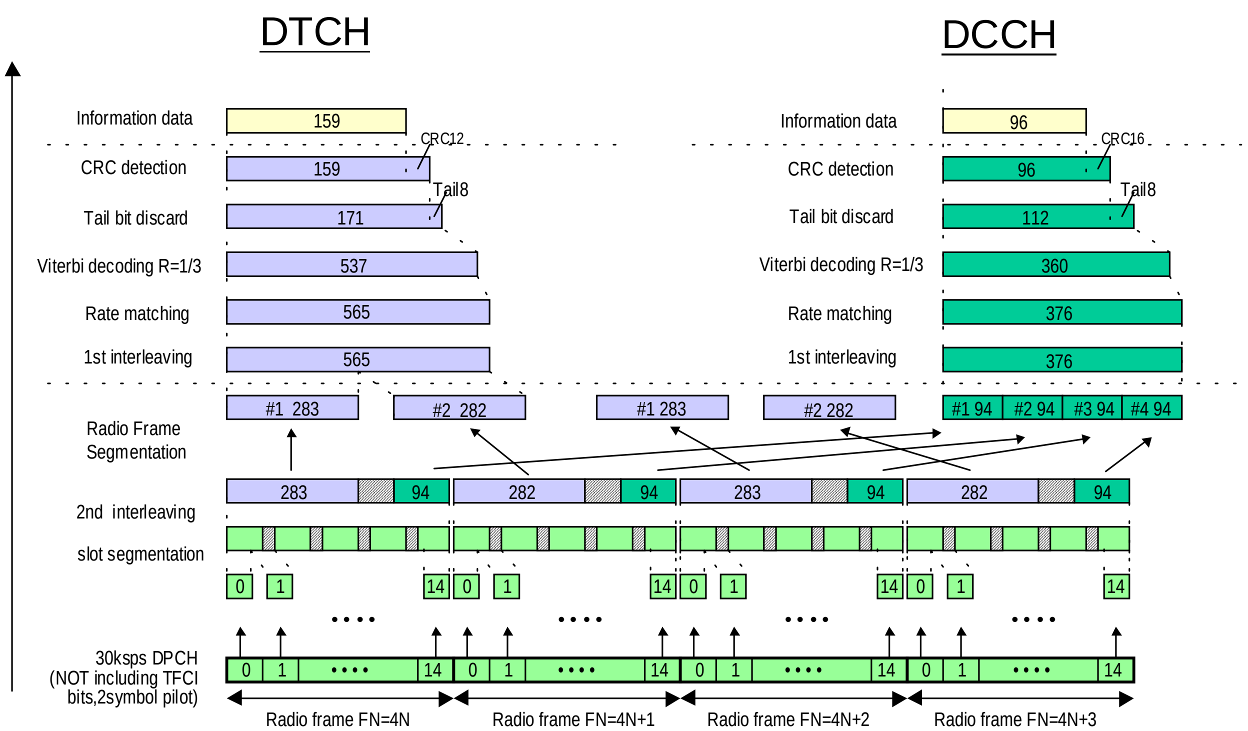

Figure A.13 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 3)

A.5 DL reference compressed mode parameters

Table A.25: Compressed mode reference pattern 1 parameters

Parameter	1.1	1.2	Note
TGSN (Transmission Gap Starting Slot Number)	11	11	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	-	-	Only one gap in use.
TGPL1 (Transmission Gap Pattern Length)	2	4	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible DL &UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	Puncturing	
Downlink frame type and Slot format	11B	11A	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

Table A.26: Compressed mode reference pattern 2 parameters

Parameter	2.1	2.2	Note
TGSN (Transmission Gap Starting Slot Number)	4	4	
TGL1 (Transmission Gap Length 1)	7	7	
TGL2 (Transmission Gap Length 2)	-	-	Only one gap in use.
TGD (Transmission Gap Distance)	-	135	
TGPL1 (Transmission Gap Pattern Length)	3	12	
TGPL2 (Transmission Gap Pattern Length)	-	-	Only one pattern in use.
TGPRC (Transmission Gap Pattern Repetition Count)	NA	NA	Defined by higher layers
TGCFN (Transmission Gap Connection Frame Number):	NA	NA	Defined by higher layers
UL/DL compressed mode selection	DL & UL	DL & UL	2 configurations possible. DL & UL / DL
UL compressed mode method	SF/2	SF/2	
DL compressed mode method	SF/2	SF/2	
Downlink frame type and Slot format	11B	11B	
Scrambling code change	No	No	
RPP (Recovery period power control mode)	0	0	
ITP (Initial transmission power control mode)	0	0	

Annex B (normative): Propagation conditions

B.1 General

B.2 Propagation Conditions

B.2.1 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.2.2 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 B.1: Propagation Conditions for Multi path Fading Environments

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, 120 km/h		Case 4, 3 km/h	
Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]	Relative Delay [ns]	Average Power [dB]
0	0	0	0	0	0	0	0
976	-10	976	0	260	-3	976	0
		20000	0	521	-6		
				781	-9		

B.2.3 Moving propagation conditions

The dynamic propagation conditions for the test of the baseband performance are non fading channel models with two taps. The moving propagation condition has two tap, one static, Path0, and one moving, Path1. The time difference between the two paths is according Equation (B.1). The taps have equal strengths and equal phases.

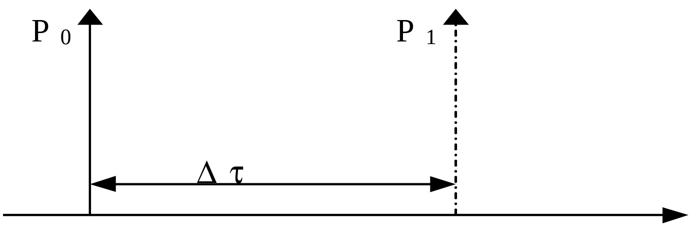

Figure B.1: The moving propagation conditions

$$\Delta\tau = \left(1 + \frac{A}{2}\left(1 + \sin(\Delta\omega \cdot t)\right)\right) \mu s$$

Equation B.1

The parameters in the equation are shown in.

A	5 µs
Δω	$40*10^{-3}$ s^{-1}

B.2.4 Birth-Death propagation conditions

The dynamic propagation conditions for the test of the baseband performance is a non fading propagation channel with two taps. The moving propagation condition has two taps, Path1 and Path2 which alternate between 'birth' and 'death'. The positions the paths appear are randomly selected with an equal probability rate and is shown in Figure B.2.

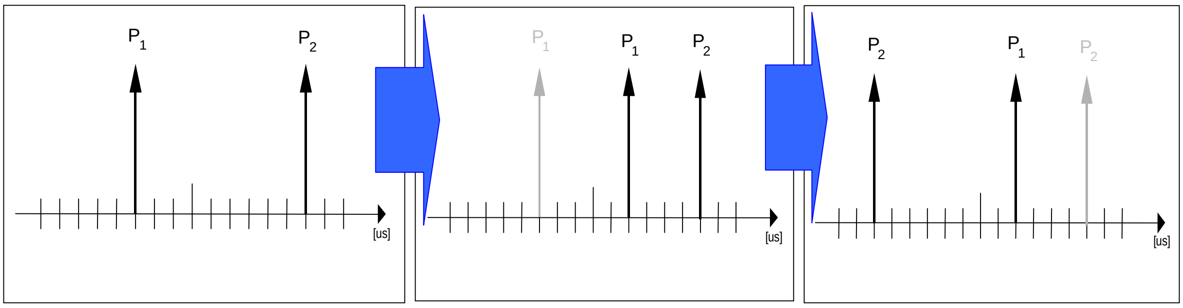

Figure B.2: Birth death propagation sequence

Note:

1. Two paths, Path1 and Path2 are randomly selected from the group[-5,-4,-3,-2,-1,0,1,2,3,4,5] µs. The paths have equal strengths and equal phases.

2. After 191 ms, Path1 vanishes and reappears immediately at a new location randomly selected from the group [-5,-4,-3,-2,-1,0,1,2,3,4,5] µs but excludes the point Path 2.

3. After an additional 191 ms, Path2 vanishes and reappears immediately at a new location randomly selected from the group [-5,-4,-3,-2,-1,0,1,2,3,4,5] µs but excludes the point Path 1.

4. The sequence in 2) and 3) is repeated.

Annex C (normative): Downlink Physical Channels

C.1 General

This annex specifies the downlink physical channels that are needed for setting a connection and channels that are needed during a connection.

C.2 Connection Set-up

Table C.1 describes the downlink Physical Channels that are required for connection set up.

Table C.1. Downlink Physical Channels required for connection set-up

Physical Channel
CPICH
PCCPCH
SCH
SCCPCH
PICH
AICH
DPCH

C.3 During connection

The following clauses, describes the downlink Physical Channels that are transmitted during a connection i.e., when measurements are done. For these measurements the offset between DPCH and SCH shall be zero chips at base station meaning that SCH is overlapping with the first symbols in DPCH in the beginning of DPCH slot structure.

C.3.1 Measurement of Rx Characteristics

Table C.2 is applicable for measurements on the Receiver Characteristics (clause 7) with the exception of subclause 7.4 (Maximum input level).

Table C.2: Downlink Physical Channels transmitted during a connection

Physical Channel	Power
CPICH	CPICH_Ec / DPCH_Ec = 7 dB
PCCPCH	PCCPCH_Ec / DPCH_Ec = 5 dB
SCH	SCH_Ec / DPCH_Ec = 5 dB
PICH	PICH_Ec / DPCH_Ec = 2 dB
DPCH	Test dependent power

C.3.2 Measurement of Performance requirements

Table C.3 is applicable for measurements on the Performance requirements (clause 8), including subclause 7.4 (Maximum input level).

Table C.3: Downlink Physical Channels transmitted during a connection[1]

Physical Channel	Power	NOTE
CPICH	CPICH_Ec/Ior = -10 dB	
PCCPCH	PCCPCH_Ec/Ior = -12 dB	
SCH	SCH_Ec/Ior = -12 dB	This power shall be divided equally between Primary and Secondary Synchronous channels
PICH	PICH_Ec/Ior = -15 dB	
DPCH	Test dependent power	
OCNS	Necessary power so that total transmit power spectral density of BS (Ior) adds to one	

C.3.3 Connection with open-loop transmit diversity mode

Table C.4 is applicable for measurements for subclause 8.6.1(Demodulation of DCH in open loop transmit diversity mode)

Table C.4: Downlink Physical Channels transmitted during a connection[1]

Physical Channel	Power	NOTE
CPICH (antenna 1)	CPICH_Ec1/Ior = -13 dB	1. Total CPICH_Ec/Ior = -10 dB
CPICH (antenna 2)	CPICH_Ec2/Ior = -13 dB	
PCCPCH (antenna 1)	PCCPCH_Ec1/Ior = -15 dB	1. STTD applied 2. Total PCCPCH_Ec/Ior = -12 dB
PCCPCH (antenna 2)	PCCPCH_Ec2/Ior = -15 dB	
SCH (antenna 1 / 2)	SCH_Ec/Ior = -12 dB	1. TSTD applied. 2. This power shall be divided equally between Primary and Secondary Synchronous channels
PICH (antenna 1)	PICH_Ec1/Ior = -18 dB	1. STTD applied 2. Total PICH_Ec/Ior = -15 dB
PICH (antenna 2)	PICH_Ec2/Ior = -18 dB	
DPCH	Test dependent power	1. STTD applied 2. Total power from both antennas
OCNS	Necessary power so that total transmit power spectral density of BS (Ior) adds to one	1. This power shall be divided equally between antennas

C.3.4 Connection with closed loop transmit diversity mode

Table C.5 is applicable for measurements for subclause 8.6.2 (Demodulation of DCH in closed loop transmit diversity mode).

Table C.5: Downlink Physical Channels transmitted during a connection[1]

Physical Channel	Power	NOTE
CPICH (antenna 1)	CPICH_Ec1/Ior = -13 dB	1. Total CPICH_Ec/Ior = -10 dB
CPICH (antenna 2)	CPICH_Ec2/Ior = -13 dB	
PCCPCH (antenna 1)	PCCPCH_Ec1/Ior = -15 dB	1. STTD applied
PCCPCH (antenna 2)	PCCPCH_Ec2/Ior = -15 dB	1. STTD applied, total 1. PCCPCH_Ec/Ior = -12 dB
SCH (antenna 1 / 2)	SCH_Ec/Ior = -12 dB	1. TSTD applied
PICH (antenna 1)	PICH_Ec1/Ior = -18 dB	1. STTD applied 2. STTD applied, total PICH_Ec/Ior = -15 dB
PICH (antenna 2)	PICH_Ec2/Ior = -18 dB	
DPCH	Test dependent power	1. Total power from both antennas
OCNS	Necessary power so that total transmit power spectral density of BS (Ior) adds to one	1. This power shall be divided equally between antennas

Annex D (normative): Environmental conditions

D.1 General

This normative annex specifies the environmental requirements of the UE. Within these limits the requirements of the present documents shall be fulfilled.

D.2 Environmental requirements

The requirements in this clause apply to all types of UE(s).

D.2.1 Temperature

The UE shall fulfil all the requirements in the full temperature range of:

Table D.1

+15°C to +35°C	for normal conditions (with relative humidity of 25 % to 75 %)
-10°C to +55°C	for extreme conditions (see IEC publications 68-2-1 and 68-2-2)

Outside this temperature range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 25.101 for extreme operation.

D.2.2 Voltage

The UE shall fulfil all the requirements in the full voltage range, i.e. the voltage range between the extreme voltages.

The manufacturer shall declare the lower and higher extreme voltages and the approximate shutdown voltage. For the equipment that can be operated from one or more of the power sources listed below, the lower extreme voltage shall not be higher, and the higher extreme voltage shall not be lower than that specified below.

Table D.2

Power source	Lower extreme voltage	Higher extreme voltage	Normal conditions voltage
AC mains	0,9 * nominal	1,1 * nominal	nominal
Regulated lead acid battery	0,9 * nominal	1,3 * nominal	1,1 * nominal
Non regulated batteries: Leclanché / lithium Mercury/nickel & cadmium	 0,85 * nominal 0,90 * nominal	 Nominal Nominal	 Nominal Nominal

Outside this voltage range the UE if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 25.101 for extreme operation. In particular, the UE shall inhibit all RF transmissions when the power supply voltage is below the manufacturer declared shutdown voltage.

D.2.3 Vibration

The UE shall fulfil all the requirements when vibrated at the following frequency/amplitudes.

Table D.3

Frequency	ASD (Acceleration Spectral Density) random vibration
5 Hz to 20 Hz	0,96 m^2/s^3
20 Hz to 500 Hz	0,96 m^2/s^3 at 20 Hz, thereafter –3 dB/Octave

Outside the specified frequency range the UE, if powered on, shall not make ineffective use of the radio frequency spectrum. In no case shall the UE exceed the transmitted levels as defined in TS 25.101 for extreme operation

Annex F (informative): UE capabilities (FDD)

This annex provides the UE capabilities related to TS 25.101.

NOTES:

This annex shall be aligned with TR25.926, UE Radio Access Capabilities regarding FDD RF parameters. These RF UE Radio Access capabilities represent options in the UE, that require signalling to the network.

In addition there are options in the UE that do not require any signalling. They are designated as UE baseline capabilities, according to TR 21.904, Terminal Capability Requirements.

Table F.1 provides the list of UE radio access capability parameters and possible values for TS 25.101.

Table F.1: RF UE Radio Access Capabilities

Table F.1: RF UE Radio Access Capabilities	**UE radio access capability parameter**	**Value range**
FDD RF parameters	UE power class (TS 25.101, subclause 6.2.1)	3, 4
	Tx/Rx frequency separation for frequency band a) (TS 25.101, subclause 5.3) Not applicable if UE is not operating in frequency band a)	190 MHz, 174.8-205.2 MHz, 134.8-245.2 MHz

Table F.2 provides the UE baseline imple^{2}mentation capabilities for TS 25.101.

Table F.2: UE RF Baseline Implementation Capabilities

UE implementation capability	**Value range**
Radio frequency bands (25.101 subclause 5.2)	a), b), a+b)

Annex G (informative): Change history

Document history		
V3.0.0	October 1999	
V3.1.0	December 1999	
V3.2.1	March 2000	

Inclusion of CRs approved by TSG-RAN#6.

Doc-1st-Level	Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version New
RP-99772	25.101	001	2	R99	Correction of UE Measurement Channels Rev.2	F	3.0.0	3.1.0
RP-99772	25.101	003		R99	Modifications for Receiver Characteristics	F	3.0.0	3.1.0
RP-99772	25.101	004		R99	Corrections to Tx Diversity testing assumptions	F	3.0.0	3.1.0
RP-99771	25.101	005		R99	UE DL performance requirements	D	3.0.0	3.1.0
RP-99772	25.101	006	1	R99	Corrections to Annex C Down link Physical Channels	F	3.0.0	3.1.0
RP-99772	25.101	007		R99	Proposal for ACLR/ACS specifications for class 3	F	3.0.0	3.1.0
RP-99773	25.101	008		R99	Addition of propagation condition to inner and outer loop PC tests in downlink	B	3.0.0	3.1.0
RP-99772	25.101	009		R99	Clarification of Uplink inner loop power control requirements	C	3.0.0	3.1.0

RP-99773	25.101	010		R99	Modifications to demodulation test parameters and requirements in inter-cell soft handover	B	3.0.0	3.1.0
RP-99772	25.101	011		R99	Power setting of DPCH	C	3.0.0	3.1.0
RP-99771	25.101	012		R99	Editorial changes to 25.101v3.0.0	D	3.0.0	3.1.0
RP-99826	25.101	013		R99	Update of UE RF capabilities	F	3.0.0	3.1.0
RP-99772	25.101	014		R99	Update of ITU Region 2 Specific Specifications and proposed universal channel numbering	C	3.0.0	3.1.0
RP-99772	25.101	015		R99	Performance requirements for demodulation of DCH in Site Selection Diversity Transmission mode for Subclause 8.6.3 of 25.101v3.0.0	F	3.0.0	3.1.0
RP-99830	25.101	016	1	R99	Change of propagation conditions	F	3.0.0	3.1.0
RP-99772	25.101	017		R99	CR for minimum requirements for UE power class 1 and 2 in 25.101	F	3.0.0	3.1.0
RP-99772	25.101	018		R99	Downlink Inner loop power control	C	3.0.0	3.1.0
RP-99773	25.101	019		R99	Performance requirements in downlink compressed mode	B	3.0.0	3.1.0

Inclusion of CRs approved by TSG-RAN#7.

RAN doc	Spec	CR	Rev	Phase	Subject	Cat	Current	New
RP-000015	25.101	020		R99	Clarifications to measurement channels	F	3.1.0	3.2.0
RP-000015	25.101	021		R99	Power measurement definitions for wanted signal (in-channel signal)	D	3.1.0	3.2.0

RP-000015	25.101	022		R99	Change of propagation conditions for Case 2	F	3.1.0	3.2.0
RP-000015	25.101	023		R99	Editorial corrections	D	3.1.0	3.2.0
RP-000015	25.101	024		R99	Birth-Death tap delays	F	3.1.0	3.2.0
RP-000015	25.101	025		R99	Out-of-synchronisation handling of the UE	C	3.1.0	3.2.0
RP-000015	25.101	026		R99	UE Modulation performance requirements	F	3.1.0	3.2.0
RP-000015	25.101	027		R99	Measurement channel for UE PCDE test	F	3.1.0	3.2.0
RP-000015	25.101	028		R99	CR for performance requirement of BTFD	F	3.1.0	3.2.0
RP-000015	25.101	029		R99	CPCH	B	3.1.0	3.2.0
RP-000015	25.101	030		R99	Clarification of ACLR	D	3.1.0	3.2.0
RP-000015	25.101	031		R99	Correction for reference measurement channel in TS 25.101	F	3.1.0	3.2.0
RP-000015	25.101	032		R99	Modifications to requirements for power control steps in uplink	F	3.1.0	3.2.0
RP-000015	25.101	033		R99	Performance requirement	F	3.1.0	3.2.0
RP-000015	25.101	034		R99	Power Control in downlink, constant BLER target	F	3.1.0	3.2.0
RP-000015	25.101	035		R99	UE Minimum TX power change	F	3.1.0	3.2.0
RP-000015	25.101	036		R99	Performance requirements for demodulation of DCH in Site Selection Diversity Transmission mode	F	3.1.0	3.2.0
RP-000015	25.101	037		R99	Reference compressed mode patterns	F	3.1.0	3.2.0

RP-000015	25.101	038		R99	384kbps measurement channel is replaced with 10ms TTI	F	3.1.0	3.2.0
RP-000015	25.101	039		R99	Modification to the handling of measurement equipment uncertainty	F	3.1.0	3.2.0
					Correction to figure A6		3.2.0	3.2.1
					Correction to version number in title/header (April 2000)		3.2.1	3.2.2

History

Document history		
V3.2.2	April 2000	Publication