TSG-RAN Meeting #9
Hawaii, US, 20 - 22 September 2000

TSGRP#9(00)0394

Title: **Agreed CRs to TS 25.101**

Source: **TSG-RAN WG4**

Agenda item: **5.4.3**

Tdoc Num	TS	CR number	Title	TYPE	Status	Cur_Ver	New_Ver
R4-000542	25.101	71	Downlink power control, wind up effects	F	agreed	3.3.1	3.4.0
R4-000550	25.101	72	Inclusion of OCNS definition for performance tests	F	agreed	3.3.1	3.4.0
R4-000553	25.101	63	Corrections to DL compressed mode tests in TS 25.101	F	agreed	3.3.1	3.4.0
R4-000554	25.101	64	Combining of TPC commands in soft handover	F	agreed	3.3.1	3.4.0
R4-000560	25.101	65	Clarifications for power steps in RACH/CPCH message transmission	F	agreed	3.3.1	3.4.0
R4-000561	25.101	66	Editorial corrections for TS 25.101	F	agreed	3.3.1	3.4.0
R4-000595	25.101	67	Corrections to power control	F	agreed	3.3.1	3.4.0
R4-000657	25.101	68	Corrections for compressed mode patterns	F	agreed	3.3.1	3.4.0
R4-000665	25.101	69	Editorial modification for BTFD measurement channels	F	agreed	3.3.1	3.4.0
R4-000691	25.101	75	Editorial modification to Annex A.5 of TS 25.101	F	agreed	3.3.1	3.4.0
R4-000693	25.101	76	Tap magnitudes and phases for Birth-Death propagation conditions	F	agreed	3.3.1	3.4.0
R4-000700	25.101	73	Removal of confidence levels	F	agreed	3.3.1	3.4.0
R4-000701	25.101	74	Corrections to all tests with power control ON in TS 25.101	F	agreed	3.3.1	3.4.0
R4-000728	25.101	70	Definition of period for frequency error	F	agreed	3.3.1	3.4.0
R4-000762	25.101	77	UE emission mask measurement filter definition correction for TS 25.101	F	agreed	3.3.1	3.4.0
R4-000775	25.101	78	Handling of measurement uncertainties in UE radio conformance testing (FDD)	F	agreed	3.3.1	3.4.0

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-25

Subject: Corrections to DL compressed mode tests in TS 25.101

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Compressed mode tests in TS 25.101 are missing values for some parameters and requirements.

Clauses affected: 8.9

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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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) and transmitted DPCH_Ec/Ior power in the downlink.

The compressed mode parameters are given in clause A.5. Tests 1 and 2 are using Set 1 compressed mode pattern parameters from Table A.21 in clause A.5 while tests 3 and 4 are using Set 2 compressed mode patterns from the same table.

8.9.1.1 Minimum requirements

For the parameters specified in Table 8.35 the downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value in Table 8.36 and the measured quality on DTCH shall be as required in Table 8.36.

Downlink power control is ON during the test. Uplink TPC commands shall be error free. System simulator shall increase the transmitted power during compressed frames by the same amount that UE is expected to increase its SIR target during those frames.

Table 8.35: Test parameter for downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Delta SIR1	dB	0		0	[3]
Delta SIR after1	dB	0		0	[3]
Delta SIR2	dB	0	0	0	0
Delta SIR after2	dB	0	0	0	0
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2			
Propagation condition		Case 2			
Target quality value on DTCH	BLER	0.01			

Table 8.36: Requirements in downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{DPCH_E_c}{I_{or}}$	dB			[-15.5]	No requirements
Measured quality of compressed and recovery frames	BLER			No requirements	<0.001
Measured quality on DTCH	BLER	0.01 ± 30 %			
Confidence level for measured quality and DPCH_Ec/Ior	%	[90]			

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-14

Subject: Combining of TPC commands in soft handover

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: A correction has been made to the RAN WG1 specification TS25.214.

Clauses affected: 8.7.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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8.7 Demodulation in Handover conditions

8.7.1 Demodulation of DCH in Inter-Cell Soft Handover

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 8.25 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.26.

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

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
$\hat{I}_{or1}/I_{oc}$ 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 8.26: 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}

8.7.2 Combining of TPC commands ~~not known to be the same~~from radio links of different radio link sets

8.7.2.1. Minimum requirement

Test parameters are specified in Table 8.27. The delay profiles of the signals received from the different cells are the same but time-shifted by 10 chips.

For Test 1, the uplink power changes between adjacent slots shall be as shown in Table 8.28 over the 4 consecutive slots. Note that this case is without an additional noise source I_{oc}.

For Test 2, the Cell1 and Cell2 TPC patterns are repeated ~~15~~ a number of times. ~~i.e., over 4 frames. Transmitted power of UE in relative uplink slots is recorded.~~ If the transmitted power of a given slot is increased compared to ~~a~~ the previous slot, then a variable "Transmitted power UP" is increased by one, otherwise a variable "Transmitted power DOWN" is increased by one. The requirements for "Transmitted power UP" and "Transmitted power DOWN" are shown in Table 8.~~28~~29. ~~Note that test is done without additional noise source Ioc.~~

Table 8.27: Parameters for TPC command combining ~~(Static conditions)~~

Parameter	Unit	Test 1	Test 2
~~Initial power in uplink~~	~~dBm~~	~~-5~~	
Phase reference	-	P-CPICH	
DPCH_Ec/Ior	dB	-12	
~~I_{or1}~~ $\hat{I}_{or1}$ and ~~I_{or2}~~ $\hat{I}_{or2}$	dBm/3.84 MHz	-60	
I_{oc}	dBm/3.84 MHz	-	-60
Power-Control-Algorithm	-	Algorithm 1	
Cell 1 TPC commands over 4 slots	-	{0,0~~,~~1~~,~~1}	
Cell 2 TPC commands over 4 slots	-	{0,1,0,1}	
Information data Rate	kbps	12.2	
Propagation condition	-	Static without AWGN source I_{oc}	Multi-path fading case 3

Table 8.28: Requirements for Test 1

Test Number	Required power changes over the 4 consecutive slots
1	Down, Down, Down, Up

Table 8.~~28~~29: ~~Test r~~Requirements for ~~TPC command combining~~Test 2

Test Number	Ratio (Transmitted power UP) / (Total number of slots)	Ratio (Transmitted power DOWN) / (Total number of slots)
~~1~~2	~~[~~≥0.25~~15]~~	~~[~~≥0.5~~30]~~

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 . If a BLER target has been assigned to a DCCH (See Annex A.3), then it has to be such that outer loop is based on DTCH and not on DCCH.

8.8.1 Power control in the downlink, constant BLER target

8.8.1.1 Minimum requirements

For the parameters specified in Table 8.~~29~~ 30 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.~~30~~31. Power control in downlink is ON during the test.

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: Nokia **Date:** 2000-08-22

Subject: Clarifications for power control steps in RACH/CPCH message transmission

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change:

- Rounding rules are missing for total transmitted power in case of RACH/CPCH message transmission.
- It is clarified that power step can be also negative in case of RACH/CPCH message transmission

Clauses affected: 6.5.2

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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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 compressed 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, excluding any transient periods, 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 compressed mode.

6.5.2.1 Minimum requirement

The transmit power levels versus time shall meet the mask specified in figure 6.2 for PRACH preambles, and the mask in figure 6.3 for all other cases. 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/CPCH: Open loop accuracy (Table 6.3).
- During preamble ramping of the RACH/CPCH, and between final RACH/CPCH preamble and RACH/CPCH message part: Accuracy depending on size of the required power difference.(Table 6.7). The step in total transmitted power between final RACH/CPCH preamble and RACH/CPCH message (control part + data part) shall be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greater magnitude.
- After transmission gaps in compressed mode: Accuracy as in Table 6.9.
- Power step to Maximum Power: Maximum power accuracy (Table 6.1).

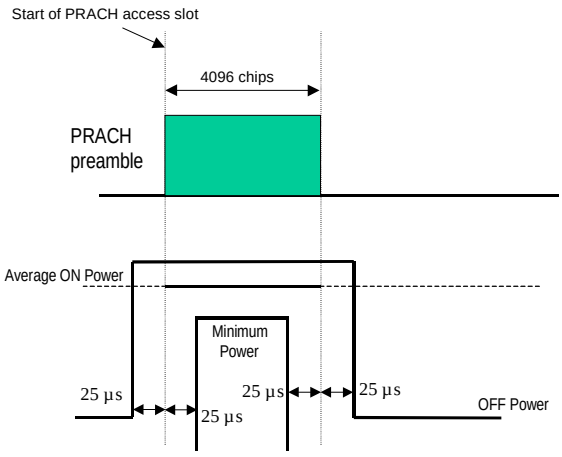

Figure 6.2: Transmit ON/OFF template for PRACH preambles

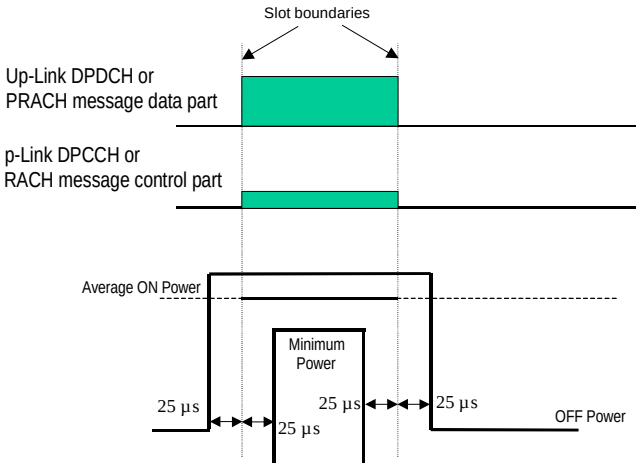

Figure 6.3: Transmit ON/OFF template for all other On/Off cases

Table 6.7: Transmitter power difference tolerance for RACH/CPCH preamble ramping, and between final RACH/CPCH preamble and RACH/CPCH message part

Power ~~difference~~ step size (Up or down)* ΔP [dB]	Transmitter power difference tolerance [dB]
0	+/- 1 dB
1	+/- 1 dB
2	+/- 1.5 dB
3	+/- 2 dB
4 ≤ ΔP ≤ 10	+/- 2.5 dB
11 ≤ ΔP ≤ 15	+/- 3.5 dB
16 ≤ ΔP ≤ 20	+/- 4.5 dB
21 ≤ ΔP	+/- 6.5 dB

Note *: Power step size for RACH/CPCH preamble ramping is from 1 to 8 dB with 1 dB steps.

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 step in total transmitted power (DPCCH + DPDCH) shall then be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greater magnitude. The accuracy of the power step, given the step size, is specified in Table 6.8. The power change due to a change in TFC is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, not including the transient duration. The transient duration is from 25μs before the slot boundary to 25μs after the slot boundary. The 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.

Table 6.8: Transmitter power step tolerance

Power step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
0	+/- 0.5 dB
1	+/- 0.5 dB
2	+/- 1.0 dB
3	+/- 1.5 dB
4 ≤ ΔP ≤ 10	+/- 2.0 dB
11 ≤ ΔP ≤ 15	+/- 3.0 dB
16 ≤ ΔP ≤ 20	+/- 4.0 dB
21 ≤ ΔP	+/- 6.0 dB

The transmit power levels versus time shall meet the mask specified in Figure 6.4.

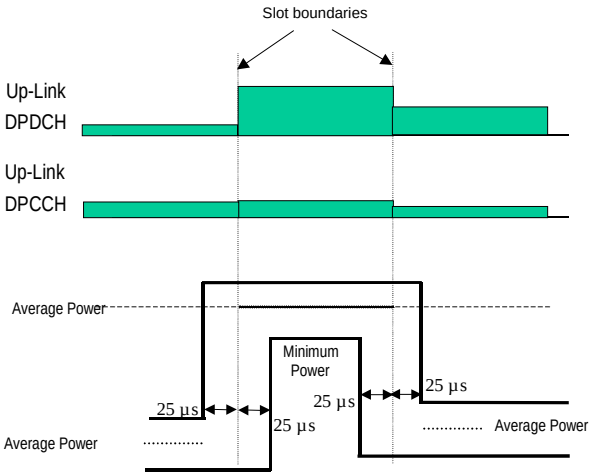

Figure 6.4: Transmit template during TFC change

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-31

Subject: Editorial corrections for TS 25.101

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Some editorial corrections are needed for TS 25.101.

Clauses affected: Cover Page, Contents, 3.2, 5.2, 6.3, 6.7, 7.2, 8.2.1, 8.2.2, 8.6, 8.6.3, 8.6.3.1, 8.7.1, Annex C

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications	X	→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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3G TS 25.101 V3.3.1 (2000-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Radio Access Networks;
UE Radio Ttransmission and Reception (FDD)
(Release 1999)

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Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
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Foreword

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

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

Version x.y.z

where:

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

1 Scope

The present document 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.
- For a non-specific reference, the latest version applies.

[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
DPCCH	Dedicated Physical Control Channel
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 Node B ~~BS~~ antenna connector.
DPDCH	Dedicated Physical Data Channel
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 Duplex~~ing~~
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, which are not defined in a test procedure) as measured at the UE antenna connector.
I_{or}	The total transmit power spectral density of the down link at the Node B ~~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.~~
Node B	A logical node responsible for radio transmission / reception in one or more cells to/from the User Equipment. Terminates the Iub interface towards the RNC
OCNS	Orthogonal Channel Noise Simulator, a mechanism used to simulate the users or control signals on the other orthogonal channels of a downlink ~~Forward~~ link.
$OCNS_E_c$	Average energy per PN chip for the OCNS.
~~$OCNS_E_c$~~	The ratio of the average transmit energy per PN chip for the OCNS to the total transmit power spectral density.
P-CCPCH	Primary Common Control Physical Channel

PCH	Paging Channel
$P-CCPCH\ \frac{E_c}{I_o}$	The ratio of the received P-CCPCH energy per chip to the total received power spectral density at the UE antenna connector.
$\frac{P-CCPCH_E_c}{I_{or}}$	The ratio of the average transmit energy per PN chip for the P-CCPCH to the total transmit power spectral density.
P-CPICH	Primary Common Pilot Channel
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
$S-CCPCH$	Secondary Common Control Physical Channel.
$S-CCPCH_E_c$	Average energy per PN chip for S-CCPCH.
SIR	Signal to Interference ratio
SSDT	Site Selection Diversity Transmission
STTD	Space Time Transmit Diversity
TDD	Time Division Duplexing
TFC	Transport Format Combination
TFCI	Transport Format Combination Indicator
TPC	Transmit Power Control
TSTD	Time Switched Transmit Diversity
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~~ UE transmit, Node B ~~base~~ receive)
2110 – 2170 MHz: Down-link (Node B ~~Base~~ transmit, ~~mobile~~ UE receive)

(b)* 1850 – 1910 MHz: Up-link (~~Mobile~~ UE transmit, Node B ~~base~~ receive)
1930 – 1990 MHz: Down-link (Node B ~~Base~~ transmit, ~~mobile~~ UE 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 $\leq F_{uplink} \leq$ 3276.6 MHz where F_{uplink} is the uplink frequency in MHz
Downlink	$N_d = 5 * (F_{downlink}$ MHz)	0.0 MHz $\leq F_{downlink} \leq$ 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 Error

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

Table 6.2: Frequency Error

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 tolerance

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 TPC commands of the same duration.

The inner loop power step is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, not including the transient duration. The transient duration is from 25μs before the slot boundary to 25μs after the slot boundary. The 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

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 shall turn its power 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 Minimum 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 shall turn it on are defined by the parameters in Table 6.6 together with the DPCH power level as defined in Figure 6.1.

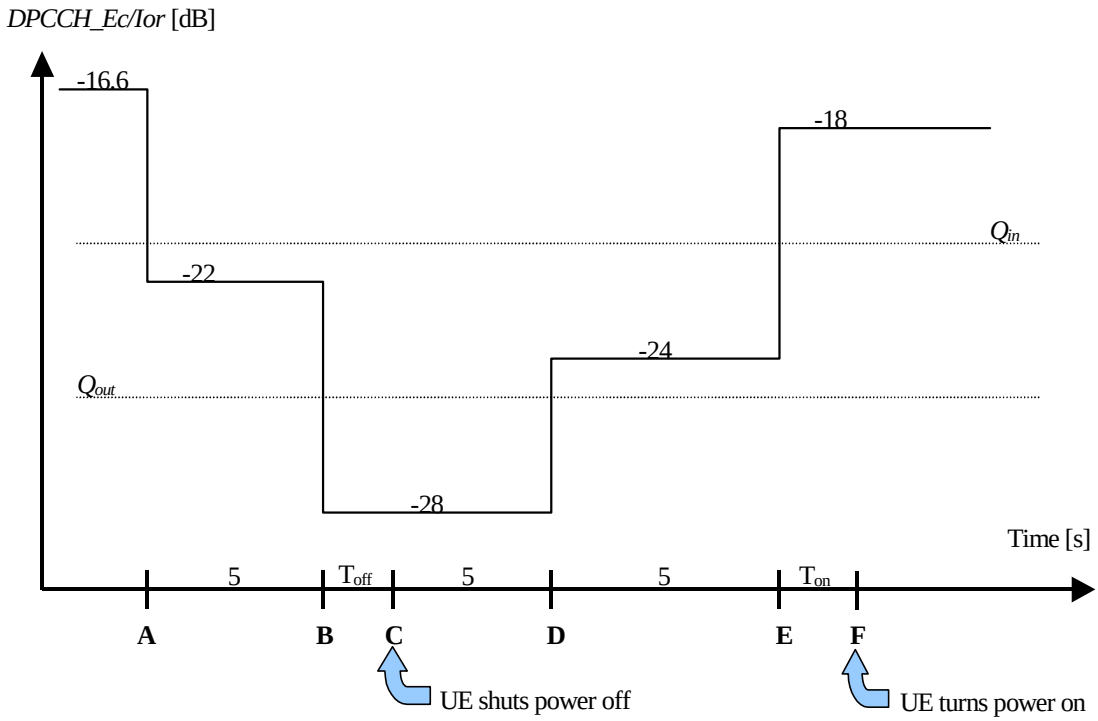

Figure 6.1: Conditions for out-of-synch handling in the UE. The indicated thresholds Q_{out} and Q_{in} are only informative

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 T_{off} = 200 ms after point B.
3. The UE shall not turn its transmitter on between points C and E.
4. The UE shall turn its transmitter on before point F, which is T_{on} = 200 ms 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 compressed 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, excluding any transient periods, 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 compressed mode.

6.5.2.1 Minimum requirement

The transmit power levels versus time shall meet the mask specified in figure 6.2 for PRACH preambles, and the mask in figure 6.3 for all other cases. 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 (Table 6.3).
- During preamble ramping of the RACH, and between final RACH preamble and RACH message part: Accuracy depending on size of the required power difference.(Table 6.7).
- After transmission gaps in compressed mode: Accuracy as in Table 6.9.
- Power step to Maximum Power: Maximum power accuracy (Table 6.1).

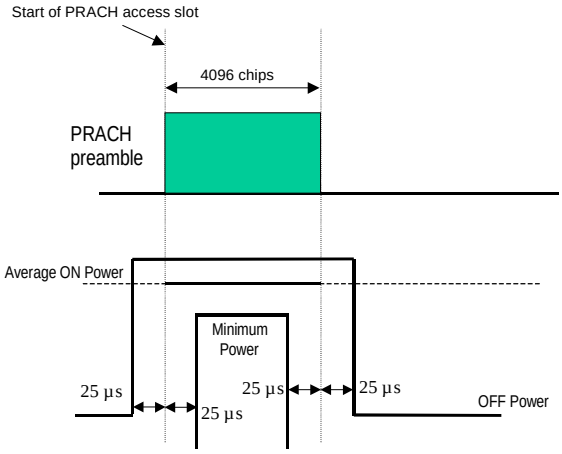

Figure 6.2: Transmit ON/OFF template for PRACH preambles

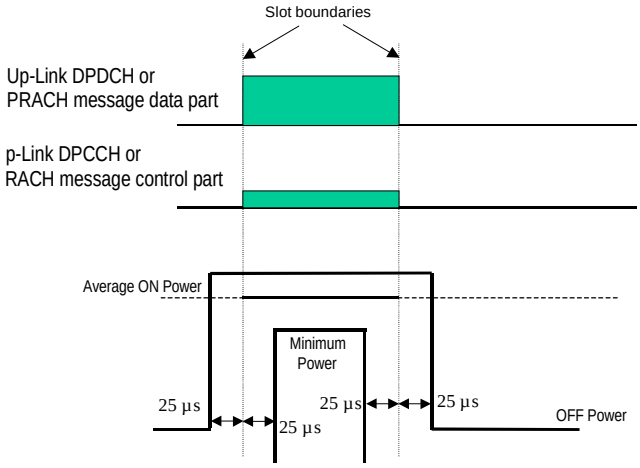

Figure 6.3: Transmit ON/OFF template for all other On/Off cases

Table 6.7: Transmitter power difference tolerance for RACH preamble ramping, and between final RACH preamble and RACH message part

Power difference size ΔP [dB]	Transmitter power difference tolerance [dB]
0	+/- 1 dB
1	+/- 1 dB
2	+/- 1.5 dB
3	+/- 2 dB
$4 \leq \Delta P \leq 10$	+/- 2.5 dB
$11 \leq \Delta P \leq 15$	+/- 3.5 dB
$16 \leq \Delta P \leq 20$	+/- 4.5 dB
$21 \leq \Delta P$	+/- 6.5 dB

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 step in total transmitted power (DPCCH + DPDCH) shall then be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greater magnitude. The accuracy of the power step, given the step size, is specified in Table 6.8. The power change due to a change in TFC is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, not including the transient duration. The transient duration is from 25μs before the slot boundary to 25μs after the slot boundary. The 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.

Table 6.8: Transmitter power step tolerance

Power step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
0	+/- 0.5 dB
1	+/- 0.5 dB
2	+/- 1.0 dB
3	+/- 1.5 dB
$4 \leq \Delta P \leq 10$	+/- 2.0 dB
$11 \leq \Delta P \leq 15$	+/- 3.0 dB
$16 \leq \Delta P \leq 20$	+/- 4.0 dB
$21 \leq \Delta P$	+/- 6.0 dB

The transmit power levels versus time shall meet the mask specified in Figure 6.4.

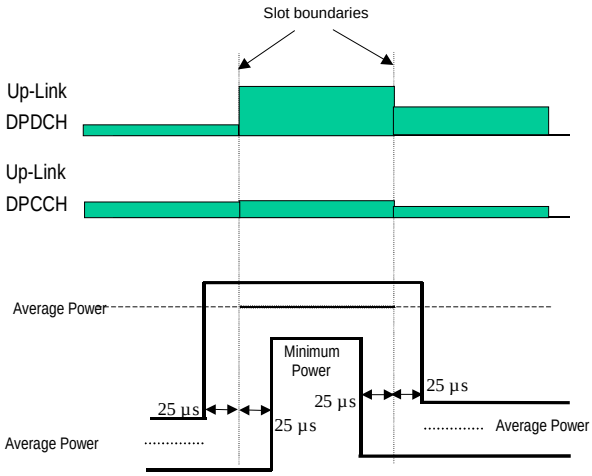

Figure 6.4: Transmit template during TFC change

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 during compressed mode, and immediately afterwards, shall be such that the power on the DPCCH follows the steps due to inner loop power control combined with additional steps of $10\text{Log}_{10}(N_{pilot.prev} / N_{pilot.curr})$ dB where $N_{pilot.prev}$ is the number of pilot bits in the previously transmitted slot, and $N_{pilot.curr}$ is the current number of pilot bits per slot.

The resulting step in total transmitted power (DPCCH +DPDCH) shall then be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greatest magnitude. The accuracy of the power step, given the step size, is specified in Table 6.8 in subclause 6.5.3.1. The power step is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, when neither the original timeslot nor the reference timeslot are in a transmission gap. The transient duration is not included, and is from 25µs before the slot boundary to 25µs after the slot boundary. 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.

In addition to any power change due to the ratio $N_{pilot.prev} / N_{pilot.curr}$, the average power of the DPCCH in the first slot after a compressed mode transmission gap shall differ from the average power in the last slot before the transmission gap by an amount Δ_{RESUME}, where Δ_{RESUME} is calculated as described in clause 5.1.2.3 of TS 25.214.

The resulting difference in the total transmitted power (DPCCH + DPDCH) shall then be rounded to the closest integer dB value. A power difference exactly half-way between two integer values shall be rounded to the closest integer of greatest magnitude. The accuracy of the resulting difference in the total transmitted power (DPCCH + DPDCH) after a transmission gap of up to 14 slots shall be as specified in Table 6.9.

Table 6.9: Transmitter power difference tolerance after a transmission gap of up to 14 slots

Tolerance on required difference in total transmitter power after a transmission gap
+/- 3 dB

The power difference is defined as the relative power difference between the average power of the original (reference) timeslot before the transmission gap and the average power of the target timeslot after the transmission gap, not including the transient durations. The transient durations at the start and end of the transmission gaps are each from 25µs before the slot boundary to 25µs after the slot boundary. 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 6.5

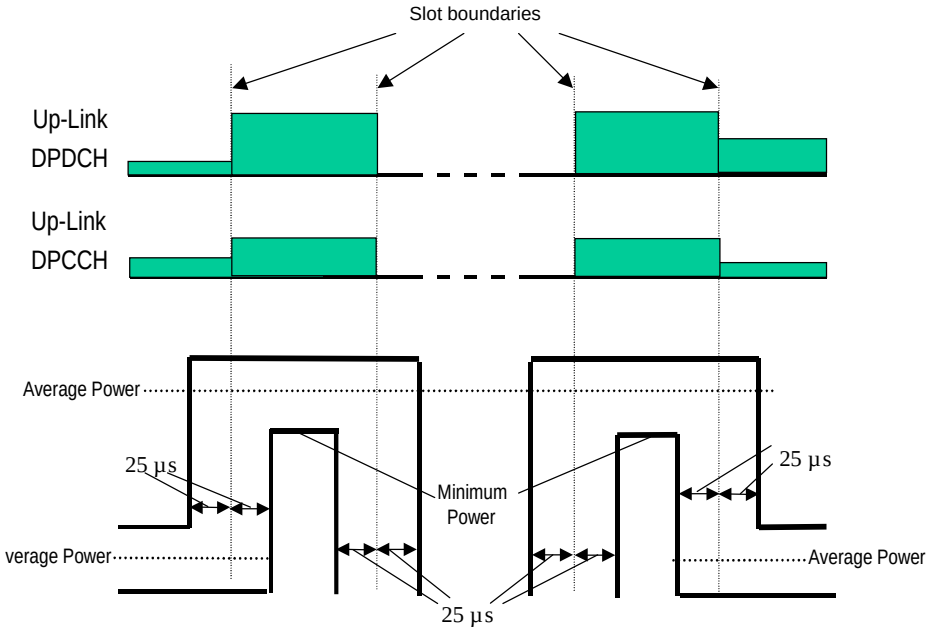

Figure 6.5: Transmit template during Compressed mode

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 6.10

Table 6.10: 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 6.11.

Table 6.11: 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 6.12: 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 6.13: 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 6.12 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 Node B ~~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 6.14.

Table 6.14: 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 6.15.

Table 6.15: 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 Peak Code Domain Error is computed by projecting power of the error vector (as defined in 6.8.2) onto the code domain at a specific spreading factor. The Code Domain Error for every code in the domain is defined as the ratio of the mean power of the projection onto that code, to the mean power of the composite reference waveform. This ratio is expressed in dB. The Peak Code Domain Error is defined as the maximum value for the Code Domain Error for all codes. 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 6.15 . The requirements are defined using the UL reference measurement channel specified in subclause A.2.5.

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 Node B ~~base station~~ and optionally in the ~~mobile stations~~UE. Possibility for downlink transmit diversity in the Node B ~~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. The OCNS interference consist of 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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

Note The I_{oac} (modulated) signal consist of common channels needed for tests and 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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

Note: $I_{blocking}$ (modulated) consist of common channels and 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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

Note: I_{ouw2} (modulated) consist of common channels and 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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.

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

Table 8.1: PCH parameters in static propagation conditions

Parameter	Unit	Value
Phase reference		P-CPICH
$\frac{DPCH_E_c}{I_{or}}$	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_E_b/N_t~~	~~dB~~	

Table 8.2: PCH requirement in static propagation conditions

~~PCH_E_b/N_t~~ TBD	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 8.3 the MER shall not exceed the piece-wise linear MER curve specified by the points in table 8.4.

Table 8.3: FACH parameters in static propagation conditions

Parameter	Unit	Value
Phase reference		P-CPICH
$\frac{DPCH_E_c}{I_{or}}$	dB	
$\frac{SCCPCH_E_c}{I_{or}}$	dB	
$\hat{I}_{or}/I_{oc}$	dB	-1
I_{oc}	dBm/3.84 MHz	-60
Control Data Rate	?	
~~$FACH_E_b/N_t$~~	~~dB~~	

Table 8.4: FACH requirements in static propagation conditions

~~$FACH_E_b/N_t$~~ TBD	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 8.5 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.6. These requirements are applicable for TFCS size 16.

Table 8.5: DCH parameters in static propagation conditions

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

Table 8.6: 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 8.7, 8.9 , 8.11 and 8.13 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.8, 8.10, 8.12 and 8.14. These requirements are applicable for TFCS size 16.

Table 8.7: Test Parameters for DCH in multi-path fading propagation conditions (Case 1)

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

Table 8.8: 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 8.9: DCH parameters in multi-path fading propagation conditions (Case 2)

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

Table 8.10: 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 8.11: DCH parameters in multi-path fading propagation conditions (Case 3)

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

Table 8.12: 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	-5.9 dB	10^{-1}
	-5.1 dB	10^{-2}
	-4.4 dB	10^{-3}

Table 8.13: DCH parameters in multi-path fading propagation conditions (Case 1) with S-CPICH

Parameter	Unit	Test 13	Test 14	Test 15	Test 16
Phase reference		S-CPICH			
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2	64	144	384

Table 8.14: DCH requirements in multi-path fading propagation conditions (Case 1) with S-CPICH

Test Number	$\frac{DPCH_E_c}{I_{or}}$	BLER
13	-15.0 dB	10^{-2}
14	-13.9 dB	10^{-1}
	-10.0 dB	10^{-2}
15	-10.6 dB	10^{-1}
	-6.8 dB	10^{-2}
16	-6.3 dB	10^{-1}
	-2.2 dB	10^{-2}

8.4 Demodulation of DCH in moving propagation conditions

8.4.1 Single link performance

The receive single link performance of the Dedicated 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 8.15 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.16.

Table 8.15: DCH parameters in moving propagation conditions

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

Table 8.16: 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 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 8.17 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.18.

Table 8.17: DCH parameters in birth-death propagation conditions

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

Table 8.18: DCH requirements in birth-death propagation conditions

Test Number	$\frac{DPCH_E_c}{I_{or}}$	BLER
1	-12.6 dB	10^{-2}
2	-8.7 dB	10^{-2}

8.6 Demodulation of DCH in downlink ~~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 8.19 the average downlink ~~$\frac{DPCH_E_c}{}$~~ power shall be below the specified value for the BLER shown in Table 8.20.

Table 8.19: Test parameters for DCH reception in an open loop transmit diversity scheme. (Propagation condition: Case 1)

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

Table 8.20: 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 8.21 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.22.

Table 8.21: 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 8.22: Test requirements for DCH reception in closed loop transmit diversity mode

Test Number	$\frac{DPCH_E_c}{I_{or}}$ (see note)	BLER
1	-18.0 dB	10^{-2}
2	-18.3 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 Node B ~~BS~~ emulators are required for this performance test. The delay profiles of signals received from different ~~base stations~~Node Bs are assumed to be the same but time shifted by 10 chip periods (2604 ns).

8.6.3.1 Minimum requirements

The downlink physical channels and their relative power to Ior are the same as those specified in clause C.3.2 irrespective of Node Bs ~~BSs~~ and the test cases. DPCH_Ec/Ior value applies whenever DPDCH in the cell is transmitted. In Test 1 and Test 3, the received powers at UE from two Node Bs ~~BSs~~ are the same, while 3dB offset is given to one that comes from one of Node Bs ~~BSs~~ for Test 2 and Test 4 as specified in Table 8.23.

For the parameters specified in Table 8.23 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.24.

Table 8.23: DCH parameters in multi-path propagation conditions during SSDT mode (Propagation condition: Case 1)

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
$\hat{I}_{or1}/I_{oc}$	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
Feedback error rate*	%	4	4	4	4
Number of FBI bits assigned to "S" Field		1	1	2	2
Code word Set		Long	Long	Short	Short

*NOTE: Feedback error rate is defined as FBI bit error rate

Table 8.24: 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 Demodulation of DCH in Inter-Cell Soft Handover

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~~ cells. A UE has to be able to demodulate two P-CCPCH channels and to combine the energy of DCH channels. Delay profiles of signals received from different ~~Base Stations~~ cells 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 8.25 the average downlink $\frac{DPCH_E_c}{}$ power shall be below the specified value for the BLER shown in Table 8.26.

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

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
$\hat{I}_{or1}/I_{oc}$ 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 8.26: 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}

8.7.2 Combining of TPC commands not known to be the same

8.7.2.1. Minimum requirement

Test parameters are specified in Table 8.27. Cell1 and Cell2 TPC patterns are repeated 15 times i.e., over 4 frames. Transmitted power of UE in relative uplink slots is recorded. If the transmitted power of a given slot is increased compared to a previous slot, then a variable "Transmitted power UP" is increased by one, otherwise a variable "Transmitted power DOWN" is increased by one. The requirements for "Transmitted power UP" and "Transmitted power DOWN" are shown in Table 8.28. Note that test is done without additional noise source Ioc.

Table 8.27: Parameters for TPC command combining (Static conditions)

Parameter	Unit	Test 1
Initial power in uplink	dBm	-5
DPCH_Ec/Ior	dB	-12
I_{or1} and I_{or2}	dBm/3.84 MHz	-60
Power-Control-Algorithm	-	Algorithm 1
Cell 1 TPC commands over 4 slots	-	{0,0.1.1}
Cell 2 TPC commands over 4 slots	-	{0,1,0,1}
Information data Rate	kbps	12.2

Table 8.28: Test requirements for TPC command combining

Test Number	Transmitted power UP	Transmitted power DOWN
1	[≥15]	[≥30]

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 . If a BLER target has been assigned to a DCCH (See Annex A.3), then it has to be such that outer loop is based on DTCH and not on DCCH.

8.8.1 Power control in the downlink, constant BLER target

8.8.1.1 Minimum requirements

For the parameters specified in Table 8.29 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.30. Power control in downlink is ON during the test.

Table 8.29: 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 8.30: 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	0.01±30%	0.01±30%
Confidence level for measured quality and $\frac{DPCH_E_c}{I_{or}}$	%	90	

8.8.2 Power control in the downlink, initial convergence

This requirement verifies that DL power control works properly during the first seconds after DPCH connection is established

8.8.2.1 Minimum requirements

For the parameters specified in Table 8.31 the downlink DPCH_Ec/Ior power, which is averaged over [50 ms], shall be within the range specified in Table 8.32. T1 equals to [500 ms] and it starts [10 ms] after the DPDCH connection is initiated. T2 equals to [500 ms] and it starts when T1 has expired. Power control is ON during the test.

Table 8.31: Test parameters for downlink power control

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Target quality value on DTCH	BLER	0.01	0.01	0.1	0.1
Initial DPCH_Ec/Ior	dB	-5.9	-25.9	-2.1	-22.1
Information Data Rate	kbps	12.2	12.2	64	64
$\hat{I}_{or}/I_{oc}$	dB	-1			
I_{oc}	dBm/3.84 MHz	-60			
Propagation condition		[Static]			

Table 8.32: Requirements in downlink power control

Parameter	Unit	Test 1 and Test 2	Test 3 and Test 4
$\frac{DPCH_E_c}{I_{or}}$ during T1	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -11.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -8.1]
$\frac{DPCH_E_c}{I_{or}}$ during T2	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -14.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -11.1]
Confidence level for measured $\frac{DPCH_E_c}{I_{or}}$	%	[90]	

8.8.3 Power control in downlink, wind up effects

8.8.3.1 Minimum requirements

This test is run in three stages where stage 1 is for convergence of the power control loop, in stage two the maximum downlink power for the dedicated channel is limited not to be higher than the parameter specified in Table 8.33. All parameters used in the three stages are specified in Table 8.33. The $\frac{DPCH_E_c}{I_{or}}$ during stage 3 shall during 90 % of the time be lower than the value specified in Table 8.34. Power control of the UE is ON during the test.

Table 8.33: Test parameter for downlink power control, wind-up effects

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 3
Time in each stage	s	>15	5	0.5
$\hat{I}_{or}/I_{oc}$	dB	5		
I_{oc}	dBm/3.84 MHz	-60		
Information Data Rate	kbps	12.2		
Max downlink ~~$\frac{DPCH_E_c}{}$~~	dB	No limitation	[-15.7]	No limitation
Quality target on DTCH	BLER	0.01		
Propagation condition		Case 4		

Table 8.34: Requirements in downlink power control, wind-up effects

Parameter	Unit	Test 1, stage 3
$\frac{DPCH_E_c}{I_{or}}$	dB	[-12.9]
Confidence level for $\frac{DPCH_E_c}{I_{or}}$	%	[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) and transmitted DPCH_Ec/Ior power in the downlink.

The compressed mode parameters are given in clause A.5. Tests 1 and 2 are using Set 1 compressed mode pattern parameters from Table A.21 in clause A.5 while tests 3 and 4 are using Set 2 compressed mode patterns from the same table.

8.9.1.1 Minimum requirements

For the parameters specified in Table 8.35 the downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value in Table 8.36 and the measured quality on DTCH shall be as required in Table 8.36.

Downlink power control is ON during the test. Uplink TPC commands shall be error free. System simulator shall increase the transmitted power during compressed frames by the same amount that UE is expected to increase its SIR target during those frames.

Table 8.35: Test parameter for downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Delta SIR1	dB	0		0	
Delta SIR after1	dB	0		0	
Delta SIR2	dB	0	0	0	0
Delta SIR after2	dB	0	0	0	0
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2			
Propagation condition		Case 2			
Target quality value on DTCH	BLER	0.01			

Table 8.36: Requirements in downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{DPCH_E_c}{I_{or}}$	dB				
Measured quality on DTCH	BLER	0.01 ± 30 %			
Confidence level for measured quality and DPCH_Ec/Ior	%	[90]			

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 8.37 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.38.

Table 8.37: 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 8.38: 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	[-17.8 dB]	10^{-2}	10^{-4}
3	[-18.4 dB]	10^{-2}	10^{-4}
4	[-13.0 dB]	10^{-2}	10^{-4}
5	[-13.2 dB]	10^{-2}	10^{-4}
6	[-13.8 dB]	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 8.39) are sent during the call set up procedure, so that the UE has to detect the correct transport format from these 9 candidates.

Table 8.39: 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 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
P-CPICH
P-CCPCH
SCH
S-CCPCH
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~~Node B 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
P-CPICH	P-CPICH_Ec / DPCH_Ec = 7 dB
P-CCPCH	P-CCPCH_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
P-CPICH	P-CPICH_Ec/Ior = -10 dB	Use of P-CPICH or S-CPICH as phase reference is specified for each requirement and is also set by higher layer signalling.
S-CPICH	S-CPICH_Ec/Ior = -10 dB	When S-CPICH is the phase reference in a test condition, the phase of S-CPICH shall be 180 degrees offset from the phase of P-CPICH. When S-CPICH is not the phase reference, it is not transmitted.
P-CCPCH	P-CCPCH_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	When S-CPICH is the phase reference in a test condition, the phase of DPCH shall be 180 degrees offset from the phase of P-CPICH.
OCNS	Necessary power so that total transmit power spectral density of Node B ~~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
P-CPICH (antenna 1)	P-CPICH_Ec1/Ior = -13 dB	1. Total P-CPICH_Ec/Ior = -10 dB
P-CPICH (antenna 2)	P-CPICH_Ec2/Ior = -13 dB	
P-CCPCH (antenna 1)	P-CCPCH_Ec1/Ior = -15 dB	1. STTD applied 2. Total P-CCPCH_Ec/Ior = -12 dB
P-CCPCH (antenna 2)	P-CCPCH_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 Node B ~~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
P-CPICH (antenna 1)	P-CPICH_Ec1/Ior = -13 dB	1. Total P-CPICH_Ec/Ior = -10 dB
P-CPICH (antenna 2)	P-CPICH_Ec2/Ior = -13 dB	
P-CCPCH (antenna 1)	P-CCPCH_Ec1/Ior = -15 dB	1. STTD applied
P-CCPCH (antenna 2)	P-CCPCH_Ec2/Ior = -15 dB	1. ~~1.~~ STTD applied, 2. total ~~1.~~ P-CCPCH_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 Node B ~~BS~~ (Ior) adds to one	1. This power shall be divided equally between antennas

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CHANGE REQUEST

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25.101	CR	67	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN #9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-25

Subject: Corrections to power control

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change:

- Grammatical improvement
- CPCH power tolerances should be stated together with RACH.
- Editorial correction to diagrams to show averaging periods correctly

Clauses affected: 6.5

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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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 compressed 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 duration of at least a timeslot ~~duration,~~ excluding any transient periods, 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 compressed mode.

6.5.2.1 Minimum requirement

The transmit power levels versus time shall meet the mask specified in figure 6.2 for PRACH preambles and CPCH preambles, and the mask in figure 6.3 for all other cases. 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/CPCH: Open loop accuracy (Table 6.3).
- During preamble ramping of the RACH/CPCH, and between final RACH/CPCH preamble and RACH/CPCH message part: Accuracy depending on size of the required power difference.(Table 6.7).
- After transmission gaps in compressed mode: Accuracy as in Table 6.9.
- Power step to Maximum Power: Maximum power accuracy (Table 6.1).

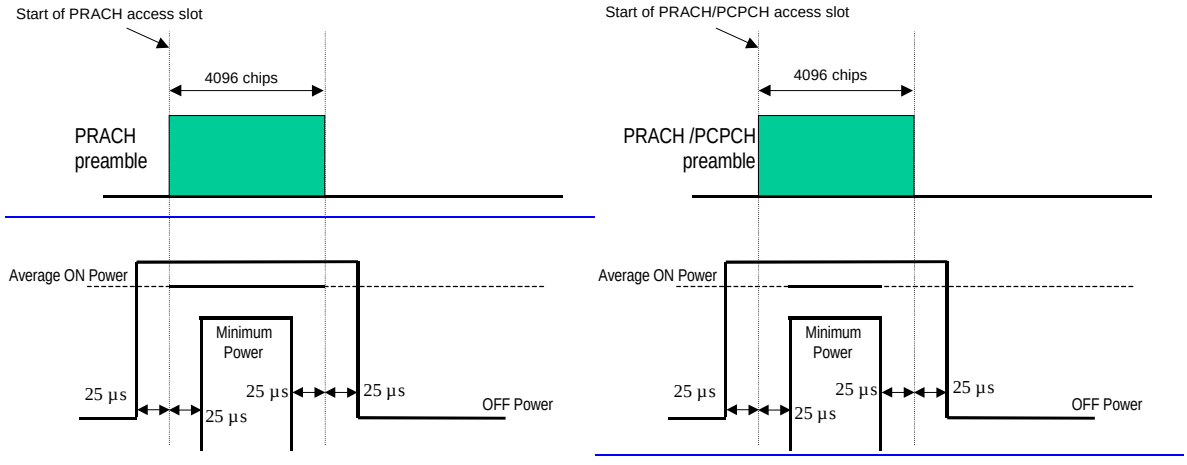

Figure 6.2: Transmit ON/OFF template for PRACH preambles and CPCH preambles

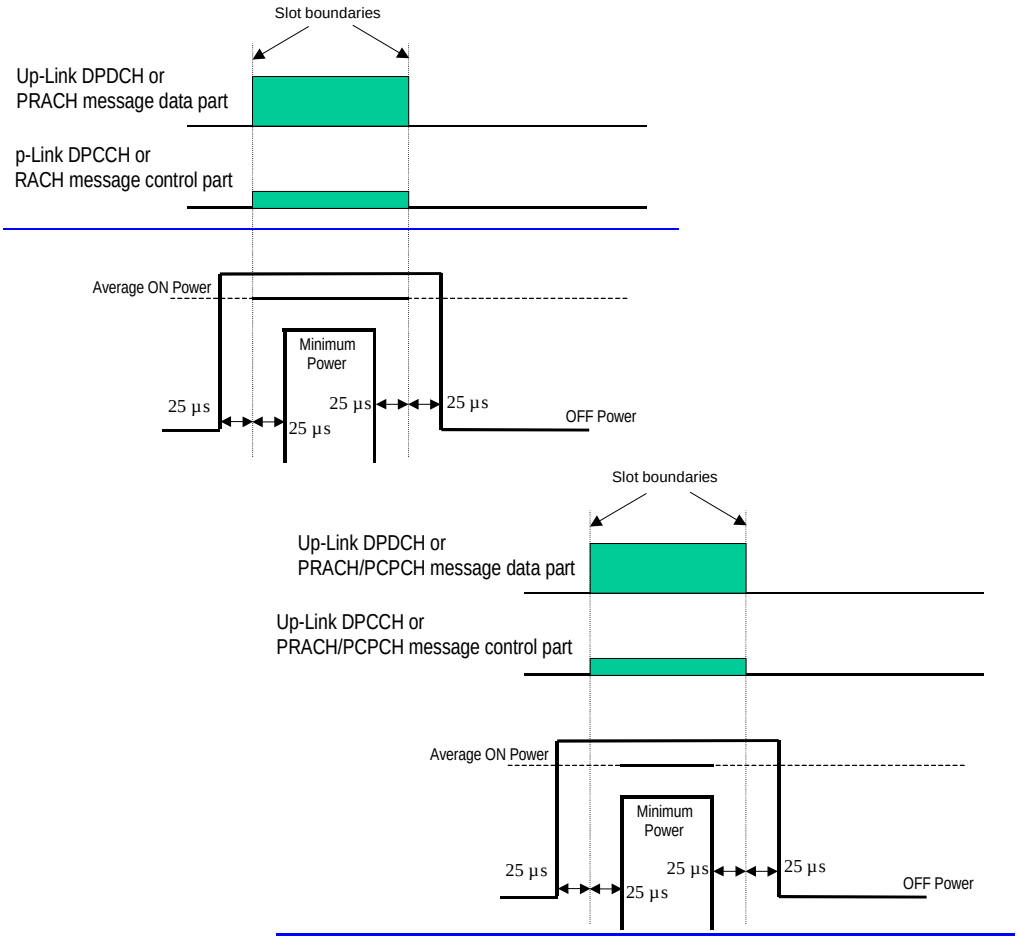

Figure 6.3: Transmit ON/OFF template for all other On/Off cases

Table 6.7: Transmitter power difference tolerance for RACH/CPCH preamble ramping, and between final RACH/CPCH preamble and RACH/CPCH message part

Power difference size ΔP [dB]	Transmitter power difference tolerance [dB]
0	+/- 1 dB
1	+/- 1 dB
2	+/- 1.5 dB
3	+/- 2 dB
4 ≤ ΔP ≤ 10	+/- 2.5 dB
11 ≤ ΔP ≤ 15	+/- 3.5 dB
16 ≤ ΔP ≤ 20	+/- 4.5 dB
21 ≤ ΔP	+/- 6.5 dB

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 step in total transmitted power (DPCCH + DPDCH) shall then be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greater magnitude. The accuracy of the power step, given the step size, is specified in Table 6.8. The power change due to a change in TFC is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, not including the transient duration. The transient duration is from 25μs before the slot boundary to 25μs after the slot boundary. The 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.

Table 6.8: Transmitter power step tolerance

Power step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
0	+/- 0.5 dB
1	+/- 0.5 dB
2	+/- 1.0 dB
3	+/- 1.5 dB
4 ≤ ΔP ≤ 10	+/- 2.0 dB
11 ≤ ΔP ≤ 15	+/- 3.0 dB
16 ≤ ΔP ≤ 20	+/- 4.0 dB
21 ≤ ΔP	+/- 6.0 dB

The transmit power levels versus time shall meet the mask specified in Figure 6.4.

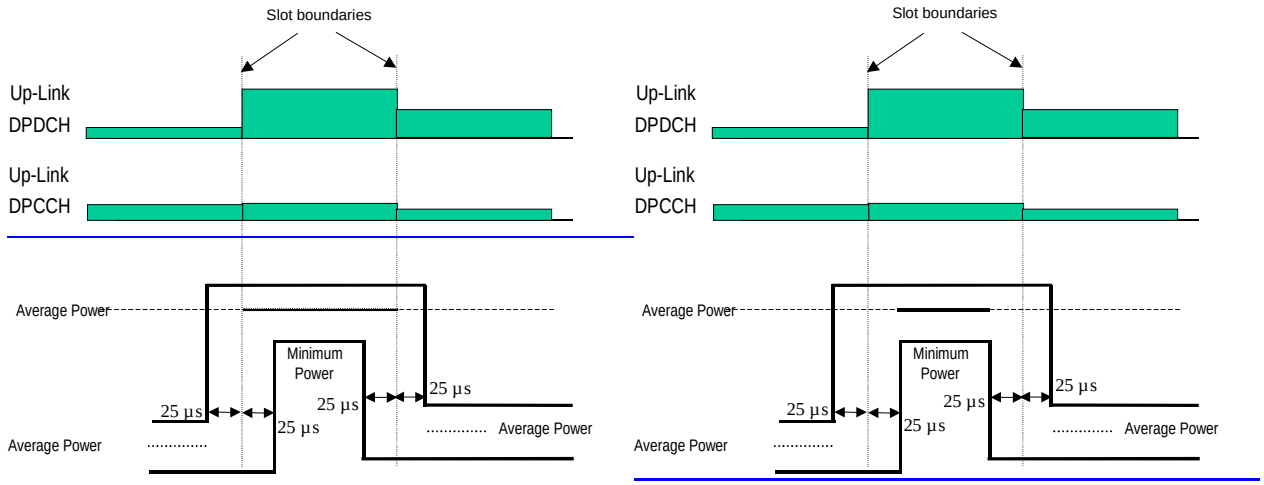

Figure 6.4: Transmit template during TFC change

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 during compressed mode, and immediately afterwards, shall be such that the power on the DPCCH follows the steps due to inner loop power control combined with additional steps of $10\text{Log}_{10}(N_{pilot.prev} / N_{pilot.curr})$ dB where $N_{pilot.prev}$ is the number of pilot bits in the previously transmitted slot, and $N_{pilot.curr}$ is the current number of pilot bits per slot.

The resulting step in total transmitted power (DPCCH +DPDCH) shall then be rounded to the closest integer dB value. A power step exactly half-way between two integer values shall be rounded to the closest integer of greatest magnitude. The accuracy of the power step, given the step size, is specified in Table 6.8 in subclause 6.5.3.1. The power step is defined as the relative power difference between the average power of the original (reference) timeslot and the average power of the target timeslot, when neither the original timeslot nor the reference timeslot are in a transmission gap. The transient duration is not included, and is from 25µs before the slot boundary to 25µs after the slot boundary. 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.

In addition to any power change due to the ratio $N_{pilot.prev} / N_{pilot.curr}$, the average power of the DPCCH in the first slot after a compressed mode transmission gap shall differ from the average power in the last slot before the transmission gap by an amount Δ_{RESUME}, where Δ_{RESUME} is calculated as described in clause 5.1.2.3 of TS 25.214.

The resulting difference in the total transmitted power (DPCCH + DPDCH) shall then be rounded to the closest integer dB value. A power difference exactly half-way between two integer values shall be rounded to the closest integer of greatest magnitude. The accuracy of the resulting difference in the total transmitted power (DPCCH + DPDCH) after a transmission gap of up to 14 slots shall be as specified in Table 6.9.

Table 6.9: Transmitter power difference tolerance after a transmission gap of up to 14 slots

Tolerance on required difference in total transmitter power after a transmission gap
+/- 3 dB

The power difference is defined as the relative power difference between the average power of the original (reference) timeslot before the transmission gap and the average power of the target timeslot after the transmission gap, not including the transient durations. The transient durations at the start and end of the transmission gaps are each from 25µs before the slot boundary to 25µs after the slot boundary. 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 6.5

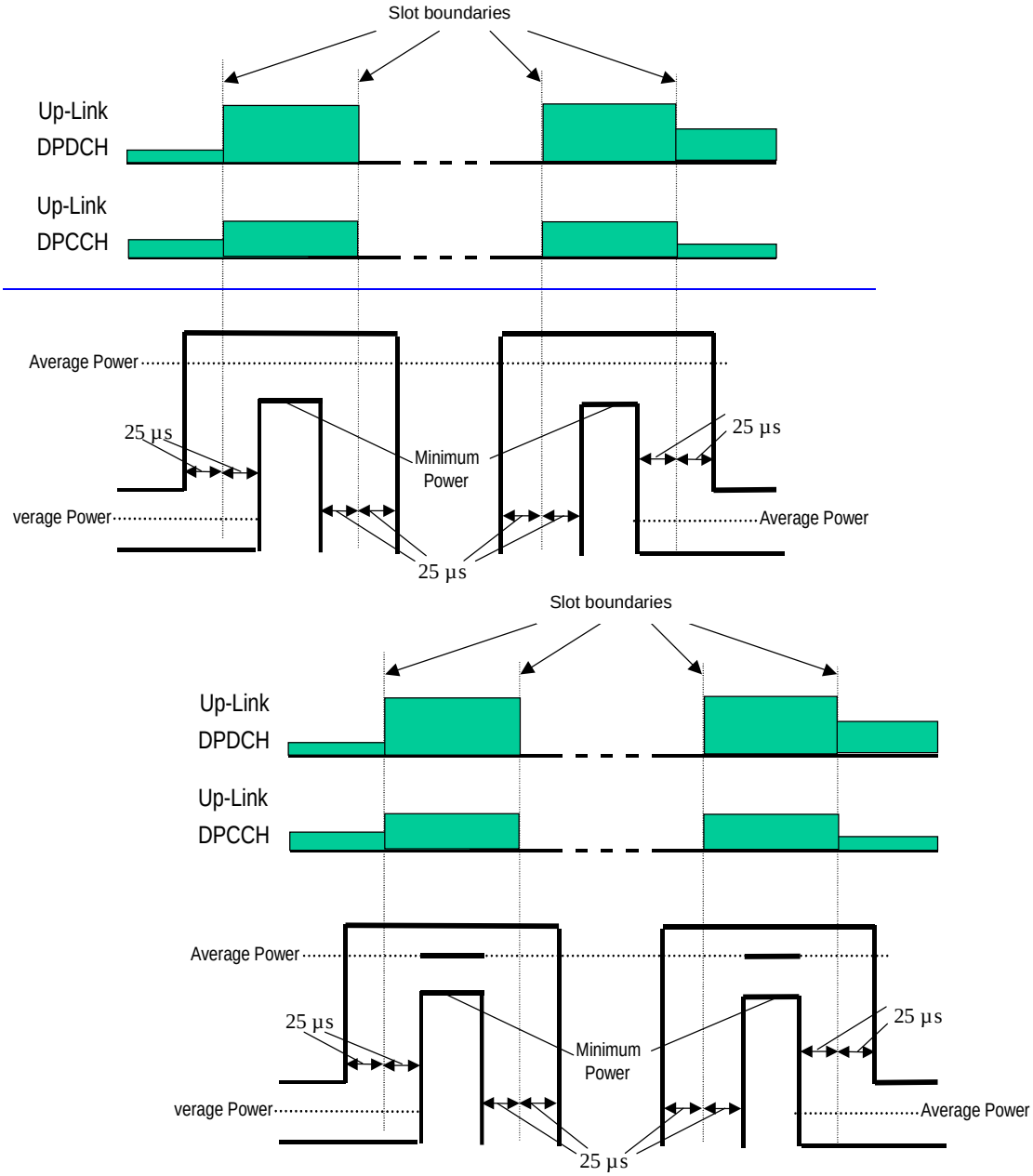

Figure 6.5: Transmit template during Compressed mode

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.

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25.101	CR	68	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-31

Subject: Correction for compressed mode patterns

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: TGD parameter should be changed to zero since only one gap is in use in all compressed mode patterns

Clauses affected: Annex A.5

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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A.5 DL reference compressed mode parameters

Parameters described in Table A.21 are used in some test specified in TS 25.101 while parameters described in Table A.22 are used in some tests specified in TS 25.133.

Set 1 parameters in Table A.21 are applicable when compressed mode by spreading factor reduction is used in downlink. Set 2 parameters in Table A.22 are applicable when compressed mode by puncturing is used in downlink.

Table A.21: Compressed mode reference pattern 1 parameters

Parameter	Set 1	Set 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)	0-	0-	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.22: Compressed mode reference pattern 2 parameters

Parameter	Set 1	Set 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)	0-	0135	
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	

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25.101	CR	69	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: *list expected approval meeting # here ↑*

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-04

Subject: Editorial modification for BTFD measurement channels

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[X]	**Release:**	Phase 2	[ ]
A	Corresponds to a correction in an earlier release	[ ]		Release 96	[ ]
B	Addition of feature	[ ]		Release 97	[ ]
C	Functional modification of feature	[ ]		Release 98	[ ]
D	Editorial modification	[ ]		Release 99	[X]
				Release 00	[ ]

Reason for change: In order to avoid a misinterpretation, this paper proposes to make an editorial modification for reference measurement channels for BTFD

Clauses affected: Annex A

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

A.4 DL reference measurement channel for BTFD performance requirements

The parameters for DL reference measurement channel for BTFD are specified in Table A.19 and Table A.20. The channel coding for information is shown in figures A.9, A.10, and A11.

Table A.19: 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.20: 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	100
Transport Block Set Size	244	159	39	100
Transmission Time Interval	20 ms			40 ms
Type of Error Protection	Convolution Coding			Convolution Coding
Coding Rate	1/3			1/3
Rate Matching attribute	256			256
Size of CRC	12			12
Position of TrCH in radio frame	fixed			fixed

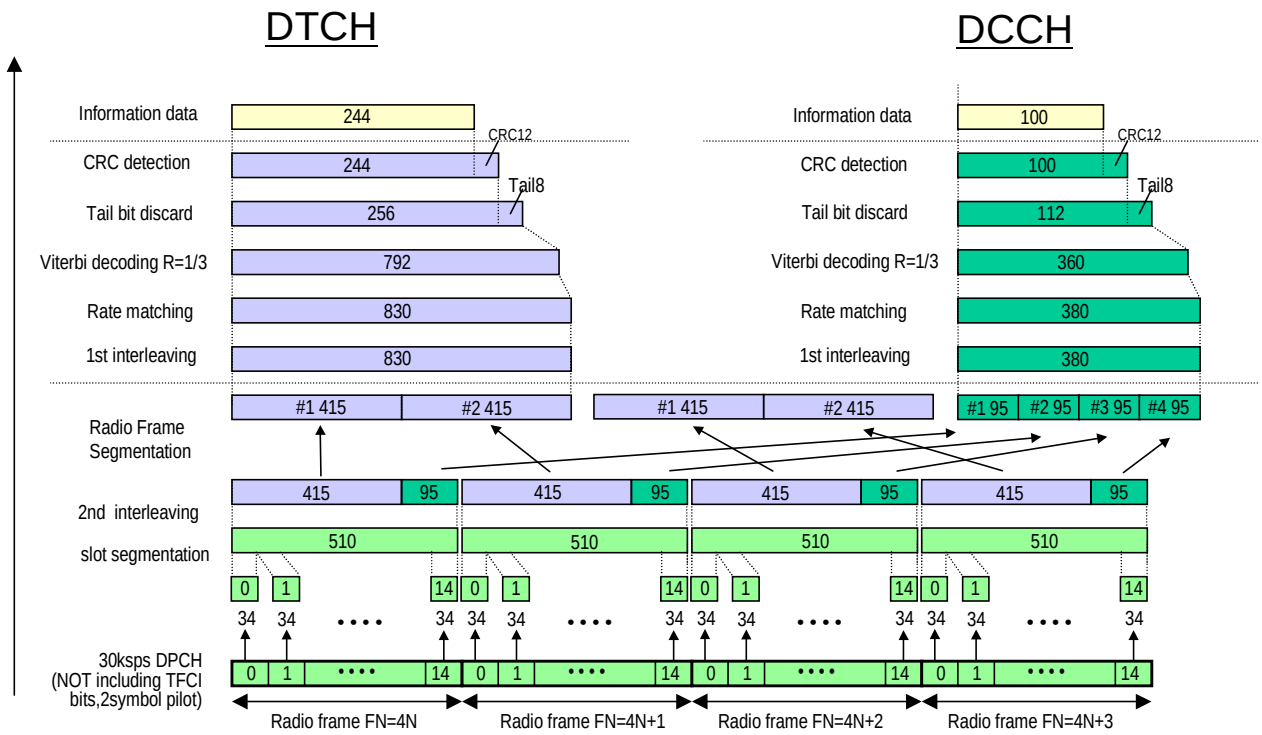

Figure A.9 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 1)

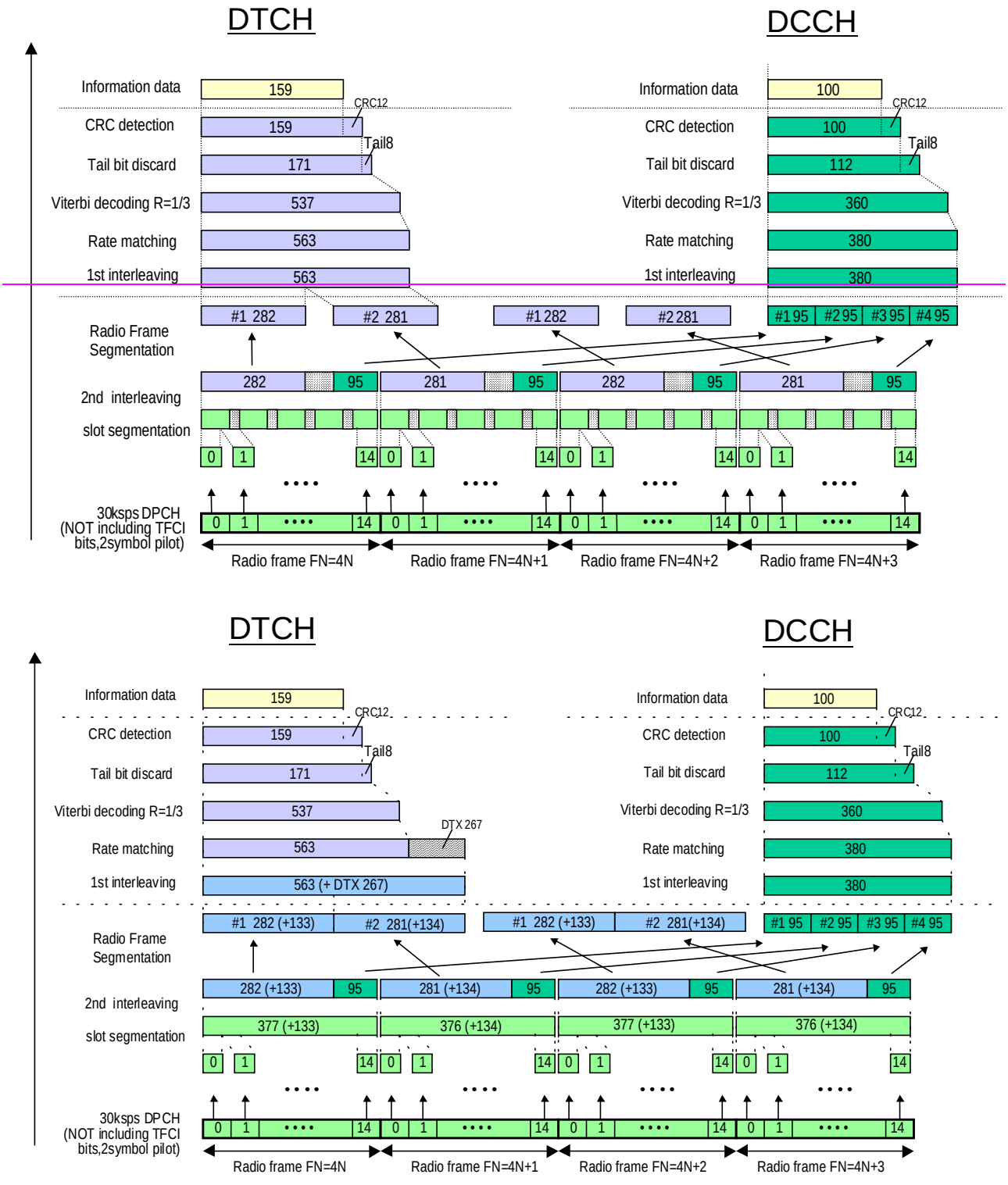

Figure A.10 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 2)

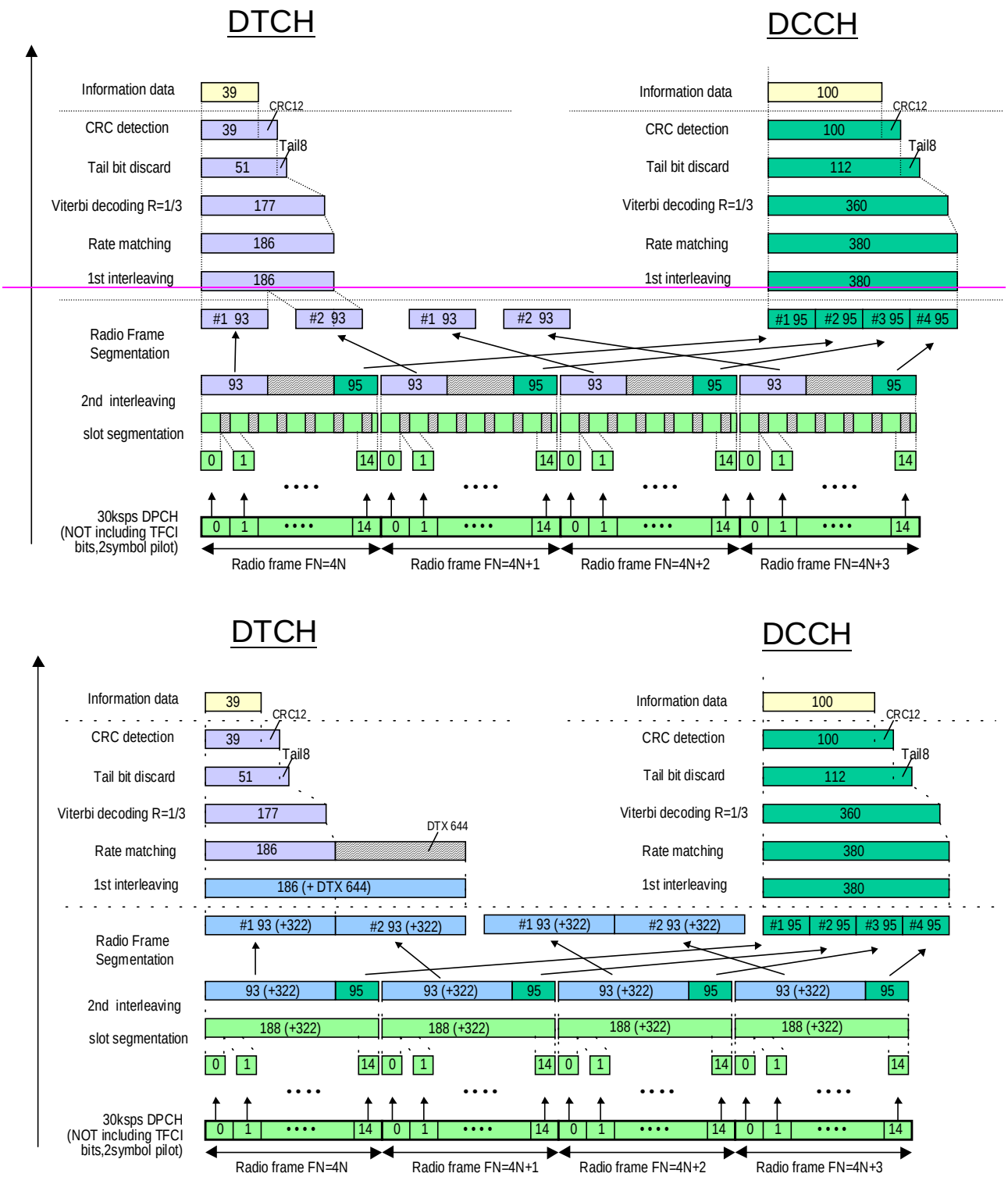

Figure A.11 (Informative): Channel coding of DL reference measurement channel for BTFD (Rate 3)

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25.101	CR	70	Current Version:	3.3.1

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-07

Subject: Definition of period for frequency error

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: The observation period for frequency error is missing.

Clauses affected: 6.3

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

6.3 Frequency Error

The UE modulated carrier frequency shall be accurate to within ±0.1 PPM observed over a period of one timeslot compared to the 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 ±0.1PPM figure. The UE shall use the same frequency source for both RF frequency generation and the chip clock.

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25.101	CR	71	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG RAN#9	for approval	X	strategic		(for SMG use only)
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-4

Subject: Downlink Power Control, wind up effects

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Introduction of a test for windup effects is needed based on contributions from Nokia, Motorola, Alcatel and Ericsson. The behaviour of a UE shall be specified in case the base station does not respond to power control commands. This CR is the conclusion between interested companies based on new Alcatel simulation results.

Clauses affected: New section 8.8.3 Power control in downlink, wind up effects.

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications	X	→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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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	

8.8.3 Power control in downlink, wind up effects

8.8.3.1 Minimum requirements

This test is run in three stages where stage 1 is for convergence of the power control loop, in stage two the maximum downlink power for the dedicated channel is limited not to be higher than the parameter specified in Table NEW1. All parameters used in the three stages are specified in Table NEW1. The $\frac{DPCH_E_c}{I_{or}}$ during stage 3 shall during 90 % of the time be lower than the value specified in Table NEW2.

Power control of the UE is ON during the test.

Table NEW1: Test parameter for downlink power control, wind-up effects

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 3

Time in each stage	s	>15	5	0.5
$\hat{I}_{or}/I_{oc}$	dB	5		
I_{oc}	dBm/3.84 MHz	-60		
Information Data Rate	kbps	12.2		
Max downlink $\frac{DPCH_E_c}{I_{or}}$	dB	No limitation	[~~15.7~~ – 16.2]	No limitation
Quality target on DTCH	BLER	0.01		
Propagation condition		Case 4		

Table NEW2: Requirements in downlink power control, wind-up effects

Parameter	Unit	Test 1, stage 3
$\frac{DPCH_E_c}{I_{or}}$	dB	[~~12.9~~13.3]
Confidence level for $\frac{DPCH_E_c}{I_{or}}$	%	90

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Torino, Italy, 4 – 8 Sep, 2000

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25.101	CR	72	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN#9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-08-09

Subject: Inclusion of OCNS definition for performance tests

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: The structure of OCNS signal, which is used in performance tests, is missing from current specification.

Clauses affected: 7.4, C.3.2, C.3.3, C.3.4

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications	X	→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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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. The structure of OCNS signal is defined in Annex C.3.2.~~The OCNS interference consist of 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.~~

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

Note The I_{oac} (modulated) signal consist of common channels needed for tests and 16 dedicated data channel. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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
P-CPICH	P-CPICH_Ec/Ior = -10 dB	Use of P-CPICH or S-CPICH as phase reference is specified for each requirement and is also set by higher layer signalling.
S-CPICH	S-CPICH_Ec/Ior = -10 dB	When S-CPICH is the phase reference in a test condition, the phase of S-CPICH shall be 180 degrees offset from the phase of P-CPICH. When S-CPICH is not the phase reference, it is not transmitted.
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	When S-CPICH is the phase reference in a test condition, the phase of DPCH shall be 180 degrees offset from the phase of P-CPICH.
OCNS	Necessary power so that total transmit power spectral density of Node B ~~BS~~ (Ior) adds to one	OCNS interference consists of 16 dedicated data channels. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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
P-CPICH (antenna 1)	P-CPICH_Ec1/Ior = -13 dB	1. Total P-CPICH_Ec/Ior = -10 dB
P-CPICH (antenna 2)	P-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 Node B ~~BS~~ (Ior) adds to one	1. ~~1.~~ This power shall be divided equally between antennas 2. OCNS interference consists of 16 dedicated data channels. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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
P-CPICH (antenna 1)	P-CPICH_Ec1/Ior = -13 dB	1. Total P-CPICH_Ec/Ior = -10 dB
P-CPICH (antenna 2)	P-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 Node B ~~BS~~ (Ior) adds to one	1. ~~1.~~ This power shall be divided equally between antennas 2. OCNS interference consists of 16 dedicated data channels. The channelisation codes for data channels are chosen optimally to reduce peak to average ratio (PAR). All dedicated channels user data is uncorrelated to each other.

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25.101	CR	73	Current Version:	3.3.1

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Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-05

Subject: Removal of confidence levels from TS 25.101.

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
- Current TS 25.101 specifies confidence levels for some tests. This is not mathematically correct to describe the requirements specified for these tests. Thus confidence levels are removed from TS 25.101 and clarifications are added to tests so that the requirements are unchanged.
- Also the averaging period of measured DPCH_Ec/Ior values were missing in some tests. This is now corrected.

Clauses affected: 8.8, 8.9

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[X]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

<--------- double-click here for help and instructions on how to create a CR.

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 . If a BLER target has been assigned to a DCCH (See Annex A.3), then it has to be such that outer loop is based on DTCH and not on DCCH.

8.8.1 Power control in the downlink, constant BLER target

8.8.1.1 Minimum requirements

For the parameters specified in Table 8.29 the ~~average~~ downlink $\frac{DPCH_E_c}{I_{or}}$ power measured values, which are averaged over one slot, shall be below the specified value in Table 8.30 more than 90% of the time, ~~for the~~ BLER shall be as shown in Table 8.30. Power control in downlink is ON during the test.

Table 8.29: 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 8.30: 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	0.01±30%	0.01±30%
~~Confidence level for measured quality and~~ $\frac{DPCH_E_c}{I_{or}}$	~~%~~	~~90~~	

8.8.2 Power control in the downlink, initial convergence

This requirement verifies that DL power control works properly during the first seconds after DPCH connection is established

8.8.2.1 Minimum requirements

For the parameters specified in Table 8.31 the downlink DPCH_Ec/Ior power measured values, which are~~is~~ averaged over [50 ms], shall be within the range specified in Table 8.32 more than 90% of the time. T1 equals to [500 ms] and it starts [10 ms] after the DPDCH connection is initiated. T2 equals to [500 ms] and it starts when T1 has expired. Power control is ON during the test.

Table 8.31: Test parameters for downlink power control

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Target quality value on DTCH	BLER	0.01	0.01	0.1	0.1
Initial DPCH_Ec/Ior	dB	-5.9	-25.9	-2.1	-22.1
Information Data Rate	kbps	12.2	12.2	64	64
$\hat{I}_{or}/I_{oc}$	dB	-1			
I_{oc}	dBm/3.84 MHz	-60			
Propagation condition		[Static]			

Table 8.32: Requirements in downlink power control

Parameter	Unit	Test 1 and Test 2	Test 3 and Test 4
$\frac{DPCH_E_c}{I_{or}}$ during T1	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -11.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -8.1]
$\frac{DPCH_E_c}{I_{or}}$ during T2	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -14.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -11.1]
~~Confidence level for measured~~ $\frac{DPCH_E_c}{I_{or}}$	~~%~~	~~[90]~~	

8.8.3 Power control in downlink, wind up effects

8.8.3.1 Minimum requirements

This test is run in three stages where stage 1 is for convergence of the power control loop, in stage two the maximum downlink power for the dedicated channel is limited not to be higher than the parameter specified in Table 8.33. All parameters used in the three stages are specified in Table 8.33. The downlink $\frac{DPCH_E_c}{I_{or}}$ power measured values, which are averaged over one slot, during- stage 3 shall ~~during 90 % of the time~~ be- lower than the value specified in -Table 8.34 more than 90% of the time. Power control of the UE is ON during the test.

Table 8.33: Test parameter for downlink power control, wind-up effects

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 3
Time in each stage	s	>15	5	0.5
$\hat{I}_{or}/I_{oc}$	dB	5		
I_{oc}	dBm/3.84 MHz	-60		
Information Data Rate	kbps	12.2		
Max downlink ~~$DPCH_E_c$~~	dB	No limitation	[-15.7]	No limitation

Quality target on DTCH	BLER	0.01
Propagation condition		Case 4

Table 8.34: Requirements in downlink power control, wind-up effects

Parameter	Unit	Test 1, stage 3
$\frac{DPCH_E_c}{I_{or}}$	dB	[-12.9]
~~Confidence level for~~ $\frac{DPCH_E_c}{I_{or}}$	~~%~~	~~[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) and transmitted DPCH_Ec/Ior power in the downlink.

The compressed mode parameters are given in clause A.5. Tests 1 and 2 are using Set 1 compressed mode pattern parameters from Table A.21 in clause A.5 while tests 3 and 4 are using Set 2 compressed mode patterns from the same table.

8.9.1.1 Minimum requirements

For the parameters specified in Table 8.35 the~~-~~ downlink $\frac{DPCH_E_c}{I_{or}}$ power measured values, which are averaged over one slot, shall be below the specified value in Table 8.36 more than 90 % of the time. ~~and t~~The measured quality on DTCH shall be as required in Table 8.36.

Downlink power control is ON during the test. Uplink TPC commands shall be error free. System simulator shall increase the transmitted power during compressed frames by the same amount that UE is expected to increase its SIR target during those frames.

Table 8.35: Test parameter for downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Delta SIR1	dB	0		0	
Delta SIR after1	dB	0		0	
Delta SIR2	dB	0	0	0	0
Delta SIR after2	dB	0	0	0	0
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2			
Propagation condition		Case 2			
Target quality value on DTCH	BLER	0.01			

Table 8.36: Requirements in downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{DPCH_E_c}{I_{or}}$	dB				
Measured quality on DTCH	BLER	0.01 ± 30 %			
~~Confidence level for measured quality and DPCH_Ec/Ior~~	~~%~~	~~[90]~~			

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e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.101	CR	74	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN#9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-05

Subject: Corrections to all tests with power control ON in TS 25.101

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Parameters Maximum_DL_power, Minimum_DL_power and Limited Power Raise Used need to be specified for tests with downlink power control ON. TS 25.433 is added to reference list for clarification.

Clauses affected: 2, 8.8, 8.9

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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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.
- For a non-specific reference, the latest version applies.

[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".

[4] TS 25.433, UTRAN Iub Interface NBAP Signalling

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 . If a BLER target has been assigned to a DCCH (See Annex A.3), then it has to be such that outer loop is based on DTCH and not on DCCH.

8.8.1 Power control in the downlink, constant BLER target

8.8.1.1 Minimum requirements

For the parameters specified in Table 8.29 the average downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value for the BLER shown in Table 8.30. Power control in downlink is ON during the test.

Table 8.29: 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	
Maximum_DL_Power *	dB	7	
Minimum_DL_Power *	dB	-18	
Limited_Power_Raise_Used	-	"Not used"	

Note *: Power is compared to P-CPICH as specified in [4].

Table 8.30: 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	0.01±30%	0.01±30%
Confidence level for measured quality and $\frac{DPCH_E_c}{I_{or}}$	%	90	

8.8.2 Power control in the downlink, initial convergence

This requirement verifies that DL power control works properly during the first seconds after DPCH connection is established

8.8.2.1 Minimum requirements

For the parameters specified in Table 8.31 the downlink DPCH_Ec/Ior power, which is averaged over [50 ms], shall be within the range specified in Table 8.32. T1 equals to [500 ms] and it starts [10 ms] after the DPDCH connection is initiated. T2 equals to [500 ms] and it starts when T1 has expired. Power control is ON during the test.

Table 8.31: Test parameters for downlink power control

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Target quality value on DTCH	BLER	0.01	0.01	0.1	0.1
Initial DPCH_Ec/Ior	dB	-5.9	-25.9	-2.1	-22.1
Information Data Rate	kbps	12.2	12.2	64	64
$\hat{I}_{or}/I_{oc}$	dB	-1			
I_{oc}	dBm/3.84 MHz	-60			
Propagation condition		[Static]			
Maximum_DL_Power	dB	7			
Minimum_DL_Power	dB	-18			
Limited_Power_Raise_Used	-	"Not used"			

Table 8.32: Requirements in downlink power control

Parameter	Unit	Test 1 and Test 2	Test 3 and Test 4
$\frac{DPCH_E_c}{I_{or}}$ during T1	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -11.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -8.1]
$\frac{DPCH_E_c}{I_{or}}$ during T2	dB	[-18.9 ≤ DPCH_Ec/Ior ≤ -14.9]	[-15.1 ≤ DPCH_Ec/Ior ≤ -11.1]
Confidence level for measured $\frac{DPCH_E_c}{I_{or}}$	%	[90]	

8.8.3 Power control in downlink, wind up effects

8.8.3.1 Minimum requirements

This test is run in three stages where stage 1 is for convergence of the power control loop, in stage two the maximum downlink power for the dedicated channel is limited not to be higher than the parameter specified in Table 8.33. All parameters used in the three stages are specified in Table 8.33. The $\frac{DPCH_E_c}{I_{or}}$ during stage 3 shall during 90 % of the time be lower than the value specified in Table 8.34. Power control of the UE is ON during the test.

Table 8.33: Test parameter for downlink power control, wind-up effects

Parameter	Unit	Test 1		
		Stage 1	Stage 2	Stage 3
Time in each stage	s	>15	5	0.5
$\hat{I}_{or}/I_{oc}$	dB	5		
I_{oc}	dBm/3.84 MHz	-60		
Information Data Rate	kbps	12.2		
~~Max downlink $\frac{DPCH_E_c}{I_{or}}$~~	~~dB~~	~~No limitation~~	~~[-15.7]~~	~~No limitation~~
Quality target on DTCH	BLER	0.01		
Propagation condition		Case 4		
Maximum_DL_Power	dB	7	-5.7	7
Minimum_DL_Power	dB	-18		
Limited_Power_Raise_Used	-	"Not used"		

Table 8.34: Requirements in downlink power control, wind-up effects

Parameter	Unit	Test 1, stage 3
$\frac{DPCH_E_c}{I_{or}}$	dB	[-12.9]
Confidence level for $\frac{DPCH_E_c}{I_{or}}$	%	[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) and transmitted DPCH_Ec/Ior power in the downlink.

The compressed mode parameters are given in clause A.5. Tests 1 and 2 are using Set 1 compressed mode pattern parameters from Table A.21 in clause A.5 while tests 3 and 4 are using Set 2 compressed mode patterns from the same table.

8.9.1.1 Minimum requirements

For the parameters specified in Table 8.35 the downlink $\frac{DPCH_E_c}{I_{or}}$ power shall be below the specified value in Table 8.36 and the measured quality on DTCH shall be as required in Table 8.36.

Downlink power control is ON during the test. Uplink TPC commands shall be error free. System simulator shall increase the transmitted power during compressed frames by the same amount that UE is expected to increase its SIR target during those frames.

Table 8.35: Test parameter for downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Delta SIR1	dB	0		0	
Delta SIR after1	dB	0		0	
Delta SIR2	dB	0	0	0	0
Delta SIR after2	dB	0	0	0	0
$\hat{I}_{or}/I_{oc}$	dB	9			
I_{oc}	dBm/3.84 MHz	-60			
Information Data Rate	kbps	12.2			
Propagation condition		Case 2			
Target quality value on DTCH	BLER	0.01			
Maximum_DL_Power	dB	7			
Minimum_DL_Power	dB	-18			
Limited_Power_Raise_Used	-	"Not used"			

Table 8.36: Requirements in downlink compressed mode

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
$\frac{DPCH_E_c}{I_{or}}$	dB				
Measured quality on DTCH	BLER	0.01 ± 30 %			
Confidence level for measured quality and DPCH_Ec/Ior	%	[90]			

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25.101	CR	75	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN#9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-05

Subject: Editorial modification to Annex A.5 of TS 25.101

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change: TS 25.101 CR 050, which was approved by the RAN#8, was incorrectly incorporated into TS 25.101 v.3.3.1. This is now corrected.

Clauses affected: A.5

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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A.5 DL reference compressed mode parameters

Parameters described in Table A.21 are used in some test specified in TS 25.101 while parameters described in Table A.22 are used in some tests specified in TS 25.133.

Set 1 parameters in Table A.21 are applicable when compressed mode by spreading factor reduction is used in downlink. Set 2 parameters in Table A.21~~2~~ are applicable when compressed mode by puncturing is used in downlink.

Table A.21: Compressed mode reference pattern 1 parameters

Parameter	Set 1	Set 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.22: Compressed mode reference pattern 2 parameters

Parameter	Set 1	Set 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	

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25.101	CR	76	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN#9	For approval	X	Strategic		(for SMG use only)
List expected approval meeting # here ↑		For information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*

(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: RAN WG4 **Date:** 2000-09-05

Subject: Tap magnitudes and phases for Birth-Death propagation conditions

Work item:

Category: *(only one category Shall be marked With an X)*

F	Correction	X	
A	Corresponds to a correction in an earlier release		
B	Addition of feature		
C	Functional modification of feature		
D	Editorial modification		

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: Finalise propagation conditions for the FDD mode.

Clauses affected: Annex B

Other specs Affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

Annex B (normative): Propagation conditions

B.1 General

B.2 Propagation Conditions

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.

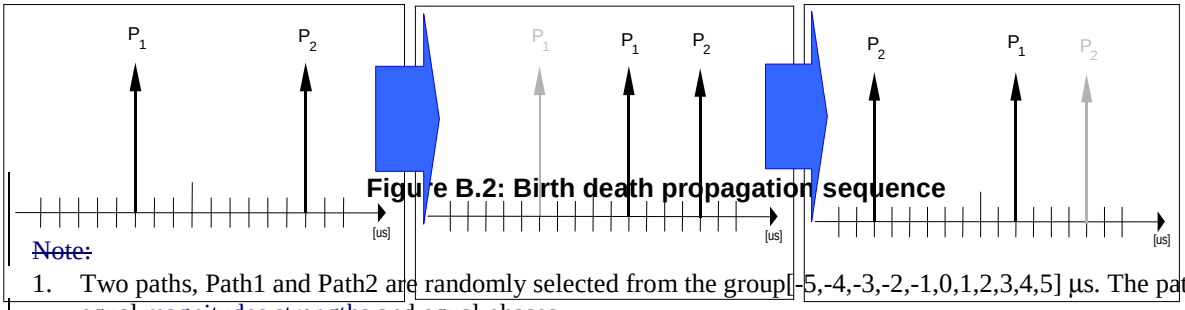

Figure B.2: Birth death propagation sequence

~~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 magnitudes ~~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. The magnitudes and the phases of the tap coefficients of Path 1 and Path 2 shall remain unaltered.
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. The magnitudes and the phases of the tap coefficients of Path 1 and Path 2 shall remain unaltered.
4. The sequence in 2) and 3) is repeated.

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Document* *R4-000762

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25.101	CR	77	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN#9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]

Source: Nokia **Date:** 2000-08-23

Subject: UE emission mask measurement filter definition correction for TS 25.101

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Aligning the measurement filtering definition and measurement procedures between UE and BTS.

Clauses affected: 6.6.2.1

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

<--------- double-click here for help and instructions on how to create a CR.

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 6.10

Table 6.10: 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. As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. To improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth can be different from the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth.
3. The lower limit shall be –50 dBm/3.84 MHz or which ever is higher.

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3GPP TSG RAN WG4 Meeting #13
Torino, Italy, 4 – 8 Sep, 2000

Document R4-000775
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.101	CR	78	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	RAN #9	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [ ] Core Network [ ]

Source: RAN WG4 **Date:** 2000-09-05

Subject: Handling of measurement uncertainties in UE radio conformance testing (FDD)

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in an earlier release	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: Alignment with draft ITU/R recommendation on handling of measurement uncertainties for a global circulation of terminals

Clauses affected: 4.1

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications	X	→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

4.1 ~~Measurement uncertainty~~Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. ~~Where the measurement uncertainty can be determined,~~ The test specification 34.121 Annex F defines test tolerances. These test tolerances are individually calculated for each test. The test tolerances are then added to the limits in this specification to create test limits. The measurement results are compared against the test limits as defined by the shared risk principle.~~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 273 Part 1 sub-part 2 section 6.5~~028~~.