TSG RAN Meeting #24 **RP-040193**
Seoul, Korea, 2 - 4 June 2004

Title CRs (Rel-5 and Corresponding Rel-6) to TS 25.101
Source TSG RAN WG4
Agenda Item 7.5.5

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-040375	25.101	343	1	F	Rel-5	5.10.0	Correction of maximum allowed power and range in TFC selection with HS-DPCCH and other clarifications	TEI5
R4-040376	25.101	344	1	F	Rel-6	6.4.0	Correction of maximum allowed power and range in TFC selection with HS-DPCCH and other clarifications	TEI6

CR-Form-v7

CHANGE REQUEST

⌘ 25.101 CR 341 ⌘rev ⌘ Current version: 5.10.0 ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [ ]

Title:	⌘	UE maximum output power with HS-DPCCH		
Source:	⌘	RAN WG4		
Work item code:	⌘	HSDPA-RF	***Date:*** ⌘	24/05/2004
Category:	⌘	**F**	***Release:*** ⌘	Rel-5
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *Rel-4 (Release 4)* *Rel-5 (Release 5)* *Rel-6 (Release 6)*

Reason for change:	⌘	Introduction of HS-DPCCH increases PAR of the UE transmit signal and this needs to be included in the UE TX design. Requiring a more powerful PA in the UE should give comparable gain in UL and not only address requirements introduced in the DL direction.
Summary of change:	⌘	Increased output power tolerance is allowed for the nominal maximum output power, when HS-DPCCH is applied in UL transmission. This takes into account the introduction of HS-DPCCH and associated PAR increase due to HS-DPCCH channel. The change clarifies that it is allowed to back off with the amount increased PAR and implement HSDPA feature without major redesign needs in UE transmitter. This change is not intended to change the requirements of multicode DPDCH transmission in UL. Isolated impact analysis: The change does not affect UE implementation, which already meets the current ACLR requirement. It may have an impact on UE implementation, which introduces the changes to meet the ACLR requirement. If proper network planning is made, this change has either no or negible impact on network coverage.
Consequences if not approved:	⌘	The UE TX design constrains in context with HSDPA to support HS-DPCCH are introducing a significant design challenges without giving any improvement to the UL service and bit rates. In addition this functionality is introducing decreased UE performance like battery operating time, increased form factor and cost.

Clauses affected:	⌘	2, 6.1, 6.2.2, 6.6.2.1.1, 6.6.2.2.1, 6.8.2.1
		Y N

Other specs affected:	⌘		X	Other core specifications	⌘ 34.121
		X		Test specifications	
			X	O&M Specifications	
Other comments:	⌘	Equivalent CRs in other Releases: CR342 cat. A to 25.101 v6.4.0			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2 References

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

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

[1] (void)

[2] ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain ".

[3] (void)

[4] 3GPP TS 25.433: "UTRAN Iub Interface NBAP Signalling".

[5] ETSI ETR 273: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties; Part 1: Uncertainties in the measurement of mobile radio equipment characteristics; Sub-part 2: Examples and annexes".

[6] 3GPP TS 45.004: "Digital cellular telecommunications system (Phase 2+); Modulation".

[7] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification"

[8] 3GPP TS25.214: "Physical layer procedures (FDD)

3 Definitions, symbols and abbreviations

--- Next change --

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 nominal maximum output power. The nominal power defined is the broadband transmit power of the UE, i.e. the power in a bandwidth of at least (1+α) times the chip rate of the radio access mode. The period of measurement shall be at least one timeslot.

Table 6.1: UE Power Classes

Operating Band	Power Class 1		Power Class 2		Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
Band I	+33	+1/-3	+27	+1/-3	+24	+1/-3	+21	+2/-2
Band II	-	-	-	-	+24	+1/-3	+21	+2/-2
Band III	-	-	-	-	+24	+1/-3	+21	+2/-2

NOTE: The tolerance allowed for the nominal maximum output power applies even for the multi-code DPDCH transmission mode.

6.2.2 UE maximum output power with HS-DPCCH

For all values of β_{hs} defined in [8] the UE maximum output powers as specified in Table 6.1a are applicable in the case when the HS-DPCCH is fully or partially transmitted during a DPCCH timeslot. In DPCCH time slots, where HS-DPCCH is not transmitted, the UE maximum output power shall fulfil the requirements specified in Table 6.1.

Table 6.1a: UE maximum output powers with HS-DPCCH

Ratio of β_c to β_d for all values of β_{hs}	Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
$1/15 \le \beta_c/\beta_d \le 12/15$	+24	+1/-3	+21	+2/-2
$13/15 \le \beta_c/\beta_d \le 15/8$	+23	+2/-3	+20	+3/-2
$15/7 \le \beta_c/\beta_d \le 15/0$	+22	+3/-3	+19	+4/-2

6.3 Frequency Error

--- Next change --

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 RRC filtered mean power of the UE carrier.

6.6.2.1.1 Minimum requirement

The power of any UE emission shall not exceed the levels specified in Table 6.10. The absolute requirement is based on a –50 dBm/3.84 MHz minimum power threshold for the UE. This limit is expressed for the narrower measurement bandwidths as –55.8 dBm/1 MHz and –71.1 dBm/30 kHz. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

Table 6.10: Spectrum Emission Mask Requirement

Δf in MHz (Note 1)	Minimum requirement (Note 2) Band I, II, III		Additional requirements Band II (Note 3)	Measurement bandwidth (Note 6)
	Relative requirement	Absolute requirement		
2.5 - 3.5	$\left\{-35-15\cdot\left(\frac{\Delta f}{MHz}-2.5\right)\right\}dBc$	-71.1 dBm	-15 dBm	30 kHz (Note 4)
3.5 - 7.5	$\left\{-35-1\cdot\left(\frac{\Delta f}{MHz}-3.5\right)\right\}dBc$	-55.8 dBm	-13 dBm	1 MHz (Note 5)
7.5 - 8.5	$\left\{-39-10\cdot\left(\frac{\Delta f}{MHz}-7.5\right)\right\}dBc$	-55.8 dBm	-13 dBm	1 MHz (Note 5)
8.5 - 12.5 MHz	-49 dBc	-55.8 dBm	-13 dBm	1 MHz (Note 5)

Note 1: Δf is the separation between the carrier frequency and the centre of the measurement bandwidth.
Note 2: The minimum requirement for bands I, II & III is calculated from the relative requirement or the absolute requirement, whichever is the higher power.
Note 3: For operation in Band II only, the minimum requirement is calculated from the minimum requirement calculated in Note 2 or the additional requirement for band II, whichever is the lower power.
Note 4: The first and last measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz and 3.485 MHz.
Note 5: The first and last measurement position with a 1 MHz filter is at Δf equals to 4 MHz and 12 MHz.
Note 6: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the RRC filtered mean power centered on the assigned channel frequency to the RRC filtered mean power centered on an adjacent channel frequency.

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. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

Table 6.11: UE ACLR

Power Class	Adjacent channel frequency relative to assigned channel frequency	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

-- Next change ---------------------------------------

6.8.2 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3,84 MHz and roll-off α=0,22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot except when the mean power between slots is expected to change whereupon the measurement interval is reduced by 25 µs at each end of the slot. For the PRACH and PCPCH preambles the measurement interval is 4096 chips less 25 µs at each end of the burst (3904 chips).

6.8.2.1 Minimum requirement

The Error Vector Magnitude shall not exceed 17.5 % for the parameters specified in Table 6.15. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

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

3GPP TSG RAN WG4 (Radio) Meeting #31 **R4-040232**
Beijing, China 10 - 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ **25.101**	**CR 342**	⌘ **rev**		⌘ Current version:	**6.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [ ]

Title:	⌘	UE maximum output power with HS-DPCCH		
Source:	⌘	RAN WG4		
Work item code:	⌘	HSDPA-RF	***Date:*** ⌘	24/05/2004
Category:	⌘	**A**	***Release:*** ⌘	Rel-6
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *Rel-4 (Release 4)* *Rel-5 (Release 5)* *Rel-6 (Release 6)*

Reason for change:	⌘	Introduction of HS-DPCCH increases PAR of the UE transmit signal and this needs to be included in the UE TX design. Requiring a more powerful PA in the UE should give comparable gain in UL and not only address requirements introduced in the DL direction.
Summary of change:	⌘	Increased output power tolerance is allowed for the nominal maximum output power, when HS-DPCCH is applied in UL transmission. This takes into account the introduction of HS-DPCCH and associated PAR increase due to HS-DPCCH channel. The change clarifies that it is allowed to back off with the amount increased PAR and implement HSDPA feature without major redesign needs in UE transmitter. This change is not intended to change the requirements of multicode DPDCH transmission in UL. Isolated impact analysis: The change does not affect UE implementation, which already meets the current ACLR requirement. It may have an impact on UE implementation, which introduces the changes to meet the ACLR requirement. If proper network planning is made, this change has either no or neglible impact on network coverage.
Consequences if not approved:	⌘	The UE TX design constrains in context with HSDPA to support HS-DPCCH are introducing a significant design challenges without giving any improvement to the UL service and bit rates. In addition this functionality is introducing decreased UE performance like battery operating time, increased form factor and cost.

Clauses affected:	⌘	2, 6.1, 6.2.2, 6.6.2.1.1, 6.6.2.2.1, 6.8.2.1
		Y **N**

Other specs affected:	⌘		X	Other core specifications	⌘ 34.121
		X		Test specifications	
			X	O&M Specifications	
Other comments:	⌘	Equivalent CRs in other Releases: CR341 cat. F to 25.101 v5.10.0			

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2 References

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[1] (void)

[2] ITU-R Recommendation SM.329: " Unwanted emissions in the spurious domain ".

[3] (void)

[4] 3GPP TS 25.433: "UTRAN Iub Interface NBAP Signalling".

[5] ETSI ETR 273: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement of radiated methods of measurement (using test sites) and evaluation of the corresponding measurement uncertainties; Part 1: Uncertainties in the measurement of mobile radio equipment characteristics; Sub-part 2: Examples and annexes".

[6] 3GPP TS 45.004: "Digital cellular telecommunications system (Phase 2+); Modulation".

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3 Definitions, symbols and abbreviations

--- Next change --

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 nominal maximum output power. The nominal power defined is the broadband transmit power of the UE, i.e. the power in a bandwidth of at least (1+α) times the chip rate of the radio access mode. The period of measurement shall be at least one timeslot.

Table 6.1: UE Power Classes

Operating Band	Power Class 1		Power Class 2		Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
Band I	+33	+1/-3	+27	+1/-3	+24	+1/-3	+21	+2/-2
Band II	-	-	-	-	+24	+1/-3	+21	+2/-2
Band III	-	-	-	-	+24	+1/-3	+21	+2/-2
Band IV	-	-	-	-	+24	+1/-3	+21	+2/-2
Band V	-	-	-	-	+24	+1/-3	+21	+2/-2
Band VI	-	-	-	-	+24	+1/-3	+21	+2/-2

NOTE: The tolerance allowed for the nominal maximum output power applies even for the multi-code DPDCH transmission mode.

6.2.2 UE maximum output power with HS-DPCCH

For all values of β_{hs} defined in [8] the UE maximum output powers as specified in Table 6.1a are applicable in the case when the HS-DPCCH is fully or partially transmitted during a DPCCH timeslot. In DPCCH time slots, where HS-DPCCH is not transmitted, the UE maximum output power shall fulfil the requirements specified in Table 6.1.

Table 6.1a: UE maximum output powers with HS-DPCCH

Ratio of β_c to β_d for all values of β_{hs}	Power Class 3		Power Class 4	
	Power (dBm)	**Tol (dB)**	**Power (dBm)**	**Tol (dB)**
$1/15 \leq \beta_c/\beta_d \leq 12/15$	+24	+1/-3	+21	+2/-2

13/15 ≤ β_c/β_d ≤ 15/8	+23	+2/-3	+20	+3/-2
15/7 ≤ β_c/β_d ≤ 15/0	+22	+3/-3	+19	+4/-2

6.3 Frequency Error

-- Next change --

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 RRC filtered mean power of the UE carrier.

6.6.2.1.1 Minimum requirement

The power of any UE emission shall not exceed the levels specified in Table 6.10. The absolute requirement is based on a –50 dBm/3.84 MHz minimum power threshold for the UE. This limit is expressed for the narrower measurement bandwidths as –55.8 dBm/1 MHz and –71.1 dBm/30 kHz. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

Table 6.10: Spectrum Emission Mask Requirement

Δf in MHz (Note 1)	Minimum requirement (Note 2) Band I, II, III, IV, V, VI		Additional requirements Band II, Band IV and Band V (Note 3)	Measurement bandwidth (Note 6)
	Relative requirement	Absolute requirement		
2.5 - 3.5	$\left\{-35-15\cdot\left(\frac{\Delta f}{MHz}-2.5\right)\right\}dBc$	-71.1 dBm	-15 dBm	30 kHz (Note 4)
3.5 - 7.5	$\left\{-35-1\cdot\left(\frac{\Delta f}{MHz}-3.5\right)\right\}dBc$	-55.8 dBm	-13 dBm	1 MHz (Note 5)
7.5 - 8.5	$\left\{-39-10\cdot\left(\frac{\Delta f}{MHz}-7.5\right)\right\}dBc$	-55.8 dBm	-13 dBm	1 MHz (Note 5)
8.5 - 12.5 MHz	-49 dBc	-55.8 dBm	-13 dBm	1 MHz (Note 5)

Note 1: Δf is the separation between the carrier frequency and the centre of the measurement bandwidth.
Note 2: The minimum requirement for bands I, II, III, IV, V & VI is calculated from the relative requirement or the absolute requirement, whichever is the higher power.
Note 3: For operation in Band II, Band IV and Band V only, the minimum requirement is calculated from the minimum requirement calculated in Note 2 or the additional requirement for band II, whichever is the lower power.
Note 4: The first and last measurement position with a 30 kHz filter is at Δf equals to 2.515 MHz and 3.485 MHz.
Note 5: The first and last measurement position with a 1 MHz filter is at Δf equals to 4 MHz and 12 MHz.
Note 6: As a general rule, the resolution bandwidth of the measuring equipment should be equal to the measurement bandwidth. However, to improve measurement accuracy, sensitivity and efficiency, the resolution bandwidth may be smaller than the measurement bandwidth. When the resolution bandwidth is smaller than the measurement bandwidth, the result should be integrated over the measurement bandwidth in order to obtain the equivalent noise bandwidth of the measurement bandwidth.

6.6.2.2 Adjacent Channel Leakage power Ratio (ACLR)

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the RRC filtered mean power centered on the assigned channel frequency to the RRC filtered mean power centered on an adjacent channel frequency.

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. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

Table 6.11: UE ACLR

Power Class	Adjacent channel frequency relative to assigned channel frequency	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

-- Next change ---

6.8.2 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the reference waveform and the measured waveform. This difference is called the error vector. Both waveforms pass through a matched Root Raised Cosine filter with bandwidth 3,84 MHz and roll-off α=0,22. Both waveforms are then further modified by selecting the frequency, absolute phase, absolute amplitude and chip clock timing so as to minimise the error vector. The EVM result is defined as the square root of the ratio of the mean error vector power to the mean reference power expressed as a %. The measurement interval is one timeslot except when the mean power between slots is expected to change whereupon the measurement interval is reduced by 25 µs at each end of the slot. For the PRACH and PCPCH preambles the measurement interval is 4096 chips less 25 µs at each end of the burst (3904 chips).

6.8.2.1 Minimum requirement

The Error Vector Magnitude shall not exceed 17.5 % for the parameters specified in Table 6.15. The requirements are applicable for all values of β_c, β_d and β_{hs} as specified in [8].

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

3GPP TSG RAN WG4 (Radio) Meeting #31 **R4-040375**
Beijing, China 10 - 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘	**25.101**	**CR**	**343**	⌘ **rev**	**1**	⌘ Current version:	**5.10.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Correction of maximum allowed power and range in TFC selection with HS-DPCCH and other clarifications		
Source:	⌘	RAN WG4		
Work item code:	⌘	TEI5	***Date:*** ⌘	24/05/2004
Category:	⌘	**F**	***Release:*** ⌘	Rel-5
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *Rel-4 (Release 4)* *Rel-5 (Release 5)* *Rel-6 (Release 6)*

Reason for change:	⌘	Reduction of maximum output power has been introduced into the specifications and therefore definition “maximum allowed power” needs to be corrected. Maximum power step in the same clause needs to be corrected. Note below table B.1B needs to be removed since it does not add any value to specifcation but may cause unecessary confusion when refereing the reader to simulation assumptions in a technical report. A testpoint (PA3, HS-PDSCH Ec/Ior=-3dB, Ior/Ioc=0dB) in Table 9.8 is not testable since there is insufficient power allocation to HS-SCCH to ensure that the test can be performed properly. Additionally minor clarifications were needed in other sections.
Summary of change:	⌘	Definition “maximum allowed power” corrected and reference to Table 6.1a added. Maximum power step size changed from 6 to 7dB. A value of tespoint (PA3, HS-PDSCH Ec/Ior=-3dB, Ior/Ioc=0dB) in Table 9.8 changed to N/A. The note below table B.1B is removed Other minor editorial corrections.
Consequences if not approved:	⌘	Maximum allowed power can be misunderstood hence reduction of maximum output power is not taken into account in TFC-selection with HS-DPCCH. Maximum Power step of the UE due to TFC-selection with HS-DPCCH is not large enough.

Clauses affected:	⌘	6.1, 6.5.3.1, 6.5.5.1, 6.6.2, 7.1, 7.4, 9.2.1.3, B.2.2
		Y | **N**

Other specs affected:	⌘		X	Other core specifications	⌘ 34.121
		X		Test specifications	
			X	O&M Specifications	
Other comments:	⌘	Equivalent CRs in other Releases: CR344r1 cat. F to 25.101 v6.4.0			

How to create CRs using this form:

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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----------------------------- FIRST MODIFIED SECTION -----------------------------

6 Transmitter characteristics

6.1 General

Unless ~~detailed~~ otherwise stated, the transmitter characteristics 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

----------------------------- NEXT MODIFIED SECTION -----------------------------

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 DPDCH 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 mean power of the original (reference) timeslot and the mean 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.

Table 6.8: Transmitter power step tolerance

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

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

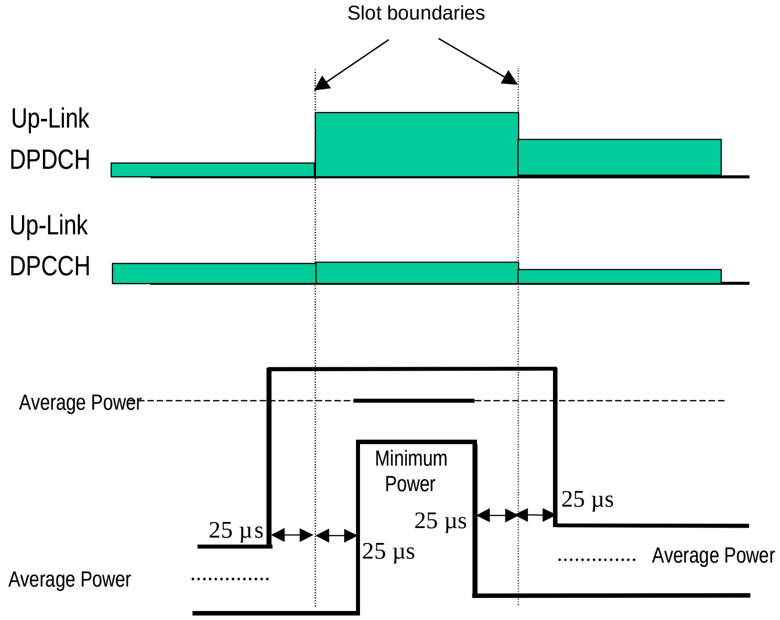

Figure 6.4: Transmit template during TFC change

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 mean power of the DPCCH follows the steps due to inner loop power control combined with additional steps of $10Log_{10}(N_{pilot.prev} / N_{pilot.curr})$ 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 mean power of the original (reference) timeslot and the mean 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.

In addition to any power change due to the ratio $N_{pilot.prev} / N_{pilot.curr}$, the mean power of the DPCCH in the first slot after a compressed mode transmission gap shall differ from the mean power of the DPCCH 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

Power difference (Up or down) ΔP [dB]	Transmitter power step tolerance after a transmission gap [dB]
Δ P ≤ 2	+/- 3
3	+/- 3
4 ≤ Δ P ≤10	+/- 3.5
11 ≤ Δ P ≤15	+/- 4
16 ≤ Δ P ≤20	+/- 4.5
21 ≤ Δ P	+/- 6.5

The power difference is defined as the difference between the mean power of the original (reference) timeslot before the transmission gap and the mean 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 transmit power levels versus time shall meet the mask specified in figure 6.5.

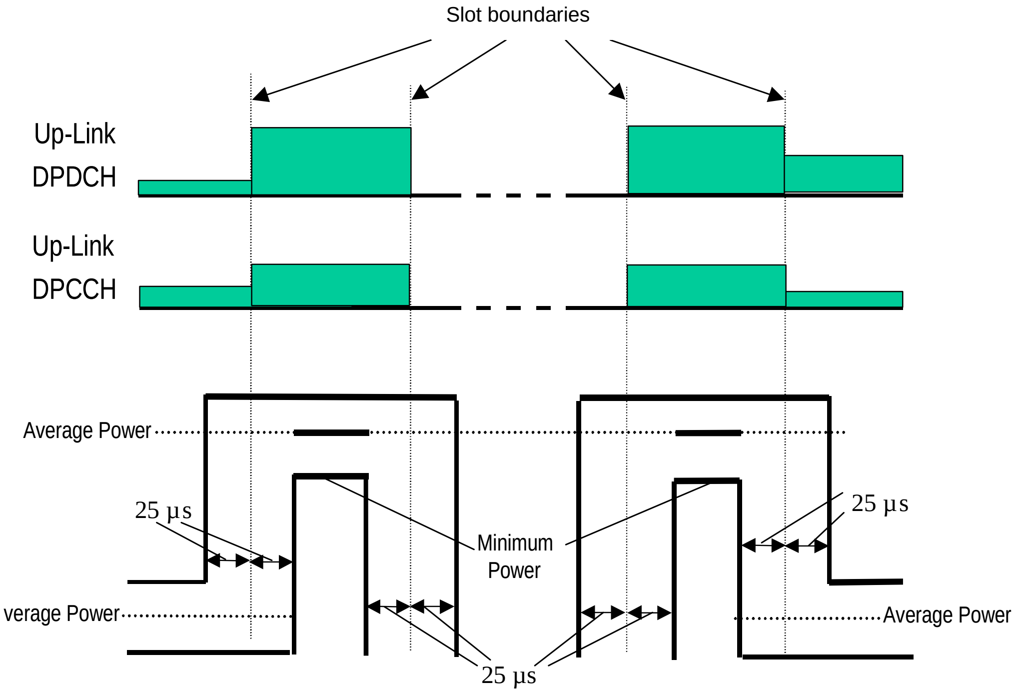

Figure 6.5: Transmit template during Compressed mode

6.5.5 HS-DPCCH

The transmission of Ack/Nack or CQI over HS-DPCCH causes the transmission power in the uplink to vary.

6.5.5.1 Minimum requirement

A change of output power is required when Ack/Nack or CQI is transmitted. The ratio of the amplitude between the DPCCH and the Ack/Nack and CQI respectively is signalled by the higher layers. The sum power on DPCCH+DPDCH shall not change by the transmission of Ack/Nack and CQI unless UE output power when Ack/Nack or CQI is transmitted would exceed the maximum ~~allowed~~ value specified in Table 6.1a whereupon the UE shall apply additional scaling to the total transmit power as defined in section 5.1.2.6 of TS.25.214. The sum in total transmitted power (DPCCH + DPDCH+HS-DPCCH) 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 6.9A. The power change due to transmission of Ack/Nack or CQI is defined as the relative power difference between the mean power of the original (reference) timeslot and the mean power of the target timeslot, not including the transient duration. The transient duration is from 25µs before the HS-DPCCH slot boundary to 25µs after the HS-DPCCH slot boundary.

Table 6.9A: Transmitter power step tolerance

Power step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
0	+/- 0.5
1	+/- 0.5
2	+/- 1.0
3	+/- 1.5
4 ≤ Δ P ≤ ~~6~~7	+/- 2.0

The transmit power levels versus time shall meet the mask specified in Figure 6.x.

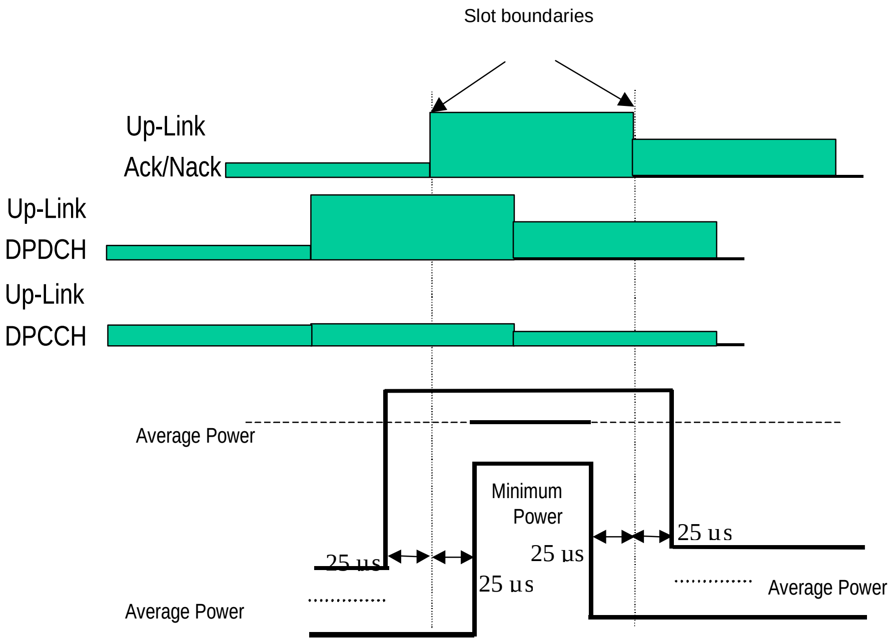

Figure 6.5A: Transmit template during Ack/Nack transmission

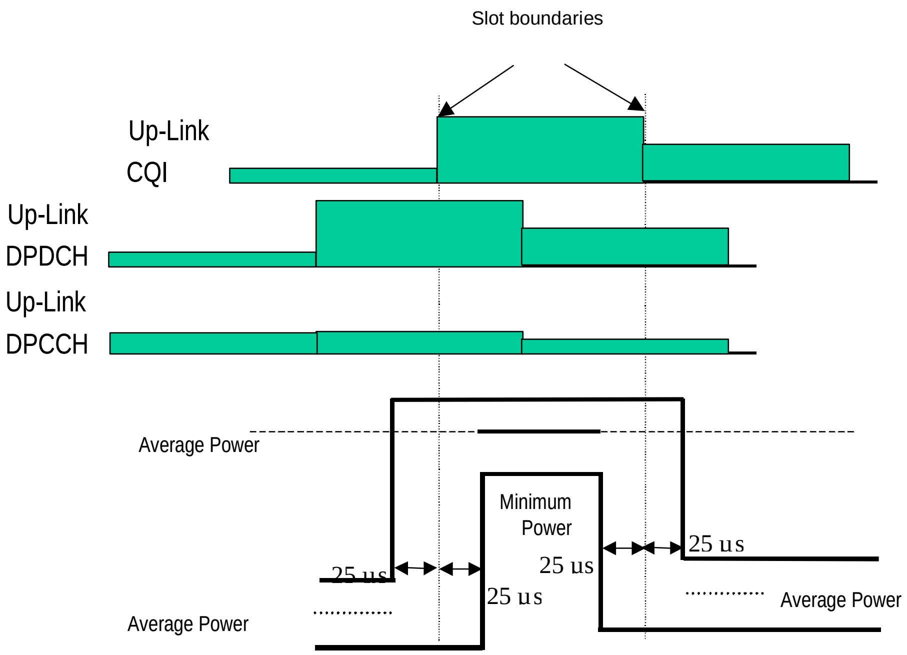

Figure 6.5B: Transmit template during CQI transmission

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.

---------------------------- NEXT MODIFIED SECTION ----------------------------

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~~ subclause A.3.1 and unless otherwise stated ~~are~~ with DL power control OFF.

------------------------------ NEXT MODIFIED SECTION -----------------------------

7.4 Maximum input level

This is defined as the maximum mean power received at the UE antenna port, at which ~~does not degrade~~ the specified BER performance shall be met.

7.4.1 Minimum requirement for DPCH reception

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
UE transmitted mean power	dBm	20 (for Power class 3) 18 (for Power class 4)

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.

7.4.2 Minimum requirement for HS-PDSCH reception

7.4.2.1 Minimum requirement for 16QAM

For the parameters specified in Table 7.3A, the requirements are specified in terms of a minimum information bit throughput R as shown in Table 7.3B for the DL reference channel H-Set 1 specified in Annex A.7.1.1. with the addition of the parameters added in the end of Table 7.3A and downlink physical channel setup according to Annex C.5.

Table 7.3A

Parameter	Unit	Test
Phase reference		P-CPICH
$\hat{I}_{or}$	dBm/3.84 MHz	-25 *
UE transmitted mean power	dBm	20 (for Power class 3) 18 (for Power class 4)
DPCH	DPCH_Ec/Ior	-13
HS-SCCH_1	HS-SCCH_Ec/Ior	-13
Redundancy and constellation version		6
Maximum number of HARQ transmissions		1
Note: The HS-DSCH shall be transmitted continuously with constant power but only every third TTI shall be sent to the UE under test.		

Table 7.3B

HS-PDSCH E_c/I_{or} (dB)	T-put R (kbps) *
-3	700

----------------------------- NEXT MODIFIED SECTION -----------------------------

9.2.1.3 Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 4/5

For the parameters specified in Table 9.6, the requirements are specified in terms of a minimum information bit throughput R as shown in Table 9.7 and 9.8 for the DL reference channels specified in Annex A.7.1.4 and A.7.1.5.

Table 9.6: Test Parameters for Testing QPSK FRCs H-Set 4/H-Set 5

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
I_{oc}	dBm/3.84 MHz	-60			
Redundancy and constellation version coding sequence		{0,2,5,6}			
Maximum number of HARQ transmission		4			

Table 9.7: Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 4

Test Number	Propagation Conditions	Reference value		
		HS-PDSCH E_c/I_{or} (dB)	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 0 dB	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 10 dB
1	PA3	-6	72	340
		-3	N/A	439
2	PB3	-6	24	186
		-3	142	299
3	VA30	-6	19	183
		-3	148	306
4	VA120	-6	11	170
		-3	144	284
* Notes: 1) The reference value R is for the Fixed Reference Channel (FRC) H-Set 4				

Table 9.8: Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 5

Test Number	Propagation Conditions	Reference value		
		HS-PDSCH E_c/I_{or} (dB)	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 0 dB	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 10 dB
1	PA3	-6	98	464
		-3	~~221~~N/A	635
2	PB3	-6	35	272
		-3	207	431
3	VA30	-6	33	285
		-3	213	443
4	VA120	-6	20	272
		-3	210	413
* Notes: 1) The reference value R is for the Fixed Reference Channel (FRC) H-Set 5				

------------------------------ NEXT MODIFIED SECTION ------------------------------

B.2 Propagation Conditions

B.2.1 Static propagation condition

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

B.2.2 Multi-path fading propagation conditions

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

Table B.1: Propagation Conditions for Multi path Fading Environments (Cases 1 to 6)

Case 1, speed 3km/h		Case 2, speed 3 km/h		Case 3, speed 120 km/h		Case 4, speed 3 km/h		* Case 5, speed 50 km/h		Case 6, speed 250 km/h	
Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]
0	0	0	0	0	0	0	0	0	0	0	0
976	-10	976	0	260	-3	976	0	976	-10	260	-3
		20000	0	521	-6					521	-6
				781	-9					781	-9

NOTE: Case 5 is only used in TS25.133.

Table B.1A shows propagation conditions that are used for the performance measurements in multi-path environment when UE is informed by higher layer signalling that only DPCCH exists for channel estimation. All taps have classical Doppler spectrum. Taps are normalized to the strongest tap in the beam/sector. The actual power relation between the sector and the beam is determined by the test case.

Table B.1A: Propagation Conditions for Multi path Fading Environments (Case 7)

Case 7, speed 50 km/h		
Relative Delay [ns]	Average Power [dB]	
	Sector	Beam
0	0.0	-
260	-4.3	-
1040	-6.6	-
4690	-2.0	0.0
7290	-7.0	-0.3
14580	-7.5	-0.9

Table B.1B shows propagation conditions that are used for HSDPA performance measurements in multi-path fading environment.

Table B.1B: Propagation Conditions for Multi-Path Fading Environments for HSDPA Performance Requirements

ITU Pedestrian A Speed 3km/h (PA3)		ITU Pedestrian B Speed 3km/h (PB3)		ITU vehicular A Speed 30km/h (VA30)		ITU vehicular A Speed 120km/h (VA120)	
Relative Delay [ns]	Relative Mean Power [dB]	Relative Delay [ns]	Relative Mean Power [dB]	Relative Delay [ns]	Relative Mean Power [dB]	Relative Delay [ns]	Relative Mean Power [dB]
0	0	0	0	0	0	0	0
110	-9.7	200	-0.9	310	-1.0	310	-1.0
190	-19.2	800	-4.9	710	-9.0	710	-9.0
410	-22.8	1200	-8.0	1090	-10.0	1090	-10.0
		2300	-7.8	1730	-15.0	1730	-15.0
		3700	-23.9	2510	-20.0	2510	-20.0

~~Note: The propagation conditions used in simulations were based on the TR 25.890. The effect of re-mapping of channel rays to integer sample locations is FFS.~~

Table B.1C shows propagation conditions that are used for CQI test in multi-path fading

Table B.1C: Propagation Conditions for CQI test in multi-path fading

Case 8, speed 30km/h	
Relative Delay [ns]	Relative mean Power [dB]
0	0
976	-10

3GPP TSG RAN WG4 (Radio) Meeting #31 **R4-040376**
Beijing, China 10 - 14 May 2004

CR-Form-v7

CHANGE REQUEST

⌘	**25.101**	**CR**	**344**	⌘ **rev**	**1**	⌘ Current version:	**6.4.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Correction of maximum allowed power and range in TFC selection with HS-DPCCH and other clarifications
Source:	⌘	RAN WG4
Work item code:	⌘	TEI6 — ***Date:*** ⌘ 24/05/2004
Category:	⌘	**F** — ***Release:*** ⌘ Rel-6

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
- *2 (GSM Phase 2)*
- *R96 (Release 1996)*
- *R97 (Release 1997)*
- *R98 (Release 1998)*
- *R99 (Release 1999)*
- *Rel-4 (Release 4)*
- *Rel-5 (Release 5)*
- *Rel-6 (Release 6)*

Reason for change:	⌘	Reduction of maximum output power has been introduced into the specifications and therefore definition “maximum allowed power” needs to be corrected. Maximum power step in the same clause needs to be corrected. Note below table B.1B needs to be removed since it does not add any value to specifcation but may cause unecessary confusion when refereing the reader to simulation assumptions in a technical report. A testpoint (PA3, HS-PDSCH Ec/Ior=-3dB, Ior/Ioc=0dB) in Table 9.8 is not testable since there is insufficient power allocation to HS-SCCH to ensure that the test can be performed properly. Categories 7 and 8 missing in HS-DSCH category definition. Additionally minor clarifications were needed in other sections.
Summary of change:	⌘	Definition “maximum allowed power” corrected and reference to Table 6.1a added. Maximum power step size changed from 6 to 7dB. A value of tespoint (PA3, HS-PDSCH Ec/Ior=-3dB, Ior/Ioc=0dB) in Table 9.8 changed to N/A. The note below table B.1B is removed Other minor editorial corrections.
Consequences if not approved:	⌘	Maximum allowed power can be misunderstood hence reduction of maximum output power is not taken into account in TFC-selection with HS-DPCCH. Maximum Power step of the UE due to TFC-selection with HS-DPCCH is not large enough.

Clauses affected:	⌘	6.1, 6.5.3.1, 6.5.5.1, 6.6.2, 7.1, 7.4, 9.2, 9.2.1.3, B.2.2

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	34.121
		X		Test specifications		
			X	O&M Specifications		
Other comments:	⌘	Equivalent CRs in other Releases: CR343r1 cat. F to 25.101 v5.10.0				

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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

------------------------------ NEXT MODIFIED SECTION ------------------------------

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 DPDCH 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 mean power of the original (reference) timeslot and the mean 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.

Table 6.8: Transmitter power step tolerance

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

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

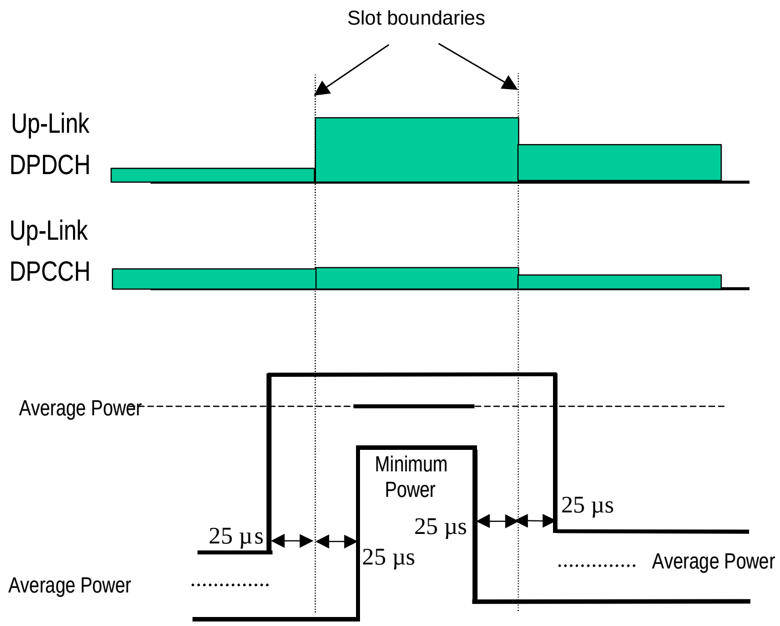

Figure 6.4: Transmit template during TFC change

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 mean power of the DPCCH follows the steps due to inner loop power control combined with additional steps of $10\mathrm{Log}_{10}(N_{pilot.prev} / N_{pilot.curr})$ 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 mean power of the original (reference) timeslot and the mean 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.

In addition to any power change due to the ratio $N_{pilot.prev} / N_{pilot.curr}$, the mean power of the DPCCH in the first slot after a compressed mode transmission gap shall differ from the mean power of the DPCCH 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

Power difference (Up or down) ΔP [dB]	Transmitter power step tolerance after a transmission gap [dB]
$\Delta P \leq 2$	+/- 3
3	+/- 3
$4 \leq \Delta P \leq 10$	+/- 3.5
$11 \leq \Delta P \leq 15$	+/- 4
$16 \leq \Delta P \leq 20$	+/- 4.5
$21 \leq \Delta P$	+/- 6.5

The power difference is defined as the difference between the mean power of the original (reference) timeslot before the transmission gap and the mean 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 transmit power levels versus time shall meet the mask specified in figure 6.5.

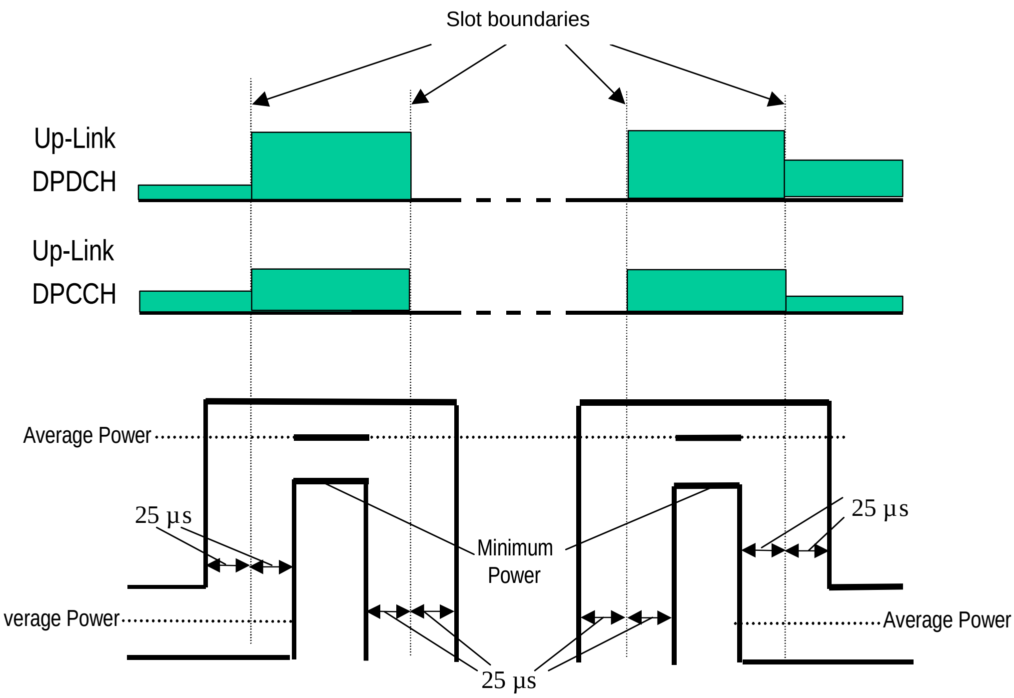

Figure 6.5: Transmit template during Compressed mode

6.5.5 HS-DPCCH

The transmission of Ack/Nack or CQI over HS-DPCCH causes the transmission power in the uplink to vary.

6.5.5.1 Minimum requirement

A change of output power is required when Ack/Nack or CQI is transmitted. The ratio of the amplitude between the DPCCH and the Ack/Nack and CQI respectively is signalled by the higher layers. The sum power on DPCCH+DPDCH shall not change by the transmission of Ack/Nack and CQI unless UE output power when Ack/Nack or CQI is transmitted would exceed the maximum ~~allowed~~ value specified in Table 6.1a whereupon the UE shall apply additional scaling to the total transmit power as defined in section 5.1.2.6 of TS.25.214. The sum in total transmitted power (DPCCH + DPDCH+HS-DPCCH) 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 6.9A. The power change due to transmission of Ack/Nack or CQI is defined as the relative power difference between the mean power of the original (reference) timeslot and the mean power of the target timeslot, not including the transient duration. The transient duration is from 25µs before the HS-DPCCH slot boundary to 25µs after the HS-DPCCH slot boundary.

Table 6.9A: Transmitter power step tolerance

Power step size (Up or down) ΔP [dB]	Transmitter power step tolerance [dB]
0	+/- 0.5
1	+/- 0.5
2	+/- 1.0
3	+/- 1.5
4 ≤ Δ P ≤ ~~6~~7	+/- 2.0

The transmit power levels versus time shall meet the mask specified in Figure 6.x.

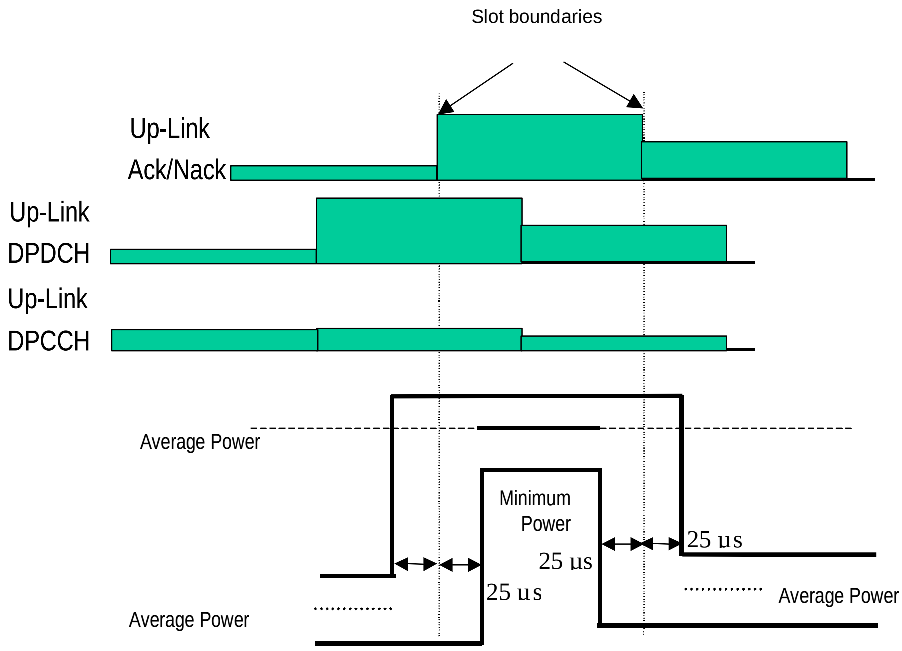

Figure 6.5A: Transmit template during Ack/Nack transmission

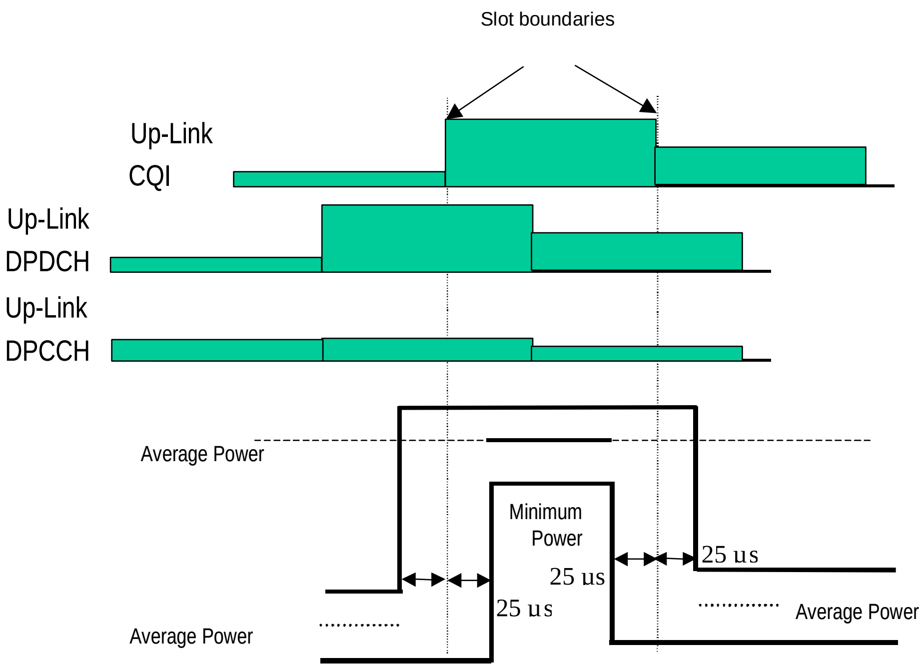

Figure 6.5B: Transmit template during CQI transmission

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.

----------------------------- NEXT MODIFIED SECTION -----------------------------

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~~ subclause A.3.1 and unless otherwise stated ~~are~~ with DL power control OFF.

----------------------------- NEXT MODIFIED SECTION -----------------------------

7.4 Maximum input level

This is defined as the maximum mean power received at the UE antenna port, at which ~~does not degrade~~ the specified BER performance shall be met.

7.4.1 Minimum requirement for DPCH reception

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
UE transmitted mean power	dBm	20 (for Power class 3) 18 (for Power class 4)

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.

7.4.2 Minimum requirement for HS-PDSCH reception

7.4.2.1 Minimum requirement for 16QAM

For the parameters specified in Table 7.3A, the requirements are specified in terms of a minimum information bit throughput R as shown in Table 7.3B for the DL reference channel H-Set 1 specified in Annex A.7.1.1. with the addition of the parameters added in the end of Table 7.3A and downlink physical channel setup according to Annex C.5.

Table 7.3A

Parameter	Unit	Test
Phase reference		P-CPICH
$\hat{I}_{or}$	dBm/3.84 MHz	-25 *
UE transmitted mean power	dBm	20 (for Power class 3) 18 (for Power class 4)
DPCH	DPCH_Ec/Ior	-13
HS-SCCH_1	HS-SCCH_Ec/Ior	-13
Redundancy and constellation version		6
Maximum number of HARQ transmissions		1
Note: The HS-DSCH shall be transmitted continuously with constant power but only every third TTI shall be sent to the UE under test.		

Table 7.3B

HS-PDSCH E_c / I_{or} (dB)	T-put R (kbps) *
-3	700

----------------------------- NEXT MODIFIED SECTION -----------------------------

9 Performance requirement (HSDPA)

9.1 General

The performance requirements for the UE in this subclause apply for the reference measurement channels specified in Annex A.7, the propagation conditions specified in table B.1B of Annex B and the Down link Physical channels specified in Annex C.5.

9.2 Demodulation of HS-DSCH (Fixed Reference Channel)

The performance requirement for a particular UE belonging to certain HS-DSCH category are determined according to Table 9.1.

Table 9.1: Mapping between HS-DSCH category and FRC

HS-DSCH category	Corresponding requirement
Category 1	H-Set 1
Category 2	H-Set 1
Category 3	H-Set 2
Category 4	H-Set 2
Category 5	H-Set 3
Category 6	H-Set 3
Category 7	H-Set 6
Category 8	H-Set 6
Category 11	H-Set 4
Category 12	H-Set 5

During the Fixed Reference Channel tests the behaviour of the Node-B emulator in response to the ACK/NACK signalling field of the HS-DPCCH is specified in Table 9.1A:

Table 9.1A: Node-B Emulator Behaviour in response to ACK/NACK/DTX

HS-DPCCH ACK/NACK Field State	Node-B Emulator Behaviour
ACK	ACK: new transmission using 1st redundancy and constellation version (RV)
NACK	NACK: retransmission using the next RV (up to the maximum permitted number or RV's)
DTX	DTX: retransmission using the RV previously transmitted to the same H-ARQ process

NOTE: Performance requirements in this section assume a sufficient power allocation to HS-SCCH_1 so that probability of reporting DTX is very low.

----------------------------- NEXT MODIFIED SECTION -----------------------------

9.2.1.3 Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 4/5

For the parameters specified in Table 9.6, the requirements are specified in terms of a minimum information bit throughput R as shown in Table 9.7 and 9.8 for the DL reference channels specified in Annex A.7.1.4 and A.7.1.5.

Table 9.6: Test Parameters for Testing QPSK FRCs H-Set 4/H-Set 5

Parameter	Unit	Test 1	Test 2	Test 3	Test 4
Phase reference		P-CPICH			
I_{oc}	dBm/3.84 MHz	-60			
Redundancy and constellation version coding sequence		{0,2,5,6}			
Maximum number of HARQ transmission		4			

Table 9.7: Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 4

Test Number	Propagation Conditions	Reference value		
		HS-PDSCH E_c/I_{or} (dB)	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 0 dB	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 10 dB
1	PA3	-6	72	340
		-3	N/A	439
2	PB3	-6	24	186
		-3	142	299
3	VA30	-6	19	183
		-3	148	306
4	VA120	-6	11	170
		-3	144	284
* Note: The reference value R is for the Fixed Reference Channel (FRC) H-Set 4				

Table 9.8: Minimum requirement QPSK, Fixed Reference Channel (FRC) H-Set 5

Test Number	Propagation Conditions	Reference value		
		HS-PDSCH E_c/I_{or} (dB)	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 0 dB	T-put R (kbps) * $\hat{I}_{or}/I_{oc}$ = 10 dB
1	PA3	-6	98	464
		-3	~~221~~N/A	635
2	PB3	-6	35	272
		-3	207	431
3	VA30	-6	33	285
		-3	213	443
4	VA120	-6	20	272
		-3	210	413
* Note: The reference value R is for the Fixed Reference Channel (FRC) H-Set 5				

------------------------------ NEXT MODIFIED SECTION ------------------------------

B.2 Propagation Conditions

B.2.1 Static propagation condition

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

B.2.2 Multi-path fading propagation conditions

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

Table B.1: Propagation Conditions for Multi path Fading Environments (Cases 1 to 6)

Case 1		Case 2		Case 3		Case 4		Case 5 (Note 1)		Case 6	
Speed for Band I, II, III and IV: 3 km/h		Speed for Band I, II, III and IV: 3 km/h		Speed for Band I, II, III and IV: 120 km/h		Speed for Band I, II, III and IV: 3 km/h		Speed for Band I, II, III and IV: 50 km/h		Speed for Band I, II, III and IV: 250 km/h	
Speed for Band V and VI: 7 km/h		Speed for Band V and VI: 7 km/h		Speed for Band V and VI: 282 km/h (Note 2)		Speed for Band V and VI: 7 km/h		Speed for Band V and VI: 118 km/h		Speed for Band V and VI: 583 km/h (Note 2)	
Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]	Relative Delay [ns]	Relative mean Power [dB]
0	0	0	0	0	0	0	0	0	0	0	0
976	-10	976	0	260	-3	976	0	976	-10	260	-3
		20000	0	521	-6					521	-6
				781	-9					781	-9

NOTE 1: Case 5 is only used in TS25.133.

NOTE 2: Speed above 250km/h is applicable to demodulation performance requirements only.

Table B.1A shows propagation conditions that are used for the performance measurements in multi-path environment when UE is informed by higher layer signalling that only DPCCH exists for channel estimation. All taps have classical Doppler spectrum. Taps are normalized to the strongest tap in the beam/sector. The actual power relation between the sector and the beam is determined by the test case.

Table B.1A: Propagation Conditions for Multi path Fading Environments (Case 7)

Case 7		
Speed for Band I, II, III and IV: 50 km/h		
Speed for Band V, VI: 118 km/h		
Relative Delay [ns]	**Average Power [dB]**	
	Sector	**Beam**
0	0.0	-
260	-4.3	-
1040	-6.6	-
4690	-2.0	0.0
7290	-7.0	-0.3
14580	-7.5	-0.9

Table B.1B shows propagation conditions that are used for HSDPA performance measurements in multi-path fading environment.

Table B.1B: Propagation Conditions for Multi-Path Fading Environments for HSDPA Performance Requirements

ITU Pedestrian A Speed 3km/h (PA3)		ITU Pedestrian B Speed 3km/h (PB3)		ITU vehicular A Speed 30km/h (VA30)		ITU vehicular A Speed 120km/h (VA120)	
Speed for Band I, II, III and IV 3 km/h		Speed for Band I, II, III and IV 3 km/h		Speed for Band I, II, III and IV 30 km/h		Speed for Band I, II, III and IV 120 km/h	
Speed for Band V, VI 7 km/h		Speed for Band V, VI 7 km/h		Speed for Band V, VI 71 km/h		Speed for Band V, VI 282 km/h (Note 1)	
Relative Delay [ns]	**Relative Mean Power [dB]**	**Relative Delay [ns]**	**Relative Mean Power [dB]**	**Relative Delay [ns]**	**Relative Mean Power [dB]**	**Relative Delay [ns]**	**Relative Mean Power [dB]**
0	0	0	0	0	0	0	0
110	-9.7	200	-0.9	310	-1.0	310	-1.0
190	-19.2	800	-4.9	710	-9.0	710	-9.0
410	-22.8	1200	-8.0	1090	-10.0	1090	-10.0
		2300	-7.8	1730	-15.0	1730	-15.0
		3700	-23.9	2510	-20.0	2510	-20.0

NOTE 1: Speed above 120km/h is applicable to demodulation performance requirements only.

~~NOTE: The propagation conditions used in simulations were based on the TR 25.890. The effect of re-mapping of channel rays to integer sample locations is FFS.~~

Table B.1C shows propagation conditions that are used for CQI test in multi-path fading

Table B.1C: Propagation Conditions for CQI test in multi-path fading

Case 8, speed 30km/h	
Relative Delay [ns]	Relative mean Power [dB]
0	0
976	-10