TSG RAN Meeting #19 **RP-030037**
Birmingham, United Kingdom, 11 - 14 March, 2003

Title **CRs (Rel-5) to TS 25.101**
Source **TSG RAN WG4**
Agenda Item **8.4.5**

RAN4 Tdoc	Spec	CR	R	Cat	Rel	Curr Ver	Title	Work Item
R4-020331	25.101	205	1	F	Rel-5	5.5.0	Phase shift due to power steps	TEI5
R4-020243	25.101	223		F	Rel-5	5.5.0	Correction to PRACH modulation quality	TEI5

3GPP TSG RAN WG4 (Radio) Meeting #26 **R4-030331**

Madrid, Spain 17 - 22 February, 2003

CR-Form-v7

CHANGE REQUEST

⌘ **25.101** **CR** **205** ⌘ **rev** **1** ⌘ Current version: **5.5.0** ⌘

*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 ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	UE Phase Shift requirements
Source:	⌘	RAN WG4
Work item code:	⌘	TEI5
Date:	⌘	05/03/2003
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:	⌘	There is no specification for the maximum allowable phase change between slots. Excessive phase discontinuity will degrade the ability of the Node B to demodulate the uplink signal. Mechanisms include power control and change of TFC.
Summary of change:	⌘	A new subclause “Maximum Phase Shift” is added in the Transmit Modulation subclause 6.8.
Consequences if not approved:	⌘	Excessive phase discontinuity at slot and frame boundaries can result in failure of demodulation in the Node B and loss of uplink performance.

Clauses affected:	⌘	6.8.4

Other specs affected: ⌘	Y	N	
		N	Other core specifications
		N	Test specifications
		N	O&M Specifications

⌘

Other comments: ⌘

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.

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 timeslot except for the PRACH/PCPCH preambles where it is 3904 chips.

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.

6.8.4 Phase discontinuity

Phase discontinuity is the change in phase between any two adjacent timeslots. The EVM for each timeslot (excluding the transient periods of 25 us on either side of the nominal timeslot boundaries), shall be measured according to subclause 6.8.2. The frequency, absolute phase, absolute amplitude and chip clock timing used to minimise the error vector are chosen independently for each timeslot. The phase discontinuity result is defined as the difference between the absolute phase used to calculate EVM for the preceding timeslot, and the absolute phase used to calculate EVM for the succeeding timeslot.

6.8.3.1 Minimum requirement

The rate of occurrence of any phase discontinuity on an uplink DPCH for the parameters specified in table 6.15a shall not exceed the values specified in table 6.15b. Phase shift that are caused by changes of the UL transport format combination (TFC) and compressed mode are not included., When calculating the phase discontinuity, the requirements for frequency error and EVM in subclauses 6.3 and 6.8.2 for each timeslot shall be met.

Table 6.15a: Parameters for Phase discontinuity

Parameter	Unit	Level
Power control step size	dB	1

Table 6.15b: Phase discontinuity minimum requirement

Phase discontinuity in degrees	Maximum allowed rate of occurrence in Hz
<= 30	1500
> 30 to ≤60	300
> 60	0

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CR-Form-v7

CHANGE REQUEST

⌘ 25.101 CR 223 ⌘rev ⌘ Current version: 5.5.0 ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction to PRACH modulation quality
Source:	⌘	RAN WG4
Work item code:	⌘	TEI5
Date:	⌘	05/03/2003
Category:	⌘	F
Release:	⌘	Rel-5

Use one of the following categories:
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R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The requirement for PCDE should not apply to the PRACH and PCPCH since they do not use multi-code transmission for the data part. The measurement interval was not consistently specified.
Summary of change:	⌘	The measurement interval is clarified for normal and PRACH / PCPCH preamble transmissions. The requirement for PCDE to apply to PRACH and PCPCH preamble and message parts is removed.
Consequences if not approved:	⌘	Possible confusion over the measurement interval leading to inconsistent measurement results. There are no performance requirements for PCDE applying to PRACH / PCPCH so no meaningful test could have been developed. **Isolated Impact Analysis:** Removal of redundant requirement has no effect on network performance.

Clauses affected:	⌘	6.8			
Other specs affected:	⌘	Y / N ☐ / X Other core specifications X / ☐ Test specifications ☐ / X O&M Specifications	⌘	TS 34.121	
Other comments:	⌘				

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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.

6.8 Transmit modulation

Transmit modulation defines the modulation quality for expected in-channel RF transmissions from the UE. The requirements apply to all transmissions including the PRACH/PCPCH pre-amble and message parts and all other expected transmissions. In cases where the mean power of the RF signal is allowed to change versus time e.g. PRACH, DPCH in compressed mode, change of TFC and inner loop power control, the EVM and Peak Code Domain Error requirements do not apply during the 25 us period before and after the nominal time when the power is expected to change.

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

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

6.8.2 Error Vector Magnitude

The Error Vector Magnitude is a measure of the difference between the 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 us at each end of the slot. ~~f~~For the PRACH ~~/~~ and PCPCH preambles ~~where it~~ the measurement interval is 4096 chips less 25 us 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.

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 timeslot except when the mean power between slots is expected to change whereupon the measurement interval is reduced by 25 us at each end of the slot~~for the PRACH/PCPCH preambles where it is 3904 chips~~.

The requirement for peak code domain error is only applicable for multi-code DPDCH transmission and therefore does not apply for the PRACH and PCPCH preamble and message parts.

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.