TSG RAN Meeting #26 **RP-040447**
Athens, Greece, 8 - 10 December 2004

Title **CRs (Rel-5 Category F and Rel-6 Category A) to TS25.214 for Correction of downlink transmit power control in compressed mode**
Source **TSG RAN WG1**
Agenda Item **7.2.5**

RAN1 Tdoc	Spec	CR	Rev	Phase	Cat	Current Version	Subject	Work item	Remarks
R1-041320	25.214	359	-	Rel-5	F	5.9.0	Correction of downlink transmit power control in compressed mode	TEI-5	
R1-041320	25.214	360	-	Rel-6	A	6.3.0	Correction of downlink transmit power control in compressed mode	TEI-6	

3GPP TSG-RAN WG1 Meeting #39
Yokohama, Japan, 15th -19th Novemeber 2004

Tdoc ⌘R1-041320

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.214** **CR** **359** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 [X] Core Network [ ]

Title:	⌘	Correction of downlink transmit power control in compressed mode
Source:	⌘	RAN WG1
Work item code:	⌘	TEI-5
Date:	⌘	15/11/2004
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:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	In sub-clause 5.2.1.3 of current specification it is said "In compressed mode, compressed frames may occur in either the uplink or the downlink or both. In compressed frames, the transmission of downlink DPDCH(s) and DPCCH shall be stopped during transmission gaps." However there is no reason why the transmission of DL DPDCH&DPCCH has to be stopped if compressed frame only occurs in the uplink.
Summary of change:	⌘	The above sentence is changed to "In compressed mode, compressed frames may occur in either the uplink or the downlink or both. In **downlink** compressed frames, the transmission of downlink DPDCH(s) and DPCCH shall be stopped during transmission gaps."
Consequences if not approved:	⌘	Currentext may cause confuion and missunderstanding of the real intention <Isolated Impact Analysis> Since this CR aims to clarify the real intention of the text to avoid possible confusion in the future, there should be no impact on Rel-99, Rel-4 UE and network.

Clauses affected:	⌘	5.2.1.3

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	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.

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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.

5.2.1.3 Power control in compressed mode

The aim of downlink power control in uplink or/and downlink compressed mode is to recover as fast as possible a signal-to-interference ratio (SIR) close to the target SIR after each transmission gap.

The UE behaviour is the same in compressed mode as in normal mode, described in subclause 5.2.1.2, except that the target SIR is offset by higher layer signalling. However due to transmission gaps in uplink compressed frames there may be incomplete sets of TPC commands when DPC_MODE=1.

UTRAN behaviour is as stated in section 5.2.1.2.2 except for DPC_MODE = 1 where missing TPC commands in the UL may lead the UTRAN to changing its power more frequently than every 3 slots.

In compressed mode, compressed frames may occur in either the uplink or the downlink or both. In downlink compressed frames, the transmission of downlink DPDCH(s) and DPCCH shall be stopped during transmission gaps.

The power of the DPCCH and DPDCH in the first slot after the transmission gap should be set to the same value as in the slot just before the transmission gap.

During compressed mode except during downlink transmission gaps, UTRAN shall estimate the *k*:th TPC command and adjust the current downlink power $P(k\text{-}1)$ [dB] to a new power $P(k)$ [dB] according to the following formula:

$$P(k) = P(k - 1) + P_{TPC}(k) + P_{SIR}(k) + P_{bal}(k),$$

where $P_{TPC}(k)$ is the *k*:th power adjustment due to the inner loop power control, $P_{SIR}(k)$ is the k-th power adjustment due to the downlink target SIR variation, and $P_{bal}(k)$ [dB] is a correction according to the downlink power control procedure for balancing radio link powers towards a common reference power. The power balancing procedure and control of the procedure is described in [6].

Due to transmission gaps in uplink compressed frames, there may be missing TPC commands in the uplink.

For DPC_MODE = 0 if no uplink TPC command is received, $P_{TPC}(k)$ derived by the Node B shall be set to zero. Otherwise, $P_{TPC}(k)$ is calculated the same way as in normal mode (see sub-clause 5.2.1.2.2) but with a step size Δ_{STEP} instead of Δ_{TPC}.

For DPC_MODE = 1, the sets of slots over which the TPC commands are processed shall remain aligned to the frame boundaries in the compressed frame. If this results in an incomplete set of TPC commands, the UE shall transmit the same TPC commands in all slots of the incomplete set.

The power control step size $\Delta_{STEP} = \Delta_{RP\text{-}TPC}$ during RPL slots after each transmission gap and $\Delta_{STEP} = \Delta_{TPC}$ otherwise, where:

- RPL is the recovery period length and is expressed as a number of slots. RPL is equal to the minimum value out of the transmission gap length and 7 slots. If a transmission gap is scheduled to start before RPL slots have elapsed, then the recovery period shall end at the start of the gap, and the value of RPL shall be reduced accordingly.

- $\Delta_{RP\text{-}TPC}$ is called the recovery power control step size and is expressed in dB. $\Delta_{RP\text{-}TPC}$ is equal to the minimum value of 3 dB and $2\Delta_{TPC}$.

The power offset $P_{SIR}(k) = \delta P_{curr} - \delta P_{prev}$, where δP_{curr} and δP_{prev} are respectively the value of δP in the current slot and the most recently transmitted slot and δP is computed as follows:

$$\delta P = \max(\Delta P1\_compression, \ldots, \Delta Pn\_compression) + \Delta P1\_coding + \Delta P2\_coding$$

where n is the number of different TTI lengths amongst TTIs of all TrChs of the CCTrCh, where $\Delta P1\_coding$ and $\Delta P2\_coding$ are computed from uplink parameters DeltaSIR1, DeltaSIR2, DeltaSIRafter1, DeltaSIRafter2 signaled by higher layers as:

- $\Delta P1\_coding$ = DeltaSIR1 if the start of the first transmission gap in the transmission gap pattern is within the current frame.

- $\Delta P1coding$ = DeltaSIRafter1 if the current frame just follows a frame containing the start of the first transmission gap in the transmission gap pattern.

- $\Delta P2\_coding$ = DeltaSIR2 if the start of the second transmission gap in the transmission gap pattern is within the current frame.

- $\Delta P2\_coding$ = DeltaSIRafter2 if the current frame just follows a frame containing the start of the second transmission gap in the transmission gap pattern.

- $\Delta P1\_coding$ = 0 dB and $\Delta P2\_coding$ = 0 dB in all other cases.

and $\Delta Pi\_compression$ is defined by :

- $\Delta Pi\_compression$ = 3 dB for downlink frames compressed by reducing the spreading factor by 2.

- $\Delta Pi\_compression = 10 \log (15*F_i / (15*F_i - TGL_i))$ if there is a transmission gap created by puncturing method within the current TTI of length F_i frames, where TGL_i is the gap length in number of slots (either from one gap or a sum of gaps) in the current TTI of length F_i frames.

- $\Delta Pi\_compression$ = 0 dB in all other cases.

In case several compressed mode patterns are used simultaneously, a δP offset is computed for each compressed mode pattern and the sum of all δP offsets is applied to the frame.

For all time slots except those in transmissions gaps, the average power of transmitted DPDCH symbols over one timeslot shall not exceed Maximum_DL_Power (dB) by more than δP_{curr}, nor shall it be below Minimum_DL_Power (dB). Transmitted DPDCH symbol means here a complex QPSK symbol before spreading which does not contain DTX. Maximum_DL_Power (dB) and Minimum_DL_Power (dB) are power limits for one channelisation code, relative to the primary CPICH power [6].

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Source:	⌘	RAN WG1
Work item code:	⌘	TEI-6
Date:	⌘	15/11/2004
Category:	⌘	**A**
Release:	⌘	Rel-6

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