TSG RAN Meeting #27 **RP-050094**
Tokyo, Japan, 9 - 11 March 2005

Title	**CR (Rel-5 Category F) to TS25.214 for Correction to computed gain factors quantization**
Source	**TSG RAN WG1**
Agenda Item	**8.2.5**

RAN1 Tdoc	Spec	CR	Rev	Rel	Cat	Current Version	Subject	Work item	Remarks
R1-050113	25.214	365	-	Rel-5	F	5.10.0	Correction to computed gain factors quantization	TEI5	

3GPP TSG-RAn WG1 Meeting #40
Scottsdale, AZ, USA, Feb 14-18, 2005

Tdoc ⌘R1-050113

CR-Form-v7.1

CHANGE REQUEST

⌘	**25.214**	**CR**	**365**	⌘ **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:	⌘	Correction to computed gain factors quantization		
Source:	⌘	RAN WG1		
Work item code:	⌘	TEI-5	***Date:*** ⌘	06/02/2005
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:	⌘	Restrictive specification prevents implementation resulting in greater link budget for certain TFCs part of RABs defined in 34.108.
Summary of change:	⌘	Enables UE to use any gain factor between the real valued computed gain factor and the quantized value currently defined in the specification.
Consequences if not approved:	⌘	Degraded link budget (i.e. rate coverage) for some of the TFC defined in 34.108; as an example coverage for the 256 kbps TFC and 384 kbps TFC defined as part of the 384 kbps PS RAB in 34.108 have the same coverage without the correction, wheras UE taking advantage of the correction could operate the 256 kbps TFC with greater coverage than the 384 kbps TFC.

Clauses affected:	⌘	5.1.2.5.3, 5.1.2.5.4				
		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.

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.

5.1.2.5 Setting of the uplink DPCCH/DPDCH power difference

5.1.2.5.1 General

The uplink DPCCH and DPDCH(s) are transmitted on different codes as defined in subclause 4.2.1 of [3]. The gain factors β_c and β_d may vary for each TFC. There are two ways of controlling the gain factors of the DPCCH code and the DPDCH codes for different TFCs in normal (non-compressed) frames:

- β_c and β_d are signalled for the TFC, or
- β_c and β_d is computed for the TFC, based on the signalled settings for a reference TFC.

Combinations of the two above methods may be used to associate β_c and β_d values to all TFCs in the TFCS. The two methods are described in subclauses 5.1.2.5.2 and 5.1.2.5.3 respectively. Several reference TFCs may be signalled from higher layers.

The gain factors may vary on radio frame basis depending on the current TFC used. Further, the setting of gain factors is independent of the inner loop power control.

After applying the gain factors, the UE shall scale the total transmit power of the DPCCH and DPDCH(s), such that the DPCCH output power follows the changes required by the power control procedure with power adjustments of Δ_{DPCCH} dB, subject to the provisions of sub-clause 5.1.2.6.

The gain factors during compressed frames are based on the nominal power relation defined in normal frames, as specified in subclause 5.1.2.5.4.

5.1.2.5.2 Signalled gain factors

When the gain factors β_c and β_d are signalled by higher layers for a certain TFC, the signalled values are used directly for weighting of DPCCH and DPDCH(s). The variable A_j, called the nominal power relation is then computed as:

$$A_j = \frac{\beta_d}{\beta_c}.$$

5.1.2.5.3 Computed gain factors

The gain factors β_c and β_d may also be computed for certain TFCs, based on the signalled settings for a reference TFC.

Let $\beta_{c,ref}$ and $\beta_{d,ref}$ denote the signalled gain factors for the reference TFC. Further, let $\beta_{c,j}$ and $\beta_{d,j}$ denote the gain factors used for the j:th TFC. Also let L_{ref} denote the number of DPDCHs used for the reference TFC and $L_{,j}$ denote the number of DPDCHs used for the j:th TFC.

<u>Define the variable</u>

$$K_{ref} = \sum_i RM_i \cdot N_i ;$$

where RM_i is the semi-static rate matching attribute for transport channel i (defined in [2] subclause 4.2.7), N_i is the number of bits output from the radio frame segmentation block for transport channel i (defined in [2] subclause 4.2.6.1), and the sum is taken over all the transport channels i in the reference TFC.

<u>Similarly, define the variable</u>

$$K_j = \sum_i RM_i \cdot N_i ;$$

where the sum is taken over all the transport channels i in the j:th TFC.

The variable A_j, called the nominal power relation is then computed as:

$$A_j = \frac{\beta_{d,ref}}{\beta_{c,ref}} \cdot \sqrt{\frac{L_{ref}}{L_j}} \sqrt{\frac{K_j}{K_{ref}}} .$$

The gain factors for the j:th TFC are then computed as follows:

- If $A_j > 1$, then $\beta_{d,j} = 1.0$ and $\beta_{c,j}$ shall be set between ~~is~~ the largest quantized β -value, for which the condition $\beta_{c,j} \leq 1 / A_j$ holds, and up to $1/A_j$. Since $\beta_{c,j}$ may not be set to zero, if the above rounding results in a zero value, $\beta_{c,j}$ shall be set between $1/A_j$ and up to the lowest quantized amplitude ratio of 1/15 as specified in [3].

- If $A_j \leq 1$, then $\beta_{d,j}$ shall be set between A_j and up to ~~is~~ the smallest quantized β -value, for which the condition $\beta_{d,j} \geq A_j$ holds and $\beta_{c,j} = 1.0$.

The quantized β-values are defined in [3] subclause 4.2.1, table 1.

5.1.2.5.4 Setting of the uplink DPCCH/DPDCH power difference in compressed mode

The gain factors used during a compressed frame for a certain TFC are calculated from the nominal power relation used in normal (non-compressed) frames for that TFC. Let A_j denote the nominal power relation for the j:th TFC in a normal frame. Further, let $\beta_{c,C,j}$ and $\beta_{d,C,j}$ denote the gain factors used for the j:th TFC when the frame is compressed. The variable $A_{C,j}$ is computed as:

$$A_{C,j} = A_j \cdot \sqrt{\frac{15 \cdot N_{pilot,C}}{N_{slots,C} \cdot N_{pilot,N}}} ;$$

where $N_{pilot,C}$ is the number of pilot bits per slot when in compressed mode, and $N_{pilot,N}$ is the number of pilot bits per slot in normal mode. $N_{slots,C}$ is the number of slots in the compressed frame used for transmitting the data.

The gain factors for the j:th TFC in a compressed frame are computed as follows:

If $A_{C,j} > 1$, then $\beta_{d,C,j} = 1.0$ and $\beta_{c,C,j}$ shall be set between ~~is~~ the largest quantized β -value, for which the condition $\beta_{c,C,j} \leq 1 / A_{C,j}$ holds, and up to $1/A_j$. Since $\beta_{c,C,j}$ may not be set to zero, if the above rounding results in a zero value, $\beta_{c,C,j}$ shall be set between $1/A_j$ and up to the lowest quantized amplitude ratio of 1/15 as specified in [3].

If $A_{C,j} \leq 1$, then $\beta_{d,C,j}$ shall be set between A_j and up to ~~is~~ the smallest quantized β -value, for which the condition $\beta_{d,C,j} \geq A_{C,j}$ holds and $\beta_{c,C,j} = 1.0$.

The quantized β-values are defined in [3] subclause 4.2.1, table 1.