3GPP TSG RAN WG1 ***TSGR1#9(99)i14***
November 30 – December 3, 1999, Dresden, Germany

Agenda item: **AH09**

Source: **Philips**

Title: **Uplink power control in compressed mode [correction]**

Document for: **Decision**

Introduction

This document contains a correction to section 5.1.2.3 (“Transmit power control in compressed mode”) of TS25.214.

At the RAN WG1 meeting #7bis, the text proposal in [1] was agreed, defining power control behaviour for each compressed mode Power Control Mode (PCM) in the two cases of algorithm 1 or algorithm 2 being used.

It was intended and agreed that in the event that PCM = 1, algorithm 1 should be used in the recovery period, regardless of whether the normal mode power control algorithm is algorithm 1 or algorithm 2. (PCM = 0 would be selected if it were desired to use algorithm 2 during the recovery period.) However, this appears to have been omitted from the current text of TS25.214.

Following discussion on the email reflector, the attached text proposal makes this correction.

3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 – Dec 3, 1999

Document R1-99i14
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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3G25.214	CR	016	Current Version:	3.0.0

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

For submission to: TSG-RAN #6 *list expected approval meeting # here ↑*	for approval	X	strategic		*(for SMG use only)*
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

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

Source: Philips **Date:** 1999-11-05

Subject: Uplink power control in compressed mode

Work item:

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

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

Reason for change: Correction to bring text into line with conclusion reached at RAN WG1 Meeting #7bis.

Clauses affected: 5.1.2.3 Transmit power control in compressed mode

Other specs affected:

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

Other comments:


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5.1.2.3 Transmit power control in compressed mode

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

In downlink compressed mode, no power control is applied during transmission gaps, since no downlink TPC command is sent. Thus, the transmit powers of the uplink DPDCH(s) and DPCCH are not changed during the transmission gaps.

In simultaneous downlink and uplink compressed mode, the transmission of uplink DPDCH(s) and DPCCH is stopped during transmission gaps.

The initial transmit power of each uplink DPDCH and DPCCH after the transmission gap is equal to the power before the gap, but with an offset Δ_{RESUME}. The value of Δ_{RESUME} (in dB) is determined according to the Power Resume Mode (PRM). The PRM is a UE specific parameter, which is signalled by the network with the other parameters of the downlink compressed mode (see TS 25.215). The different modes are summarised in table 1.

Table 1: Power control resume modes during compressed mode

Power Resume Mode	Description
0	$\Delta_{RESUME} = 0$
1	$\Delta_{RESUME} = \text{Int}[d_{last} / \Delta_{TPCmin}] \Delta_{TPCmin}$

Here Int[ ] means round to the nearest integer and Δ_{TPCmin} is the minimum power control step size supported by the UE. δ_{last} is the power offset computed at the last slot before the transmission gap according to the following recursive relations, which are, executed every slot during uplink transmission:

$$d_{last} = 0.9375 d_{previous} - 0.96875 TPC\_cmd_{last} \Delta_{TPC}$$

$$d_{previous} = d_{last}$$

TPC_cmd is the power control command executed by the UE in the last slot before the transmission gap. $\delta_{previous}$ is the power offset computed for the previous slot. The value of $\delta_{previous}$ shall be initialised to zero when a DCH is activated, or during the first slot after a transmission gap.

After each transmission gap, 2 modes are possible for the power control algorithm. The power control mode (PCM) is fixed and signalled with the other parameters of the downlink compressed mode (see TS 25.215). The different modes are summarised in the table 2:

Table 2: Power control modes during compressed mode

Mode	Description
0	Ordinary transmit power control (see subclause 5.1.2.2) is applied with step size Δ_{TPC}
1	Ordinary transmit power control is applied using algorithm 1 (see subclause 5.1.2.2.2) with step size $\Delta_{RP\text{-}TPC}$ during RPL slots after each transmission gap.

For mode 0, the step size is not changed and the ordinary transmit power control is still applied during compressed mode (see subclause 5.1.2.2), using the same algorithm for processing TPC commands as in normal mode (see section 5.1.2.2.2 and 5.1.2.2.3).

For mode 1, during RPL slots after each transmission gap, called the recovery period, ~~the same~~ power control algorithm 1 is applied ~~but~~ with a step size $\Delta_{RP\text{-}TPC}$ instead of Δ_{TPC}.

$\Delta_{RP\text{-}TPC}$ is called recovery power control step size and is expressed in dB. If algorithm 1 (section 5.1.2.2.2) is used in normal mode, $\Delta_{RP\text{-}TPC}$ is equal to the minimum value of 3 dB and $2\Delta_{TPC}$. If algorithm 2 (section 5.1.2.2.3) is used in normal mode, $\Delta_{RP\text{-}TPC}$ is equal to 1 dB.

RPL is called recovery period length and is expressed in number of slots. RPL is fixed and equal to the minimum value of TGL and 7 slots.

After the recovery period, ordinary transmit power control resumes using the same algorithm and step size as used in normal mode before the transmission gap.

If algorithm 2 (section 5.1.2.2.3) is being used in normal mode, the sets of slots over which the TPC commands are processed (in section 5.1.2.2.2.3.1) shall remain aligned to the frame boundaries in the compressed frame. In both mode 0 or mode 1, if the transmission gap or the recovery period results in any incomplete sets of TPC commands, no TPC_temp_i command will be determined for those sets of slots which are incomplete, and there will be no change in transmit power level for those sets of slots.

5.1.2.4 Setting of the uplink DPCCH/DPDCH power difference

5.1.2.4.1 General

The uplink DPCCH and DPDCH(s) are transmitted on different codes as defined in section 4.2.1 of TS 25.213. 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:

- b_c and b_d are signalled for the TFC, or
- b_c and b_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 b_c and b_d values to all TFCs in the TFCS. The two methods are described in sections 5.1.2.4.2 and 5.1.2.4.3 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. This means that at the start of a frame, the gain factors are determined and the inner loop power control step is applied on top of that.

Appropriate scaling of the output power shall be performed by the UE, so that the output DPCCH power follows the inner loop power control with power steps of $\pm\Delta_{TPC}$ dB.