3GPP TSG RAN WG1 ***TSGR1#12(00)0500***
Seoul, Korea, Apr 10 – 13, 2000

Agenda item:

Source: **Philips**

Title: **Correction to Power Control in Compressed Mode Recovery Period**

Document for: **Decision**

Introduction

This CR makes a correction to 25.214 section 5.1.2.3 on uplink DCH power control in compressed mode.

Although this would probably rarely occur, it is still desirable that UE behaviour is specified. The clarification suggested is that in this event the recovery period ends, and the value of RPL is reduced accordingly.

3GPP TSG RAN WG1 Meeting #12

***Document* R1-00-0500**

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

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.214	CR	085	Current Version:	3.2.0

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

For submission to: TSG-RAN #8 *list expected approval meeting # here ↑*

for approval [X]
for information [ ]

strategic [ ]
non-strategic [ ]
(for SMG use only)

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:** 2000-03-31

Subject: Correction to Power Control in Compressed Mode Recovery Period

Work item:

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

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: Clarification of power control behaviour in compressed mode recovery period when a transmission gap starts within the recovery period

Clauses affected: 5.1.2.3

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:

help.doc

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5.1.2.3 Transmit power control in compressed mode

In compressed mode, some frames are compressed and contain transmission gaps. The uplink power control procedure is as specified in clause 5.1.2.2, using the same UTRAN supplied parameters for Power Control Algorithm and step size (Δ_{TPC}), but with additional features which aim to recover as rapidly as possible a signal-to-interference ratio (SIR) close to the target SIR after each transmission gap.

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

Due to the transmission gaps in compressed frames, there may be misssing TPC commands in the downlink. If no downlink TPC command is transmitted, the corresponding TPC_cmd derived by the UE shall be set to zero.

Compressed and non-compressed frames in the uplink DPCCH may have a different number of pilot bits per slot. A change in the transmit power of the uplink DPCCH would be needed in order to compensate for the change in the total pilot energy. Therefore at the start of each slot the UE shall derive the value of a power offset Δ_{PILOT}. If the number of pilot bits per slot in the uplink DPCCH is different from its value in the most recently transmitted slot, Δ_{PILOT} (in dB) shall be given by:

$$\Delta_{PILOT} = 10\mathrm{Log}_{10}\,(N_{pilot,prev}/N_{pilot,curr})$$

where $N_{pilot,prev}$ is the number of pilot bits in the most recently transmitted slot , and $N_{pilot,curr}$ is the number of pilot bits in the current slot. Otherwise, including during transmission gaps in the downlink, Δ_{PILOT} shall be zero.

Unless otherwise specified, in every slot during compressed mode the UE shall adjust the transmit power of the uplink DPCCH with a step of Δ_{DPCCH} (in dB) which is given by:

$$\Delta_{DPCCH} = \Delta_{TPC} \times \mathrm{TPC\_cmd} + \Delta_{PILOT}$$

At the start of the first slot after an uplink transmission gap the UE shall apply a change in the transmit power of the uplink DPCCH by an amount Δ_{DPCCH} (in dB), with respect to the uplink DPCCH power in the most recently transmitted uplink slot, where

$$\Delta_{DPCCH} = \Delta_{RESUME} + \Delta_{PILOT}$$

The value of Δ_{RESUME} (in dB) shall be determined by the UE according to the Initial Transmit Power mode (ITP). The ITP is a UE specific parameter, which is signalled by the network with the other compressed mode parameters (see TS 25.215). The different modes are summarised in table 1.

Table 1: Initial Transmit Power modes during compressed mode

Initial Transmit Power mode	Description
0	$\Delta_{RESUME} = \Delta_{TPC} \times \mathrm{TPC\_cmd}_{gap}$
1	$\Delta_{RESUME} = d_{\,last}$

In the case of a transmission gap in the uplink, $\mathrm{TPC\_cmd}_{gap}$ shall be the value of TPC_cmd derived in the first slot of the uplink transmission gap, if a downlink TPC_command is transmitted in that slot. Otherwise $\mathrm{TPC\_cmd}_{gap}$ shall be zero.

If a downlink TPC command is transmitted in the first slot of a downlink transmission gap, then δ_{last} shall be equal to the value of δ_i computed in the first slot of the downlink transmission gap. Otherwise δ_{last} shall be equal to the value of δ_i computed in the last slot before the downlink transmission gap. δ_i shall be updated according to the following recursive relations, which shall be executed in all slots with simultaneous uplink and downlink DPCCH transmission and in the first slot of a downlink transmission gap if a downlink TPC command is transmitted in that slot:

$$d_i = 0.9375 d_{i-1} - 0.96875 TPC\_cmd_i \Delta_{TPC}$$
$$d_{i-1} = d_i$$

TPC_cmd_i is the most recent power control command derived by the UE.

δ_{i-1} is the value of δ_i computed for the previous slot. The value of δ_{i-1} shall be initialised to zero when the uplink DPCCH is activated, and also at the end ofthe first slot after each downlink transmission gapAfter a transmission gap in either the uplink or the downlink, the period following resumption of simultaneous uplink and downlink DPCCH transmission is called a recovery period. 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.

During the recovery period, 2 modes are possible for the power control algorithm. The Recovery Period Power control mode (RPP) is signalled with the other compressed mode parameters (see TS 25.215). The different modes are summarised in the table 2:

Table 2: Recovery Period Power control modes during compressed mode

Recovery Period power control mode	Description
0	Transmit power control is applied using the algorithm determined by the value of PCA, as insubclause 5.1.2.2 with step size Δ_{TPC}
1	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 RPP mode 0, the step size is not changed during the recovery period and ordinary transmit power control is applied (see subclause 5.1.2.2), using the algorithm for processing TPC commands determined by the value of PCA (see sub clauses 5.1.2.2.2 and 5.1.2.2.3).

For RPP mode 1, during RPL slots after each transmission gap, power control algorithm 1 is applied with a step size $\Delta_{RP\text{-}TPC}$ instead of Δ_{TPC}, regardless of the value of PCA. The change in uplink DPCCH transmit power (except for the first slot after the transmission gap) is given by

$$\Delta_{DPCCH} = \Delta_{RP\text{-}TPC} \times TPC\_cmd + \Delta_{PILOT}$$

$\Delta_{RP\text{-}TPC}$ is called the recovery power control step size and is expressed in dB. If PCA has the value 1, , $\Delta_{RP\text{-}TPC}$ is equal to the minimum value of 3 dB and $2\Delta_{TPC}$. If PCA has the value 2 , $\Delta_{RP\text{-}TPC}$ is equal to 1 dB.

After the recovery period, ordinary transmit power control resumes using the algorithm specified by the value of PCA and with step size Δ_{TPC}.

If PCA has the value 2 , the sets of slots over which the TPC commands are processed shall remain aligned to the frame boundaries in the compressed frame. For both RPP mode 0 and RPP mode 1, if the transmission gap or the recovery period results in any incomplete sets of TPC commands, TPC_cmd shall be zero for those sets of slots which are incomplete.