3GPP TSG RAN WG1 ***TSGR1#9(99)i11***

November 30 – December 3, 1999, Dresden, Germany

Agenda item:	**Ad hoc 14, Adhoc 9**
Source:	**Philips**
Title:	**Consolidation of CPCH Power Control Preamble Information**
Document for:	**Decision**

Introduction

This paper aims to consolidate the uplink power control information for CPCH into one section.

In R1-99i15, a new section 5.1.3 has been proposed for TS25.214, for uplink PCPCH power control information.

In the adhoc 14 meeting at WG1#8, some text was agreed in R1-99h03 for to clarify the power control preamble for CPCH. This power control information was intended to be inserted in the CPCH access procedure in TS25.214.

The present paper proposes an editorial change to bring all the power control information for the CPCH together into the new section 5.1.3 in TS25.214.

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

***Document* R1-99i11**
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.

3G25.214	**CR**	**014**	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	for approval	X	strategic		*(for SMG use only)*
list expected approval meeting # here ↑		for information		non-strategic		

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:**	1999-11-19
Subject:	Consolidation of CPCH Power Control Preamble Information		
Work item:			

Category:	F	Correction		**Release:**	Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature	X		Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:	Power control information for CPCH appears in 2 different parts of the specification, and needs to be brought together.
Clauses affected:	5.1 Uplink Power Control

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:	New section 5.1.3 inserted

help.doc

<--------- double-click here for help and instructions on how to create a CR.

5.1.2.4.2 Signalled gain factors

When the gain factors b_c and b_d are signalled by higher layers for a certain TFC, the signalled values are used directly for weighting of DPCCH and DPDCH(s).

5.1.2.4.3 Computed gain factors

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

Let $b_{c,ref}$ and $b_{d,ref}$ denote the signalled gain factors for the reference TFC. Further, let $b_{c,j}$ and $b_{d,j}$ denote the gain factors used for the TFC in the j:th radio frame.

Define the variable

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

where RM_i is the semi-static rate matching attribute for transport channel i (defined in TS 25.212 section 4.2.7), N_i is the number of bits output from the radio frame segmentation block for transport channel i (defined in TS 25.212 section 4.2.6.1), and the sum is taken over all the transport channels i in the reference TFC.

Similarly, define the variable

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

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

The variable A_j is then computed as:

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

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

If $A_j > 1$, then $b_{d,j} = 1.0$ and $b_{c,j} = \lfloor 1/A_j \rfloor$, where $\lfloor \bullet \rfloor$ means rounding to closest lower quantized β–value.

If $A_j \leq 1$, then $b_{d,j} = \lceil A_j \rceil$ and $b_{c,j} = 1.0$, where $\lceil \bullet \rceil$ means rounding to closest higher quantized β-value.

The quantized β-values is defined in TS 25.213 section 4.2.1, table 1.

5.1.3 PCPCH

This section describes the power control procedures for the PCPCH. The CPCH access procedure is described in section 6.2.

5.1.3.1 Power control in the message part

The uplink inner-loop power control adjusts the UE transmit power in order to keep the received uplink signal-to-interference ratio (SIR) at a given SIR target, SIR_{target}, which is set by the higher layer outer loop.

The network should estimate the signal-to-interference ratio SIR_{est} of the received PCPCH . The network then generates TPC commands and transmits the commands once per slot according to the following rule: if SIR_{est} >

SIR_{target} then the TPC command to transmit is "0", while if $SIR_{est} < SIR_{target}$ then the TPC command to transmit is "1".

The UE derives a TPC command, TPC_cmd, for each slot. Two algorithms shall be supported by the UE for deriving a TPC_cmd, as described in subclauses 5.1.2.2.2.1 and 5.1.2.2.3.1. Which of these two algorithms is used is a higher-layer parameter under the control of the UTRAN.

The step size Δ_{TPC} is a higher-layer parameter under the control of the UTRAN, that can have the values 1 dB or 2 dB.

After deriving the TPC command TPC_cmd using one of the two supported algorithms, the UE shall adjust the transmit power of the uplink PCPCH with a step of Δ_{TPC} dB according to the TPC command. If TPC_cmd equals 1 then the transmit power of the uplink PCPCH shall be increased by Δ_{TPC} dB. If TPC_cmd equals -1 then the transmit power of the uplink PCPCH shall be decreased by Δ_{TPC} dB. If TPC_cmd equals 0 then the transmit power of the uplink PCPCH shall be unchanged.

Any power increase or decrease shall take place immediately before the start of the pilot field on the PCPCH control channel.

5.1.3.2 Power control in the power control preamble

The UE commences the power control preamble using the same power level as was used for the CD preamble.

The initial power control step size used in the power control preamble differs from that used in the message part: if inner loop power control algorithm 1 is to be used in the message part, then the initial step size in the power control preamble is $\Delta_{TPC\text{-}init}$, where $\Delta_{TPC\text{-}init}$ is equal to the minimum value out of 3 dB and $2\Delta_{TPC}$, where Δ_{TPC} is the power control step size used for the message part. If inner loop power control algorithm 2 is to be used in the message part, then inner loop power control algorithm 1 is used initially in the power control preamble, with a step size of 2dB. In either case, the power control algorithm and step size revert to those used for the message part as soon as the sign of the TPC commands reverses for the first time.

5.2 Downlink power control

The transmit power of the downlink channels is determined by the network. In general the ratio of the transmit power between different downlink channels is not specified and may change with time.

5.2.1 DPCCH/DPDCH

5.2.1.1 General

The downlink transmit power control procedure controls simultaneously the power of a DPCCH and its corresponding DPDCHs. The power control loop adjusts the power of the DPCCH and DPDCHs with the same amount, i.e. the relative power difference between the DPCCH and DPDCHs is not changed.

The relative transmit power offset between DPCCH fields and DPDCHs is determined by the network The TFCI, TPC and pilot fields of the DPCCH are offset relative to the DPDCHs power by PO1, PO2 and PO3 dB respectively. The power offsets may vary in time.

5.2.1.2 Ordinary transmit power control

The downlink inner-loop power control adjusts the network transmit power in order to keep the received downlink SIR at a given SIR target, SIR_{target}. A higher layer outer loop adjusts SIR_{target} independently for each connection.

The UE should estimate the received downlink DPCCH/DPDCH power of the connection to be power controlled. Simultaneously, the UE should estimate the received interference. The obtained SIR estimate SIR_{est}

is then used by the UE to generate TPC commands according to the following rule: if $SIR_{est} > SIR_{target}$ then the TPC command to transmit is “0”, requesting a transmit power decrease, while if $SIR_{est} < SIR_{target}$ then the TPC command to transmit is “1”, requesting a transmit power increase.