3GPP TSG RAN WG1 ***TSGR1#8(99)h02***
October 12-15, 1999, New York, USA

Agenda item: **Ad hoc 14**

Source: **Philips, Nokia**

Title: **Text proposal and Change Request for CPCH power control preamble length**

Document for: **Decision**

Introduction

The value for the CPCH power control preamble has been indicated in 25.211 to be 10ms in square brackets and shown as “FFS”. The issue has been discussed on the Ad Hoc 14 reflector and it was proposed that the length of the preamble would take two possible values, either on or off.

The benefit of a power control preamble has been demonstrated in [1], presented in Ad Hoc 9. This paper therefore proposes that the length of the CPCH power control preamble is a parameter set by higher layers, which can take the values 0 or 8 slots.

The length 8 slots is proposed in order to align the timing with RACH/CPCH sub channels which use an even number of slots. This allows a power error of 16dB to be corrected prior to the start of data transmission in the message part if a 2dB step size is used.

This document contains CR003 for TS25.211 and CR006 for TS25.214.

Reference:

[1] TSGR1#(99)g23 *“Further simulation results on power control on initialisation (DCH and CPCH)”*, Philips, October 1999

3GPP TSG-RAN meeting #8 ***Document*** ***R1-99h02***

New York, USA, 12-15 Oct 1999

3G CHANGE REQUEST

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

25.211 CR 003 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG RAN#6 for approval **X** *(only one box should be marked with an X)*

list TSG meeting no. here ↑ for information

Proposed change affects: USIM [ ] ME [ ] UTRAN [X] Core Network [ ]

(at least one should be marked with an X)

Source: Philips, Nokia **Date:** 13-Oct-1999

Subject: CPCH power control preamble length

3G Work item:

Category:

(only one category shall be marked with an X)

F	Correction	X
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Reason for change: Resolution of “ffs” item.

Clauses affected: 5.2.2.2.1 “CPCH transmission”and 5.2.2.2.4 “CPCH power control preamble part”

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	25.214-CR006
Other 2G 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

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

Table 8: Pilot bit patterns for RACH message part with N_{pilot} = 8.

	N_{pilot} = 8							
Bit #	0	1	2	3	4	5	6	7
Slot #0	1	1	1	1	1	1	1	0
1	1	0	1	0	1	1	1	0
2	1	0	1	1	1	0	1	1
3	1	0	1	0	1	0	1	0
4	1	1	1	0	1	0	1	1
5	1	1	1	1	1	1	1	0
6	1	1	1	1	1	0	1	0
7	1	1	1	0	1	0	1	0
8	1	0	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1
10	1	0	1	1	1	0	1	1
11	1	1	1	0	1	1	1	1
12	1	1	1	0	1	0	1	0
13	1	0	1	0	1	1	1	1
14	1	0	1	0	1	1	1	1

5.2.2.2 Physical Common Packet Channel (PCPCH)

The Physical Common Packet Channel (PCPCH) is used to carry the CPCH.

5.2.2.2.1 CPCH transmission

The CPCH transmission is based on DSMA-CD approach with fast acquisition indication. The UE can start transmission at a number of well-defined time-offsets, relative to the frame boundary of the received BCH of the current cell. The access slot timing and structure is identical to RACH in section 5.2.2.1.1. The structure of the CPCH random access transmission is shown in Figure 6. The CPCH random access transmission consists of one or several Access Preambles [A-P] of length 4096 chips, one Collision Detection Preamble (CD-P) of length 4096 chips, a ~~[10] ms~~ DPCCH Power Control Preamble (PC-P) which is either 0 slots or 8 slots in length, and a message of variable length Nx10 ms.

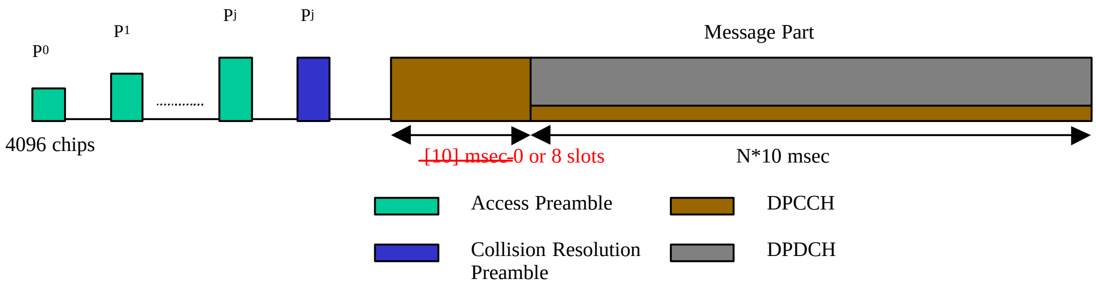

Figure 6: Structure of the CPCH random access transmission.

5.2.2.2.2 CPCH access preamble part

Similar to 5.2.2.1.2 (RACH preamble part). The RACH preamble signature sequences are used. The number of sequences used could be less than the ones used in the RACH preamble. The scrambling code could either be chosen to be a different code segment of the Gold code used to form the scrambling code of the RACH preambles (see [4] for more details) or could be the same scrambling code in case the signature set is shared.

5.2.2.2.3 CPCH collision detection preamble part

Similar to 5.2.2.1.2 (RACH preamble part). The RACH preamble signature sequences are used. The scrambling code is chosen to be a different code segment of the Gold code used to form the scrambling code for the RACH and CPCH preambles (see [4] for more details).

5.2.2.2.4 CPCH power control preamble part

The power control preamble segment is a ~~[10] ms~~ DPCCH Power Control Preamble (PC-P). The following Table 9 is identical to Rows 2 and 4 of Table 2 in 5.2.1. Table 9 defines the DPCCH fields which only include Pilot, FBI and TPC bits. The Power Control Preamble length is ~~ffs~~a parameter which shall take the values 0 or 8 slots, as set by the higher layers.

Table 9: DPCCH fields for CPCH power control preamble segment.

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{pilot}	N_{TFCI}	N_{FBI}	N_{TPC}
0	15	15	256	150	10	8	0	0	2
1	15	15	256	150	10	7	0	1	2

5.2.2.2.5 CPCH message part

Figure 1 in 5.2.1 shows the structure of the CPCH message part. Each message consists of up to N_Max_frames 10 ms frames. N_Max_frames is a higher layer parameter. Each 10 ms frame is split into 15 slots, each of length T_{slot} = 2560 chips. Each slot consists of two parts, a data part that carries higher layer information and a control part that carries Layer 1 control information. The data and control parts are transmitted in parallel.

The data part consists of $10*2^k$ bits, where k = 0, 1, 2, 3, 4, 5, 6, corresponding to spreading factors of 256, 128, 64, 32, 16, 8, 4 respectively. Note that various rates might be mapped to different signature sequences.

The spreading factor for the UL-DPCCH (message control part) is 256. The entries in Table 1 corresponding to spreading factors of 256 and below and Table 2 [both in section 5.2.1] apply to the DPDCH and DPCCH fields respectively for the CPCH message part.

5.3 Downlink physical channels

5.3.1 Downlink Transmit Diversity

Table 10 summarizes the possible application of open and closed loop Transmit diversity modes on different downlink physical channels.

Table 10: Application of Tx diversity modes on downlink physical channels.

3GPP TSG-RAN meeting #8
New York, USA, 12-15 Oct 1999

***Document* R1-99h02**

3G 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**	**006**	Current Version:	3.00

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG	RAN#6	for approval	X	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME		UTRAN	X	Core Network	

Source:	Philips, Nokia	**Date:**	14-Oct-99
Subject:	CPCH power control preamble length		
3G Work item:			

Category:	F	Correction	X
	A	Corresponds to a correction in a 2G specification	
(only one category	B	Addition of feature	
shall be marked	C	Functional modification of feature	
with an X)	D	Editorial modification	

Reason for change:	Resolution of an “ffs” item from TS25.211
Clauses affected:	6.2 “CPCH Access Procedures”

Other specs affected:	Other 3G core specifications	X	→ List of CRs:	25.211-CR003
	Other 2G 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

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

7.2 Increases the preamble transmission power with the specified offset ΔP_0.

7.3 Decrease the Preamble Retransmission Counter by one.

7.4 If the Preamble Retransmission Counter > 0, the UE repeats from step 6 otherwise an error indication is passed to the higher layers and the random-access procedure is exited.

8. If the UE detects the negative acquisition indicator corresponding to the selected signature in the downlink access slot corresponding to the selected uplink access slot, the UE:

   8.1 Selects a new uplink access slot as in 7.1

   8.2 Randomly selects a new signature from the available signatures within the ASC given by higher layers. Random function is TBD.

   8.3 Modifies the preamble transmission power with the specified offset ΔP_1.

   8.4 Repeats from step 6

9. The UE transmits its random access message three or four uplink access slots after the uplink access slot of the last transmitted preamble depending on the AICH transmission timing parameter. Transmission power of the random access message is modified from that of the last transmitted preamble with the specified offset $\Delta P_{p\text{-}m}$.

10. An indication of successful random-access transmission is passed to the higher layers.

Dynamic persistence is provided for managing interference and minimising delay by controlling access to the RACH channel. The system will publish a dynamic persistence value on the BCH, the value of which is dependent on the estimated backlog of users in the system.

Table 7 : The available access slots for different RACH sub-channels

	Sub-channel Number											
Frame number	0	1	2	3	4	5	6	7	8	9	10	11
SFN modulo 8=0	0	1	2	3	4	5	6	7				
SFN modulo 8=1	12	13	14						8	9	10	11
SFN modulo 8=2				0	1	2	3	4	5	6	7	
SFN modulo 8=3	9	10	11	12	13	14						8
SFN modulo 8=4	6	7					0	1	2	3	4	5
SFN modulo 8=5			8	9	10	11	12	13	14			
SFN modulo 8=6	3	4	5	6	7					0	1	2
SFN modulo 8=7						8	9	10	11	12	13	14

6.2 CPCH Access Procedures

For each CPCH physical channel in a CPCH set allocated to a cell the following physical layer parameters are included in the System Information message:

- UL Access Preamble (AP) scrambling code.
- UL Access Preamble signature set
- The Access preamble slot sub-channels group
- AP- AICH preamble channelization code.
- UL Collision Detection(CD) preamble scrambling code.
- CD Preamble signature set
- CD preamble slot sub-channels group
- CD-AICH preamble channelization code.
- CPCH UL scrambling code.
- CPCH UL channelization code. (variable, data rate dependant)
- DPCCH DL channelization code.([512] chip)

Note : There may be some overlap between the AP signature set and CD signature set if they correspond to the same scrambling code.

The following are access, collision detection/resolution and CPCH data transmission parameters:

Power ramp-up, Access and Timing parameters (Physical layer parameters)

1. N_AP_retrans_max = Maximum Number of allowed consecutive access attempts (retransmitted preambles) if there is no AICH response. This is a CPCH parameter and is equivalent to Preamble_Retrans_Max in RACH.

2. $P_{RACH} = P_{CPCH}$ = Initial open loop power level for the first CPCH access preamble sent by the UE.

[RACH/CPCH parameter]

3. ΔP_0 = Power step size for each successive CPCH access preamble.

[RACH/CPCH parameter]

4. ΔP_1 = Power step size for each successive RACH/CPCH access preamble in case of negative AICH. A timer is set upon receipt of a negative AICH. This timer is used to determine the period after receipt of a negative AICH when ΔP_1 is used in place of ΔP_0.

[RACH/CPCH parameter]

5. T_{cpch} = CPCH transmission timing parameter: This parameter is identical to PRACH/AICH transmission timing parameter.

[RACH/CPCH parameter]

6. $L_{pc\text{-}preamble}$ = Length of power control preamble (0 or 8 slots)

[CPCH parameter]

Note : It is FFS if ΔP_0 for the CPCH access may be different from ΔP_0 for the RACH access as defined in section 6.1.

The CPCH -access procedure in the physical layer is:

1) The UE MAC function selects a CPCH transport channel from the channels available in the assigned CPCH set The CPCH channel selection includes a dynamic persistence algorithm (similar to RACH) for the selected CPCH channel.