TSG-RAN Meeting #6 **_TSGRP#6(99)686_**
Nice, France, 13 – 15 December 1999

Title: **Agreed CRs of category "C" (Modification) and "F" (Correction) to TS 25.214**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc
25.214	003	2	R99	Flexible timing of UTRAN response to uplink	C	3.0.0	3.1.0	R1-99h89
25.214	006	2	R99	CPCH power control preamble length	C	3.0.0	3.1.0	R1-99i09
25.214	007	-	R99	Removal of open loop power control	C	3.0.0	3.1.0	R1-99i63
25.214	009	1	R99	Update of Random Access Procedure	C	3.0.0	3.1.0	R1-99j37
25.214	010	1	R99	Soft symbol combining for uplink power control	C	3.0.0	3.1.0	R1-99l22
25.214	012	-	R99	Uplink power control maximum TX power	F	3.0.0	3.1.0	R1-99i66
25.214	013	1	R99	Setting of beta values for multi-code	F	3.0.0	3.1.0	R1-99j91
25.214	014	-	R99	Consolidation of CPCH Power Control Preamble	C	3.0.0	3.1.0	R1-99i11
25.214	015	1	R99	Consolidation of Power Control Information for	C	3.0.0	3.1.0	R1-99k51
25.214	016	-	R99	Uplink power control in compressed mode	F	3.0.0	3.1.0	R1-99i14
25.214	018	1	R99	Timing for initialisation procedures	C	3.0.0	3.1.0	R1-99k52
25.214	026	2	R99	Downlink power control	F	3.0.0	3.1.0	R1-99l04
25.214	041	-	R99	Revision of power control timing text	C	3.0.0	3.1.0	R1-99j13

NOTE: The source of this document is TSG-RAN WG1. The source shown on each CR cover sheet is the originating organisation.

CHANGE REQUEST

25.214 CR 003 rev. 2 Current Version: 3.0.0

For submission to:	TSG-R #6	for approval	X	strategic	
		for information		non-strategic	

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]

Source:	~~Nokia~~RAN WG1	**Date:**	28/10/99
Subject:	Flexible timing of UTRAN response to uplink closed loop Tx diversity feedback commands (rev. 2)		
Work item:	TS 25.214		

Category:

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

Reason for change:

In closed loop Tx diversity UTRAN calculates new estimates of antenna weights based upon the feedback commands sent by UE. The new weights are applied in the beginning of the pilot field of the downlink DPCCH. Having received the feedback command through D-field of the uplink DPCCH the time left for processing the command at the UTRAN depends on used downlink physical channel structure, uplink DPCCH structure and propagation delay. As there is no definition of maximum cell size it is possible that the processing time at the UTRAN gets too short and the application of the new weights will take place one slot later. Thus, when the new weights are actually applied at UTRAN side depends on the cell radius. Yet, UE should know when UTRAN applies the weights in order to be able to do verification

Clauses affected: 8.1

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:

8.1 Determination of feedback information

The UE uses the Common PIlot CHannel (CPICH) to separately estimate the channels seen from each antenna.

Once every slot, the UE computes the phase adjustment, ϕ, and for mode 2 the amplitude adjustment that should be applied at the UTRAN access point to maximise the UE received power. In non-soft handover case, that can be accomplished by e.g. solving for weight vector, $\underline{w}$, that maximises

$$P=\underline{w}^H H^H H \underline{w} \qquad (1)$$

where

$H=[\underline{h}_1 \; \underline{h}_2 \ldots]$

and where the column vectors $\underline{h}_i$ and h_2 represent the estimated channel impulse responses for the transmission antennas 1 and 2, of length equal to the length of the channel impulse response. The elements of w correspond to the phase and amplitude adjustments computed by the UE.

During soft handover or SSDT power control, the antenna weight vector, $\underline{w}$ can be, for example, determined so as to maximise the criteria function,

$$P=\underline{w}^H (H_1^H H_1 + H_2^H H_2 + \cdots)\underline{w} \qquad (2)$$

where H_i is an estimated channel impulse response for BS#i. In regular SHO, the set of BS#i corresponds to the active set. With SSDT, the set of BS#i corresponds to the primary base station(s).

The UE feeds back to the UTRAN access point the information on which phase/power settings to use. Feedback Signalling Message (FSM) bits are transmitted in the portion of FBI field of uplink DPCCH slot(s) assigned to FB Mode Transmit Diversity, the FBI D field (see 25.211). Each message is of length $N_W = N_{po}+N_{ph}$ bits and its format is shown in the Figure 1~~Figure 1~~. The transmission order of bits is from MSB to LSB, i.e. MSB is transmitted first. FSM_{po} and FSM_{ph} subfields are used to transmit the power and phase settings, respectively.

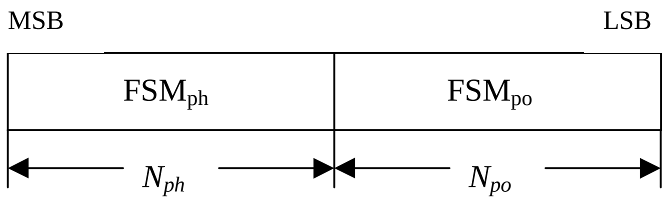

Figure 1 : Format of feedback signalling message. FSM_{po} transmits the power setting and FSM_{ph} the phase setting.

The adjustments are made by the UTRAN Access Point at the beginning of the downlink DPCCH pilot field. The downlink slot in which the adjustment is done is signaled to L1 of UE by higher layers. Two possibilities exist:

1. When feedback command is transmitted in uplink slot *i*, which is transmitted in ~~1024~~ a chip offset limited to 1024 ± 148 chips when compared to received downlink slot *j*, the adjustment is done at the beginning of the pilot field of the downlink slot (*j*+1) mod 15, or

2. When feedback command is transmitted in uplink slot *i*, which is transmitted in ~~1024~~ a chip offset limited to 1024 ± 148 chips when compared to received downlink slot *j*, the adjustment is done at the beginning of the pilot field of the downlink slot (*j*+2) mod 15.

3GPP TSG RAN WG1 ***TSGR1#9(99)i09***

November 30 – December 3, 1999, Dresden, Germany

Agenda item:	**WG1 Plenary**
Source:	**Philips, Nokia**
Title:	**Revised Text Proposal and Change Request for CPCH power control preamble length**
Document for:	**Decision**

Introduction

In the Adhoc 14 meeting at WG1#8, it was agreed that the length of the CPCH power control preamble should be a higher layer parameter which can take one of 2 values, 0 slots or 8 slots.

This paper is a re-submission of the corresponding text proposal and change requests contained in R1-99h02 and agreed in adhoc 14 at WG1#8.

The previously agreed CRs 25211-003 and 25214-006 have now been updated to use the new version of the CR form.

In addition, CR25211-003 has been modified to update another reference to the power control preamble length which had been missed in the first version of the CR.

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

Document R1-99i09

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

CHANGE REQUEST

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3G25.211	**CR**	**003rev2**	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*
list expected approval meeting # here ↑		for information		non-strategic		*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	UTRAN / Radio	Core Network
	X	X	

Source: Philips, Nokia

Date: 1999-11-18

Subject: CPCH power control preamble length

Work item:

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

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

Release:

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

Reason for change: Resolution of “ffs” item.

Clauses affected:
5.2.2.2.1 “CPCH transmission”,
5.2.2.2.4 “CPCH power control preamble part”,
7.4 “PCPCH/AICH timing relation”

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	25214-006rev2
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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5.2.2.2.1 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.

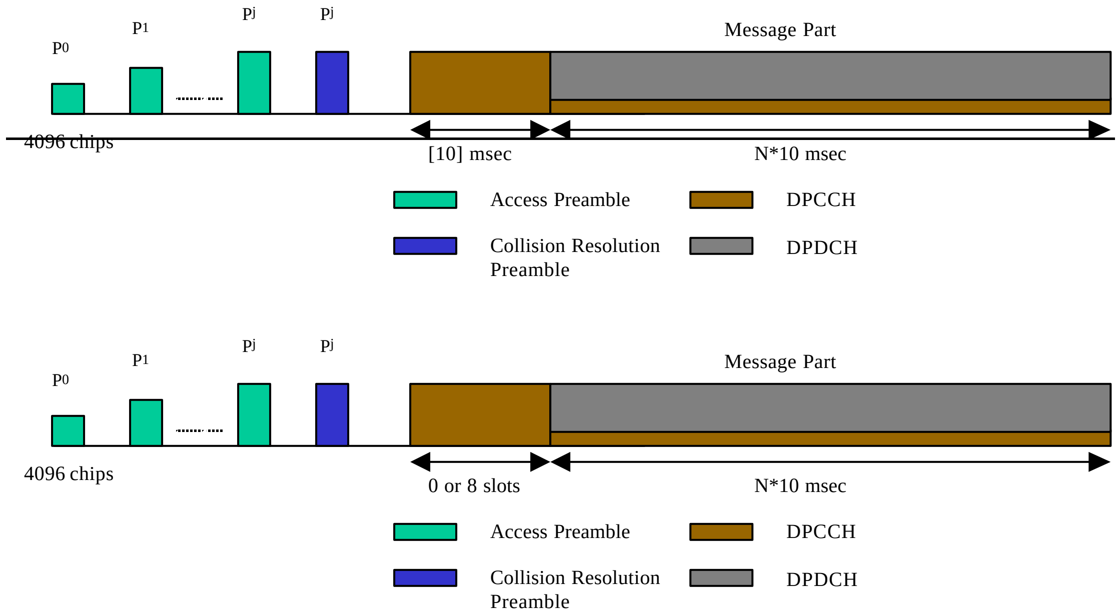

Figure 6: Structure of the CPCH random access transmission

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 section 5.2.1. Table 9 defines the DPCCH fields which only include Pilot, FBI and TPC bits. The Power Control Preamble length is a parameter which shall take the values 0 or 8 slots, as set by the higher layers ~~ffs~~.

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

7.4 PCPCH/AICH timing relation

Transmission of random access bursts on the PCPCH is aligned with access slot times. The timing of the access slots is derived from the received Primary CCPCH timing The transmit timing of access slot n starts n×20/15 ms after the frame boundary of the received Primary CCPCH, where n = 0, 1, …,14. In addition, transmission of access preambles in PCPCH is limited to the allocated access slot subchannel group which is assigned by higher layer signalling to each CPCH set. Twelve access slot subchannels are defined and PCPCH may be allocated all subchannel slots or any subset of the twelve subchannel slots. The access slot subchannel identification is identical to that for the RACH and is described in table 6 of section 6.1 of [5].

Everything in the previous section [PRACH/AICH] applies to this section as well. The timing relationship between preambles, AICH, and the message is the same as PRACH/AICH. Note that the collision resolution preambles follow the access preambles in PCPCH/AICH. However, the timing relationships between CD-Preamble and CD-AICH is identical to RACH Preamble and AICH. The timing relationship between CD-AICH and the Power Control Preamble in CPCH is identical to AICH to message in RACH. The T_{cpch} timing parameter is identical to the PRACH/AICH transmission timing parameter. When T_{cpch} is set to zero or one, the following PCPCH/AICH timing values apply:

Note that a1 corresponds to AP-AICH and a2 corresponds to CD-AICH.

τ_{p-p} = Time to next available access slot, between Access Preambles.

Minimum time = 15360 chips + 5120 chips X Tcpch

Maximum time = 5120 chips X 12 = 61440 chips

Actual time is time to next slot (which meets minimum time criterion) in allocated access slot subchannel group.

τ_{p-a1} = Time between Access Preamble and AP-AICH has two alternative values: 7680 chips or 12800 chips, depending on T_{cpch}

τ_{a1-cdp} = Time between receipt of AP-AICH and transmission of the CD Preamble has one value: 7680 chips.

τ_{p-cdp} = Time between the last AP and CD Preamble. is either 3 or 4 access slots, depending on T_{cpch}

τ_{cdp-a2} = Time between the CD Preamble and the CD-AICH has two alternative values: 7680 chips or 12800 chips, depending on T_{cpch}

$\tau_{cdp-pcp}$ = Time between CD Preamble and the start of the Power Control Preamble is either 3 or 4 access slots, depending on T_{cpch}.

Figure 27 illustrates the PCPCH/AICH timing relationship whenT_{cpch} is set to 0 and all access slot subchannels are available for PCPCH.

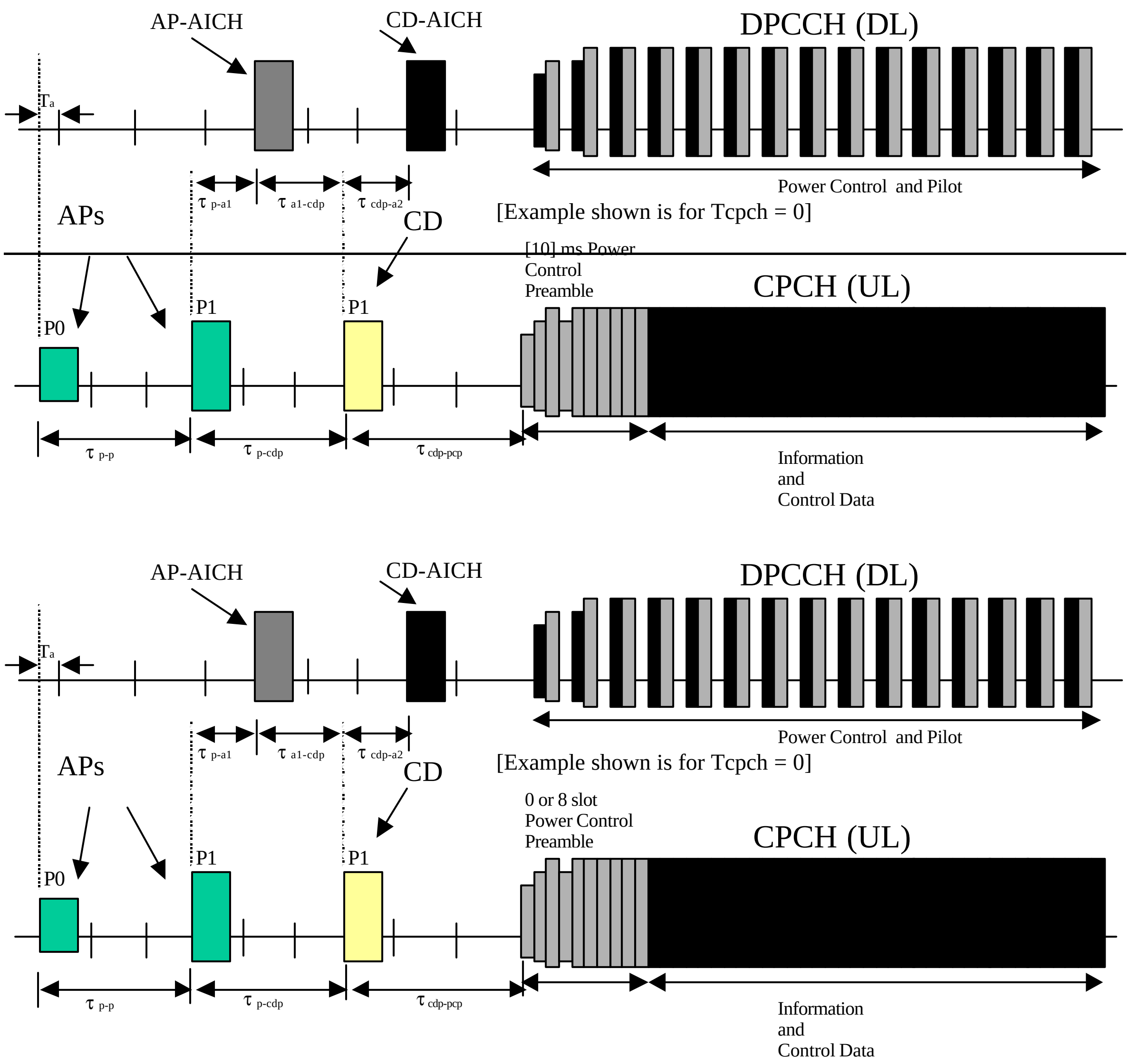

Figure 27: Timing of PCPCH and AICH transmission as seen by the UE, with T_{cpch}= 0

7.5 DPCH/PDSCH timing

The relative timing between a DPCH frame and the associated PDSCH frame is shown in figure 28.

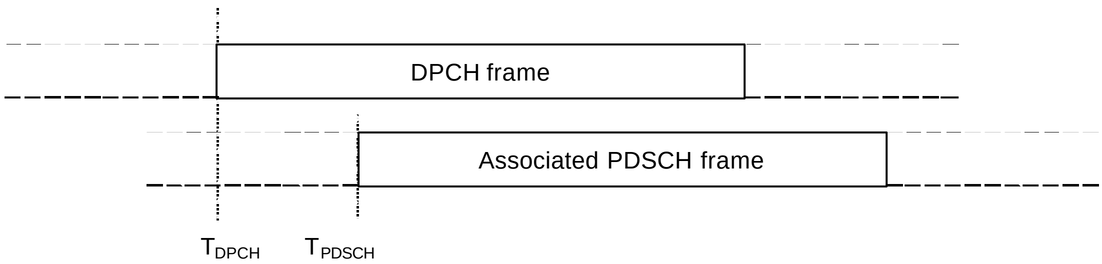

Figure 28: Timing relation between DPCH frame and associated PDSCH frame

The start of a DPCH frame is denoted T_{DPCH} and the start of the associated PDSCH frame is denoted T_{PDSCH}. Any DPCH frame is associated to one PDSCH frame through the relation -35840 chips < T_{DPCH} - T_{PDSCH} ≤ 2560 chips, i.e. the associated PDSCH frame starts anywhere between 1 slot before or up to 14 slots behind the DPCH.

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Document R1-99i09

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3G25.214 CR 006rev2 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
list expected approval meeting # here ↑		for information		non-strategic	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: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: Philips, Nokia **Date:** 1999-11-18

Subject: CPCH power control preamble length

Work item:

Category:				**Release:**	
	F	Correction		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: Resolution of “ffs” item from TS25.211.

Clauses affected: 6.2 “CPCH Access Procedures”

Other specs affected:			
Other 3G core specifications	X	→ List of CRs:	25211-003rev2
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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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.

TSG-RAN Working Group 1 meeting #9
Dresden, Germany
November 30 – December 3, 1999

TSGR1#9(99)i63

Agenda item:

Source: Ericsson

Title: CR 25.214-007: Removal of open loop power control

Document for: Decision

At WG1#8 it was decided to move the responsibility to define open loop power control to WG2. This decision is reflected in CR 25.214-009 for the RACH procedure. However, the open loop power control is currently described in more parts of the specification. Those sections are addressed by this CR.

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

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

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25.214	**CR**	**007**	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)*
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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: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: Ericsson **Date:** 1999-11-18

Subject: Removal of open loop power control

Work item:

Category:				**Release:**	
	F	Correction		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: Open loop power control is specified in RAN WG2, and should hence not be specified in RAN WG1.

Clauses affected: 5.1.1.1, 5.1.2.2.1

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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a) Based on the handover destination CPICH reception timing, the UE establishes chip synchronisation of downlink channels from handover destination cell. Frame synchronization can be confirmed using the Frame Synchronization Word. Successful frame synchronization is confirmed and reported to the higher layers when S_R successive frames have been confirmed to be frame synchronized. Otherwise, frame synchronization failure is reported to the higher layers.

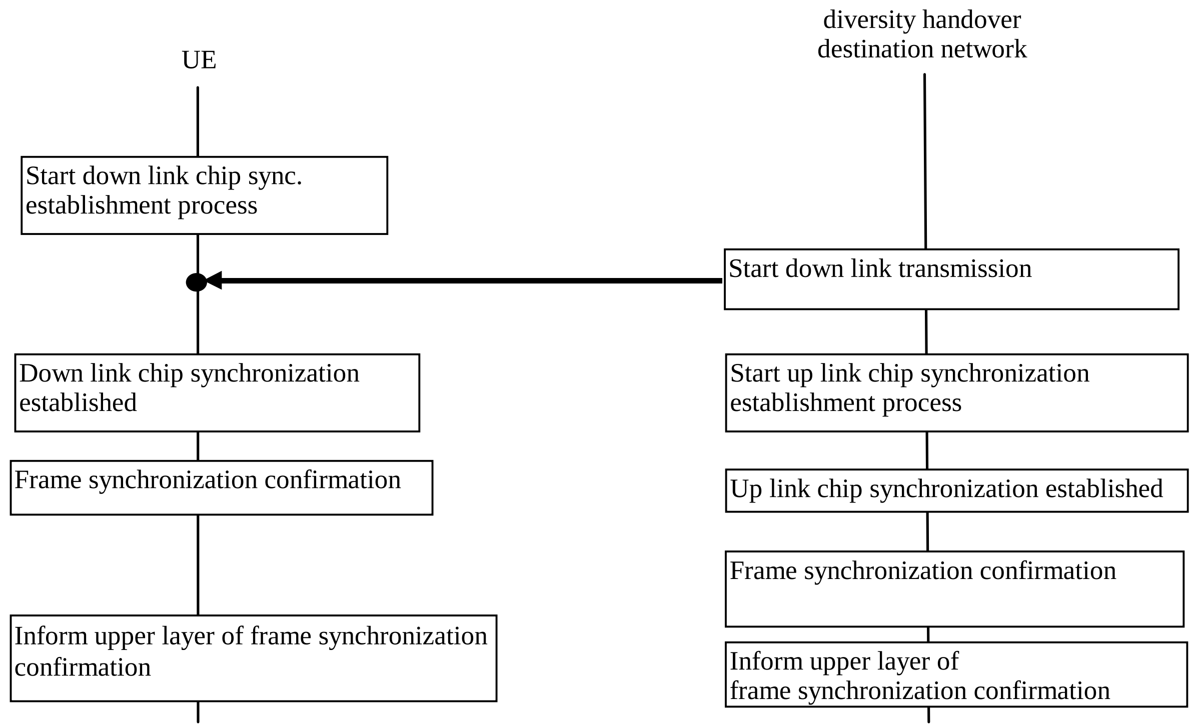

Figure 1 : Synchronization establishment flow upon intra/inter-cell soft handover

During a connection, in some cases the UE is allowed to change its transmission timing. When the UE is not in soft handover or in soft handover with cells that all are known to have the same timing reference, the UE may adjust its DPDCH/DPCCH transmission time instant. <Note: maximum rate of the adjustment should be specified in R4> Otherwise, the UE may not adjust its DPDCH/DPCCH transmission time instant.

5 Power control

5.1 Uplink power control

5.1.1 PRACH

5.1.1.1 General

The power control during the physical random access procedure is described in clause 6. The setting of power of the message control and data parts is described in the next sub-clause.

~~The transmitter power of UE shall be calculated by following equation:~~

~~$P_{RACH} = L_{Perch} + I_{BTS} +$ Constant value~~
~~where,~~

~~P_{RACH}: transmitter power level in dBm,~~
~~L_{Pearch}: measured path loss in dB,~~
~~I_{BTS}: interference signal power level at BTS in dBm, which is broadcasted on BCH,~~
~~Constant value: This value shall be designated via Layer 3 message (operator matter).~~

5.1.1.2 Setting of PRACH control and data part power difference

The message part of the uplink PRACH channel shall employ gain factors to control the control/data part relative power similar to the uplink dedicated physical channels. Hence, section 5.1.2.4 applies also for the RACH message part, with the differences that:

- β_c is the gain factor for the control part (similar to DPCCH),
- β_d is the gain factor for the data part (similar to DPDCH),

- no inner loop power control is performed.

5.1.2 DPCCH/DPDCH

5.1.2.1 General

'The uplink 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. The relative transmit power offset between DPCCH and DPDCHs is determined by the network and signalled to the UE using higher layer signalling.

5.1.2.2 Ordinary transmit power control

5.1.2.2.1 General

The initial uplink transmit power ~~to use is decided using an open-loop power estimate, similar to the random access procedure. < *Editor's note: This needs to be elaborated, how is the estimate derived?* >~~is set by higher layers.

The maximum transmission power at the maximum rate of DPDCH is designated for uplink and control must be performed within this range. < *Editor's note: The necessity of this range needs to be confirmed.* > The maximum transmit power value of the inner-loop TPC is set by the network using higher layer signalling.

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}.

The serving cells (cells in the active set) should estimate signal-to-interference ratio SIR_{est} of the received uplink DPCH . The serving cells 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".

Upon reception of one or more TPC commands in a slot, the UE derives a single TPC command, TPC_cmd, for each slot, combining multiple TPC commands if more than one is received in a slot. Two algorithms shall be supported by the UE for deriving a TPC_cmd, as described in subclauses 5.1.2.2.2 and 5.1.2.2.3. Which of these two algorithms is used is an UE-specific parameter and is under the control of the UTRAN.

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

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

TSG-RAN Working Group 1 meeting #9
Dresden, Germany
November 30 – December 3, 1999

TSGR1#9(99)j37

Agenda item:

Source: Ericsson

Title: CR 25.214-009: Updates to Random Access Procedure, Rev 1

Document for: Decision

This document is revision of R1-99i65. Compared to the original document, the following modifications have been done:

- *New wording for the description of the random function.*
- *The word "negative" added to step 8 in the random-access procedure (correction).*

This CR requests some changes to the description of the physical random access procedure in Section 6.1 of 25.214. The modifications are mainly intended to align the description with current WG2 assumptions.

- Section 6.1 is renamed "Physical Random Access Procedure". This better reflects what is actually described in the section.
- It is clarified what parameters are received from RRC, from MAC, or derived internally within Layer 1.
- The description of dynamic persistence is removed. Dynamic persistence is carried out before the physical random access procedure is initiated, i.e. it should not be a part of the Layer 1 description.
- At the reception of a negative AI, the physical random access procedure is terminated with no other Layer 1 activities.

Furthermore

- The power-ramping step is described in such a way that it is clear that the power-ramping step is a multiple of 1 dB.
- A short text that further clarifies the RACH sub-channels is included.
- The "Random functions" previously TBD are specified to be uniform.
- Some editorial updates are made.

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

Document ??99???
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or for SMG, use the format P-99-xxx

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25.214	**CR**	**009**	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	UTRAN / Radio	Core Network
	X	X	

Source: Ericsson **Date:** 1999-11-25

Subject: Update of Random Access Procedure

Work item:

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

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

Release:

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

Reason for change: Aligns the Random Access Procedure with the assumptions of WG2 and adds some general clarifications.

Clauses affected: 6.1

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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6.1 Physical random access procedure

The physical random access procedure described in this section is initiated upon request of a PHY-Data-REQ primitive from the MAC sublayer (cf. TS 25.321).

Before the physical random-access procedure can be initiated, Layer 1 shall receive the following information from the higher layers (RRC):

- The preamble scrambling code.
- The AICH_Transmission_Timing parameter [0 or 1].
- The available signatures and RACH sub-channel groups for each Access Service Class (ASC), where a sub-channel group is defined as a group of some of the sub-channels defined in Section 6.1.1.
- The power-ramping factor Power_Ramp_Step [integer > 0].
- The parameter Preamble_Retrans_Max [integer > 0].
- The initial preamble power Preamble_Initial_Power.
- The set of Transport Format parameters. This includes the power offser ΔP_{p-m} between the preamble and the message part for each Transport Format.

Note that the above parameters may be updated from higher layers before each physical random access procedure is initiated.

At each initiation of the physical random access procedure, Layer 1 shall receive the following information from the higher layers (MAC):

- The Transport Format to be used for the PRACH message part.
- The ASC of the PRACH transmission.
- The data to be transmitted (Transport Block Set).

The physical random-access procedure shall be performed as follows:

1 Randomly select the RACH sub-channel group from the available ones for the given ASC. The random function shall be usch that each of the allowed selections is chosen with equal probability.

2 Derive the available access slots in the next two frames, defined by SFN and SFN+1 in the selected RACH sub-channel group with the help of SFN and table 7. Randomly select one uplink access slot from the available access slots in the next frame, defined by SFN, if there is one available. If there is no access slot available in the next frame, defined by SFN then, randomly select one access slot from the available access slots in the following frame, defined by SFN+1. The random function shall be such that each of the allowed selections is chosen with equal probability.

3 Randomly select a signature from the available signatures for the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.

4 Set the Preamble Retransmission Counter to Preamble_Retrans_Max.

5 Set the preamble transmission power to Preamble_Initial_Power.

6 Transmit a preamble using the selected uplink access slot, signature, and preamble transmission power.

7 If no positive or negative acquisition indicator corresponding to the selected signature is detected in the downlink access slot corresponding to the selected uplink access slot:

7.1 Select a new uplink access slot as next available access slot, i.e. next access slot in the sub-channel group used, as selected in 1

7.2 Randomly select a new signature from the available signatures within the given ASC. The random function shall be such that each of the allowed selections is chosen with equal probability.

7.3 Increase the preamble transmission power by ΔP_0 = Power_Ramp_Step [dB].

7.4 Decrease the Preamble Retransmission Counter by one.

7.5 If the Preamble Retransmission Counter > 0 then repeat from step 6. Otherwise pass L1 status (“No ack on AICH”) to the higher layers (MAC) and exit the physical random access procedure.

8 If a negative acquisition indicator corresponding to the selected signature is detected in the downlink access slot corresponding to the selected uplink access slot, pass L1 status (“Nack on AICH received”) to the higher layers (MAC) and exit the physical random access procedure.

9 Transmit the 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 Pass L1 status “RACH message transmitted” to the higher layers and exit the physical random access procedure.

6.1.1 RACH sub-channels

A RACH sub-channel defines a sub-set of the total set of access slots. There are a total of 12 RACH sub-channels. RACH sub-channel #i (i = 0, …, 11) consists of the following access slots:

- Access slot #i transmitted in parallel to P-CCPCH frames for which SFN mod 8 = 0 or SFN mod 8 = 1.
- Every 12th access slot relative to this access slot.

The access slots of different RACH sub-channels are also illustrated in Table 7.

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

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

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25.214 CR **010rev1** Current Version: v3.0.0

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

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

Source: Nokia **Date:** 30 Nov 1999

Subject: Soft symbol combining for uplink power control

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: Using soft symbol information for TPC bits improves the performance without marked complexity increase

Clauses affected: 5.1.2.2.2.3.1

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:	

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shall be increased by Δ_{TPC} dB. If TPC_cmd equals -1 then the transmit power of the uplink DPCCH and uplink DPDCHs shall be decreased by Δ_{TPC} dB. If TPC_cmd equals 0 then the transmit power of the uplink DPCCH and uplink DPDCHs shall be unchanged.

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

5.1.2.2.1.1 Out of synchronisation handling

5.1.2.2.2 Algorithm 1 for processing TPC commands

5.1.2.2.2.1 Derivation of TPC_cmd when only one TPC command is received in each slot

When a UE is not in soft handover, only one TPC command will be received in each slot. In this case, the value of TPC_cmd is derived as follows:

- If the received TPC command is equal to 0 then TPC_cmd for that slot is –1.
- If the received TPC command is equal to 1, then TPC_cmd for that slot is 1.

5.1.2.2.2.2 Combining of TPC commands known to be the same

When a UE is in soft handover, multiple TPC commands may be received in each slot from different cells in the active set. In some cases, the UE has the knowledge that some of the transmitted TPC commands in a slot are the same. This is the case e.g. with receiver diversity or so called softer handover when the UTRAN transmits the same command in all the serving cells the UE is in softer handover with. For these cases, the TPC commands known to be the same are combined into one TPC command, to be further combined with other TPC commands as described in subclause 5.1.2.2.2.3.

5.1.2.2.2.3 Combining of TPC commands not known to be the same

In general in case of soft handover, the TPC commands transmitted in the same slot in the different cells may be different.

This subclause describes the general scheme for combination of the TPC commands not known to be the same and then provides an example of such a scheme. It is to be further decided what should be subject to detailed standardisation, depending on final requirements. The example might be considered as the scheme from which minimum requirement will be derived or may become the mandatory algorithm.

5.1.2.2.2.3.1 General scheme

First, the UE shall conduct a soft symbol decision on each of the power control commands TPC_i, where i = 1, 2, …, N and N is the number of TPC commands not known to be the same, that may be the result of a first phase of combination according to subclause 5.1.2.2.2.2.First, the UE shall estimate the signal-to-interference ratio PC_SIR_i on each of the power control commands TPC_i, where i = 1, 2, …, N and N is the number of TPC commands not known to be the same, that may be the result of a first phase of combination according to subclause 5.1.2.2.2.2.

Then the UE assigns to each of the TPC_i command a reliability figure W_i, where W_i is the soft symbol decision obtained abovea function β of PC_SIR_i, $W_i = \beta(PC\_SIR_i)$. Finally, the UE derives a combined TPC command, TPC_cmd, as a function γ of all the N power control commands TPC_i and reliability estimates W_i:

TPC_cmd = $\gamma (W_1, W_2, \ldots W_N, TPC_1, TPC_2, \ldots, TPC_N)$, where TPC_cmd can take the values 1 or -1.

5.1.2.2.2.3.2 Example of the scheme

A particular example of the scheme is obtained when using the following definition of the functions β and γ:

For β: the reliability figure W_i is set to 0 if $PC\_SIR_i < PC\_thr$, otherwise W_i is set to 1. This means that the power control command is assumed unreliable if the signal-to-interference ratio of the TPC commands is lower than a minimum value PC_thr.

~~**For γ:** if there is at least one TPC_i command, for which $W_i = 1$ and $TPC_i = 0$, or if $W_i = 0$ and $TPC_i = 0$ for all N TPC_i commands, then TPC_cmd is set to 1, otherwise TPC_cmd is set to 1. Such a function γ means that the power is decreased if at least one cell for which the reliability criterion is satisfied asks for a power decrease.~~

TSG-RAN Working Group 1 meeting #9
Dresden, Germany
November 30 – December 3, 1999

TSGR1#9(99)i66

Agenda item:

Source: Ericsson

Title: CR 25.214-012: Uplink power control maximum TX power

Document for: Decision

In TS 25.214, there is a note for the text dealing with uplink power control maximum power. There is already a parameter specified by WG2 in the RRC specification, that is used to control the maximum transmit power of the UE, so the note in TS 25.214 questioning this can be removed. Moreover, the power is not associated directly with a certain rate on the DPDCH, so that statement can be removed.

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25.214	**CR**	**012**		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)
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Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: Ericsson **Date:** 1999-11-18

Subject: Uplink power control maximum TX power

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: There is already a parameter specified by WG2 in the RRC specification, that is used to control the maximum transmit power of the UE, so the note in TS 25.214 questioning this can be removed. Moreover, the power is not associated directly with a certain rate on the DPDCH, so that statement can be removed.

Clauses affected:

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:

P_{RACH}: transmitter power level in dBm,
L_{Pearch}: measured path loss in dB,
I_{BTS}: interference signal power level at BTS in dBm, which is broadcasted on BCH,
Constant value: This value shall be designated via Layer 3 message (operator matter).

5.1.1.2 Setting of PRACH control and data part power difference

The message part of the uplink PRACH channel shall employ gain factors to control the control/data part relative power similar to the uplink dedicated physical channels. Hence, section 5.1.2.4 applies also for the RACH message part, with the differences that:

- β_c is the gain factor for the control part (similar to DPCCH),
- β_d is the gain factor for the data part (similar to DPDCH),
- no inner loop power control is performed.

5.1.2 DPCCH/DPDCH

5.1.2.1 General

'The uplink 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. The relative transmit power offset between DPCCH and DPDCHs is determined by the network and signalled to the UE using higher layer signalling.

5.1.2.2 Ordinary transmit power control

5.1.2.2.1 General

The initial uplink transmit power to use is decided using an open-loop power estimate, similar to the random access procedure.

< Editor's note: This needs to be elaborated, how is the estimate derived? >

By means of higher layer signalling, a The maximum transmission power at the maximum rate of DPDCH is designated for uplink inner-loop power control may be set to a lower value than what the terminal power class is capable of. Power control and control mustshall be performed within the allowedis range.

< Editor's note: The necessity of this range needs to be confirmed. > The maximum transmit power value of the inner-loop TPC is set by the network using higher layer signalling.

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}.

The serving cells (cells in the active set) should estimate signal-to-interference ratio SIR_{est} of the received uplink DPCH . The serving cells 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".

Upon reception of one or more TPC commands in a slot, the UE derives a single TPC command, TPC_cmd, for each slot, combining multiple TPC commands if more than one is received in a slot. Two algorithms shall be supported by the UE for deriving a TPC_cmd, as described in subclauses 5.1.2.2.2 and 5.1.2.2.3. Which of these two algorithms is used is an UE-specific parameter and is under the control of the UTRAN.

TSG-RAN Working Group 1 meeting #9 **TSGR1#9(99)j91**

Dresden, Germany
November 30 – December 3, 1999

Agenda item:

Source: Ericsson

Title: CR 25.214-013r1: Setting of beta values for multi-code

Document for: Decision

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1 Introduction

In 25.214 the setting of the β-values, when it is calculated, is only relevant when one code is transmitted. Therefore this contribution is proposing a calculation that also works when the number of physical channels in the reference TFC and the targeted TFC is different.

2 Proposal

In 25.214, paragraph 5.1.2.4.3 the variable on which the offset amplitude between DPDCH and DPCCH is based is given as

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

but when the number of physical channel varies between the reference channel and the actual channel this must of course be taken into account when calculating the parameter. Defining L_{ref} as the number of DPDCHs used for the reference TFC and L_j as the number of DPDCHs used for the TFC in the *j:*th radio frame, the parameter A_j shall be defined as below.

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

In this proposal is also added a note so that the calculated β-value never can be equal to 0.

Revision information

In revision 1 of the CR, the following things have been fixed:

- Changed terminology "TFC in j:th frame" to "j:th TFC".
- Updated the heading of the CR

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25.214	**CR**	**013r1**	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)*
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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: Ericsson **Date:** 1999-11-28

Subject: Setting of beta values for multi-code

Work item:

Category:				**Release:**	
	F	Correction	X	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		Release 98	
with an X)	D	Editorial modification		Release 99	
				Release 00	

Reason for change: Multicode in uplink is not supported in the current specified calculation of the offset gains (beta-values). This is now added. Also, some editorial change of the terminology is made.

Clauses affected: 5.1.2.4.3

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:

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 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.

5.1.2.4.2 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).

5.1.2.4.3 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 ~~in the *j*:th radio frame~~. 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.

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 *j*:th TFC ~~used in the *j*:th frame~~.

The variable A_j 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 ~~in the *j*:th radio frame~~ are then computed as follows:

If $A_j > 1$, then $\beta_{d,j} = 1.0$ and $\beta_{c,j} = \lfloor 1/A_j \rfloor$, where $\lfloor \bullet \rfloor$ means rounding to closest lower quantized β–value. 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 to the lowest quantized amplitude ratio of 0.0667 as specified in TS 25.213.

If $A_j \le 1$, then $\beta_{d,j} = \lceil A_j \rceil$ and $\beta_{c,j} = 1.0$, 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.

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**
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3G25.214 CR 014 Current Version: 3.0.0

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

Source: Philips **Date:** 1999-11-19

Subject: Consolidation of CPCH Power Control Preamble Information

Work item:

Category:				**Release:**	
	F	Correction		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

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5.1.2.4.2 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).

5.1.2.4.3 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 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:

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

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

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

If $A_j \leq 1$, then $\beta_{d,j} = \lceil A_j \rceil$ and $\beta_{c,j} = 1.0$, 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 $\Delta_{TPC-init}$, where $\Delta_{TPC-init}$ 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.

3GPP TSG RAN WG1 ***TSGR1#9(99)k51***

November 30 – December 3, 1999, Dresden, Germany

Agenda item: **Ad hoc 14, Adhoc 9**

Source: **Philips**

Title: **Consolidation of Power Control Information for DCH Initialisation**

Document for: **Decision**

Introduction

This paper is a revision of R1-99i13, incorporating changes agreed in Adhoc 9 at WG1#9:

1. The reference to the outer power control loop in the power control preamble has been removed;
2. The reference to DSCHs has been removed, as the power control preamble relates to a DCH;
3. The existence of the DL DPCCH during the power control preamble on the UL DPCCH has been clarified.

This paper consolidates the uplink power control information for DCHs into one section.

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

***Document* R1-99k51**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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3G25.214	**CR**	**015rev1**	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: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: Philips **Date:** 1999-12-01

Subject: Consolidation of Power Control Information for DCH Initialisation

Work item:

Category:				**Release:**		
	F	Correction			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 DCH initialisation appears in a different part of the specification from the rest of the power control information for DCHs, and needs to be brought together.

Clauses affected: 5.1.2 DPCCH/DPDCH
7.1.1 Rapid initialisation of DCH for Packet Data Transfer using DSCH

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

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	$\Delta_{RESUME} = \text{Int}[\delta_{last} / \Delta_{TPCmin}]\ \Delta_{TPCmin}$

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:

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

$$\delta_{previous} = \delta_{last}$$

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 is applied with step size Δ_{TPC}
1	Ordinary transmit power control is applied with step size Δ_{RP-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 is applied but with a step size Δ_{RP-TPC} instead of Δ_{TPC}.

Δ_{RP-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, Δ_{RP-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, Δ_{RP-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 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 Transmit power control in DPCCH power control preamble

A power control preamble may be used for initialisation of a DCH. Both the UL and DL DPCCHs shall be transmitted during the uplink power control preamble. The UL DPDCH shall not commence before the end of the power control preamble.

The length of the power control preamble is a UE-specific parameter signalled by the network, and can take the values 0 slots or 8 slots.

The inner power control loop acts on the UL DPCCH during the preamble in the same way as described in section 5.1.2.2.1.

The initial power control step size used in the power control preamble differs from that used after the preamble in the following way. If algorithm 1 is to be used after the preamble to calculate the value of TPC_cmd, 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 $2\Delta_{TPC}$. If algorithm 2 is to be used after the preamble to calculate the value of TPC_cmd, then initially in the power control preamble algorithm 1 is used with a step size of 2dB. In either case, the power control algorithm and step size revert to those used for the main part of the transmission as soon as the sign of TPC_cmd reverses for the first time, or at the end of the power control preamble if the power control preamble ends first.

5.1.2.54 Setting of the uplink DPCCH/DPDCH power difference

5.1.2.54.1 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:

- 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 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.

5.1.2.54.2 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).

5.1.2.54.3 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.

7 Procedures in Packet Data Transfer

7.1 Rapid Initialization of DCH for Packet Data Transfer

A rapid initialization procedure for establishing a DCH is defined to support bursting packet data transfer. The rapid initialization may be invoked for downlink packet data transfer on the DSCH or uplink packet data transfer on the DCH. The procedure may also be invoked to resume a recently discontinued DCH connection.

7.1.1 Rapid Initialization of DCH for Packet Data Transfer using DSCH

The synchronization of the DSCH/DCH pair may be expedited so that data transmission using DSCH can commence in slightly over 10 ms following the FACH burst assigning the TFCI using DCH. Figure 3shows the timing diagram of RACH/FACH to DCH/DCH+DSCH state transition. The parameter T_A specifies the RACH/FACH response time. The parameters T_B, T_C and T_D are referenced relative to the FACH frame. T_B specifies the time period when the downlink DPCCH is started. The parameter T_C specifies the period at which the UE will start the uplink DPCCH. Finally, T_D specifies the period that the DCH will be stable and the first frame of data may arrive. The parameters T_B, T_C, and T_D have the following relationship:

$$T_B < T_C << T_D$$

$$T_D = T_B + N_{slots}*0.666$$

where N_{slots} is a positive integer.

In order to initialise fast uplink link power control loop, searcher and channel estimator at the Node B, the UE will adhere to the following:

- The transmission of uplink link DPCCH will start at N_{slots} slots (1 to 15 slots) prior to the scheduled downlink packet data transmission using DSCH.
- The DPCCH will be transmitted with an additional negative power offset P_{offset} from the computed open loop estimate.
- ~~The initial power control step size for transmitting the DPCCH will be set at P_{step} (typically: 2dB).~~
- ~~The UE will revert back to the normal power control (PC) step size upon the receipt of the first down power control command during the uplink DPCCH transmission phase,~~
- ~~The step size always goes back to its nominal setting in the beginning of DSCH transmission~~Power control until the time T_D is described in section 5.1.2.4.

The parameters T_B, T_C, T_D , N_{slots}~~,~~ and P_{offset} ~~and P_{step}~~ may be negotiated with each individual UE or broadcast by the system so that the transition from RACH/FACH to DCH/DCH+DSCH sub-state is optimised.

7.1.2 Rapid Initialization of DCH for Uplink Packet Data Transfer

The synchronization of the DCH may also be expedited for the transfer of uplink packet data.. Figure 4 shows the same parameters T_B, T_C, and T_D applied to an uplink packet data transfer. The UE, upon detecting data in its queue, transmits a RACH with measurement report. After the UTRAN assigns the DCH via the FACH message, the downlink DPCCH is started after a time period T_B. The UE then begins transmission of the uplink DPCCH for reasons as outlined in section 7.3.4 at time period T_C. T_C is measured relative to the FACH transmit timing. Finally, the UE begins transmitting the data on the DPDCH after the period. The procedure for starting the uplink DPCCH transmission will be similar to Section 7.3.4.1

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

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

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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:	F Correction	X	**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			Release 98	
with an X)	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	$\Delta_{RESUME} = \mathrm{Int}[\delta_{last} / \Delta_{TPCmin}]\ \Delta_{TPCmin}$

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:

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

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 Δ_{RP-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 Δ_{RP-TPC} instead of Δ_{TPC}.

Δ_{RP-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, Δ_{RP-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, Δ_{RP-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:

- 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 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.

3GPP TSG RAN WG1 ***TSGR1#9(99)k52***
November 30 – December 3, 1999, Dresden, Germany

Agenda item: **Ad hoc 14**

Source: **Philips**

Title: **Text Proposal for Timing for Initialisation Procedures**

Document for: **Decision**

Introduction

This paper is a revision of R1-99i17 following email and offline discussions.

The aim of the text proposal is to clarify the timing requirements for initialisation of DCHs and DSCHs, replacing the text currently found in section 7.1 of TS 25.214 with a new section 7.7 in TS 25.211.

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

Document ***R1-99k52***
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3G25.211	**CR**	**017**	Current Version:	3.0.0

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

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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:** 1999-12-01

Subject: Timing for initialisation procedures

Work item:

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

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

Release:

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

Reason for change:

The current text in section 7 of TS25.214 describing rapid initialisation of DCHs is unclear and inconsistent with other parts of the specifications.
CR214-015rev1 has moved the power control information out of section 7 of TS25.214. The remaining information is timing information, which should be in TS25.211.
This CR creates a new section in TS25.211 for a clarified version of the timing information from section 7 of TS25.214.
There is also an editorial change to a cross-reference in section 7.6.3.

Clauses affected:

7 Timing relationship between physical channels (new section 7.7)
7.6.3 Uplink / downlink timing at UE

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	CR25214-018rev1
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

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

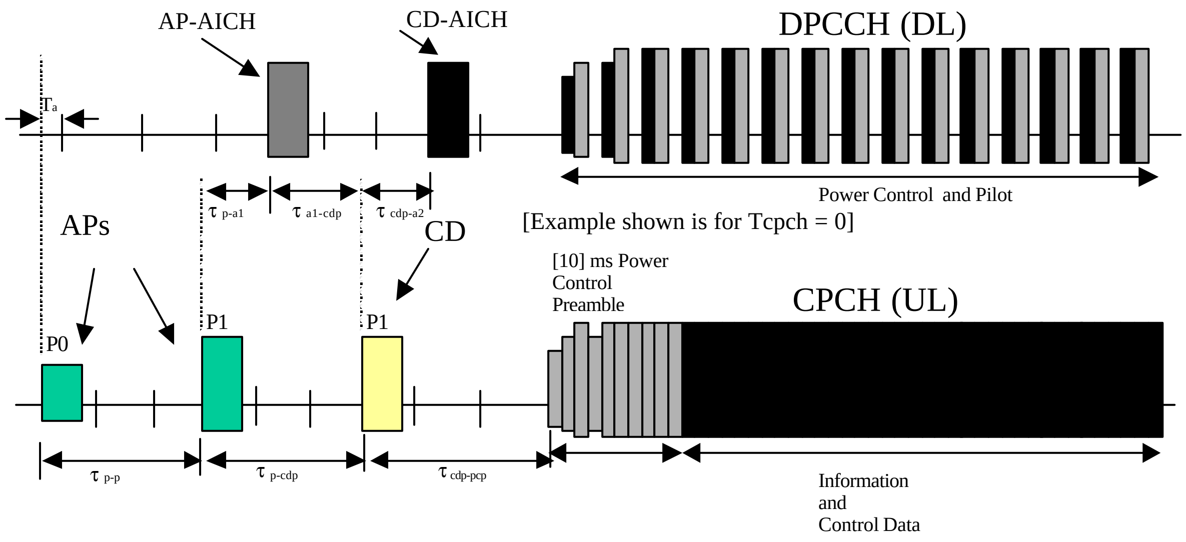

Figure 27: Timing of PCPCH and AICH transmission as seen by the UE, with T_{cpch}= 0

7.5 DPCH/PDSCH timing

The relative timing between a DPCH frame and the associated PDSCH frame is shown in figure 28.

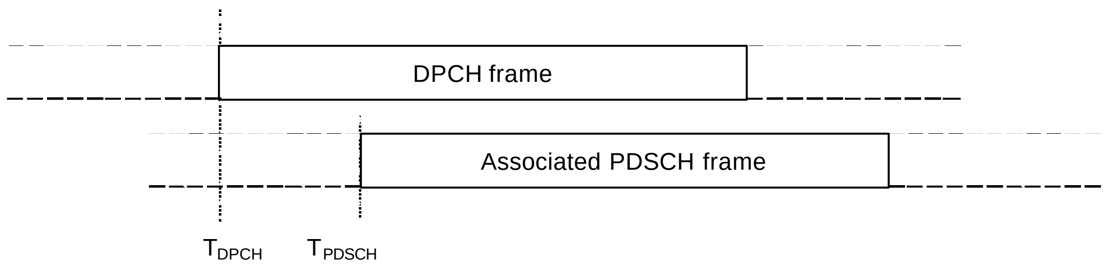

Figure 28: Timing relation between DPCH frame and associated PDSCH frame

The start of a DPCH frame is denoted T_{DPCH} and the start of the associated PDSCH frame is denoted T_{PDSCH}. Any DPCH frame is associated to one PDSCH frame through the relation -35840 chips < T_{DPCH} - T_{PDSCH} ≤ 2560 chips, i.e. the associated PDSCH frame starts anywhere between 1 slot before or up to 14 slots behind the DPCH.

7.6 DPCCH/DPDCH timing relations

7.6.1 Uplink

In uplink the DPCCH and all the DPDCHs transmitted from one UE have the same frame timing.

7.6.2 Downlink

In downlink, the DPCCH and all the DPDCHs carrying CCTrCHs of dedicated type to one UE have the same frame timing.

7.6.3 Uplink/downlink timing at UE

At the UE, the uplink DPCCH/DPDCH frame transmission takes place approximately T_0 chips after the reception of the first significant path of the corresponding downlink DPCCH/DPDCH frame. T_0 is a constant defined to be 1024 chips. More information about the uplink/downlink timing relation and meaning of T_0 can be found in [5], section 4.~~5~~3.

7.7 Timing relations for initialisation of channels

Figure 29 shows the timing relationships between the physical channels involved in the initialisation of a DCH.

The maximum time permitted for the UE to decode the relevant FACH frame before the first frame of the DPCCH is received shall be $T_{B\text{-min}}$ = 38400 chips (i.e.15 slots).

The downlink DPCCH shall commence at a time T_B after the end of the relevant FACH frame, where $T_B \geq T_{B\text{-min}}$ according to the following equation:

$$T_B = (T_n - T_k) \times 256 - N_{pcp} \times 2560 + N_{offset\_1} \times 38400 \text{ chips}$$

, where:

N_{pcp} is a higher layer parameter set by the network, and represents the length (in slots) of the power control preamble (see [5], section 5.1.2.4).

N_{offset_1} is a parameter derived from the activation time set by higher layers. In order that $T_B \geq T_{B\text{-min}}$, N_{offset_1} shall be an integer number of frames such that:

$$N_{offset\_1} \geq \begin{cases} 1 \text{ when } T_n - T_k \geq \dfrac{T_{B-\min}}{256} + 10N_{pcp} - 150 \\ 2 \text{ when } \dfrac{T_{B-\min}}{256} + 10N_{pcp} - 300 \leq T_n - T_k < \dfrac{T_{B-\min}}{256} + 10N_{pcp} - 150 \\ 3 \text{ when } T_n - T_k < \dfrac{T_{B-\min}}{256} + 10N_{pcp} - 300 \end{cases}$$

T_n and T_k are parameters defining the timing of the frame boundaries on the DL DPCCH and S-CCPCH respectively (see section 7.1). These parameters are provided by higher layers.

The uplink DPCCH shall commence at a time T_C after the end of the relevant FACH frame, where

$$T_C = T_B + T_0 + N_{offset\_2} \times 38400 \text{ chips}$$

, where T_0 is as in section 7.6.3 and N_{offset_2} is a UE-specific higher-layer parameter which shall be an integer number of frames greater than or equal to zero.

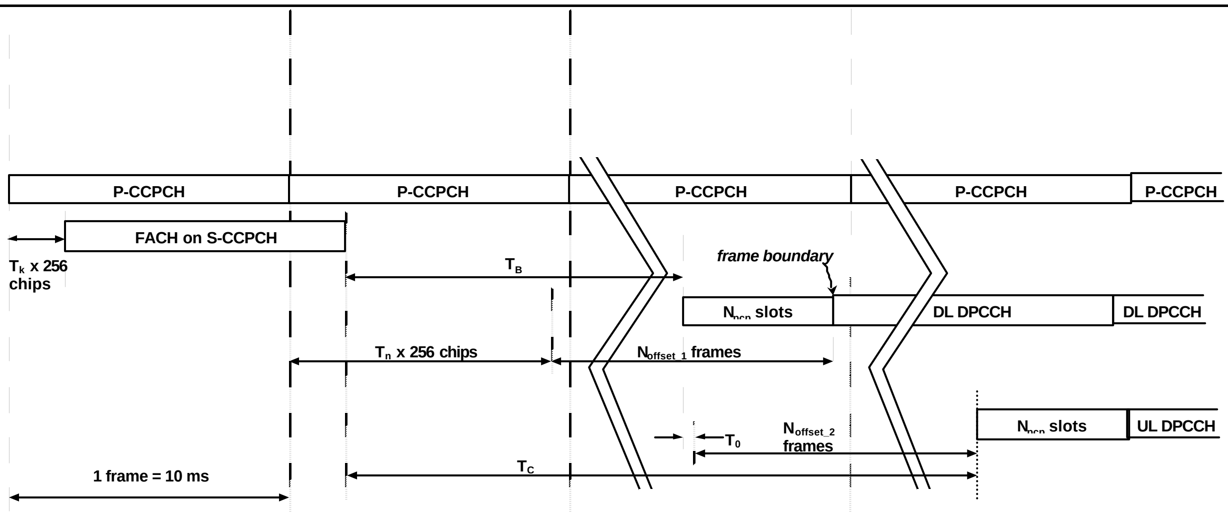

Figure 29: Timing for initialisation of DCH

The data channels shall not commence before the end of the power control preamble.

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***Document* R1-99k52**
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3G25.214 CR 018rev1 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
list expected approval meeting # here ↑	for information		non-strategic		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:** 1999-12-01

Subject: Timing for initialisation procedures

Work item:

Category:				**Release:**		
	F	Correction			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:
The current text in section 7 of TS25.214 describing rapid initialisation of DCHs is unclear and inconsistent with other parts of the specifications.
CR214-015rev1 has moved the power control information out of section 7 of TS25.214.
CR211-017 has created a new section in TS25.211 for a clarified version of the remaining information from section 7.1 of TS25.214.
This CR therefore deletes section 7.1 of TS25.214.

Clauses affected: 7.1 Rapid initialisation of DCH for packet data transfer

Other specs affected:				
	Other 3G core specifications	X	→ List of CRs:	CR25211-017
	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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7 Procedures in Packet Data Transfer

7.1 Rapid Initialization of DCH for Packet Data Transfer

A rapid initialization procedure for establishing a DCH is defined to support bursting packet data transfer. The rapid initialization may be invoked for downlink packet data transfer on the DSCH or uplink packet data transfer on the DCH. The procedure may also be invoked to resume a recently discontinued DCH connection.

7.1.1 Rapid Initialization of DCH for Packet Data Transfer using DSCH

The synchronization of the DSCH/DCH pair may be expedited so that data transmission using DSCH can commence in slightly over 10 ms following the FACH burst assigning the TFCI using DCH. Figure 3shows the timing diagram of RACH/FACH to DCH/DCH+DSCH state transition. The parameter T_A specifies the RACH/FACH response time. The parameters T_B, T_C and T_D are referenced relative to the FACH frame. T_B specifies the time period when the downlink DPCCH is started. The parameter T_C specifies the period at which the UE will start the uplink DPCCH. Finally, T_D specifies the period that the DCH will be stable and the first frame of data may arrive. The parameters T_B, T_C, and T_D have the following relationship:

$$T_B < T_C << T_D$$

$$T_D = T_B + N_{slots}*0.666$$

where N_{slots} is a positive integer.

In order to initialise fast uplink link power control loop, searcher and channel estimator at the Node B, the UE will adhere to the following:

- The transmission of uplink link DPCCH will start at N_{slots} slots (1 to 15 slots) prior to the scheduled downlink packet data transmission using DSCH.
- The DPCCH will be transmitted with an additional negative power offset P_{offset} from the computed open loop estimate.
- The initial power control step size for transmitting the DPCCH will be set at P_{step} (typically: 2dB).
- The UE will revert back to the normal power control (PC) step size upon the receipt of the first down power control command during the uplink DPCCH transmission phase,
- The step size always goes back to its nominal setting in the beginning of DSCH transmission

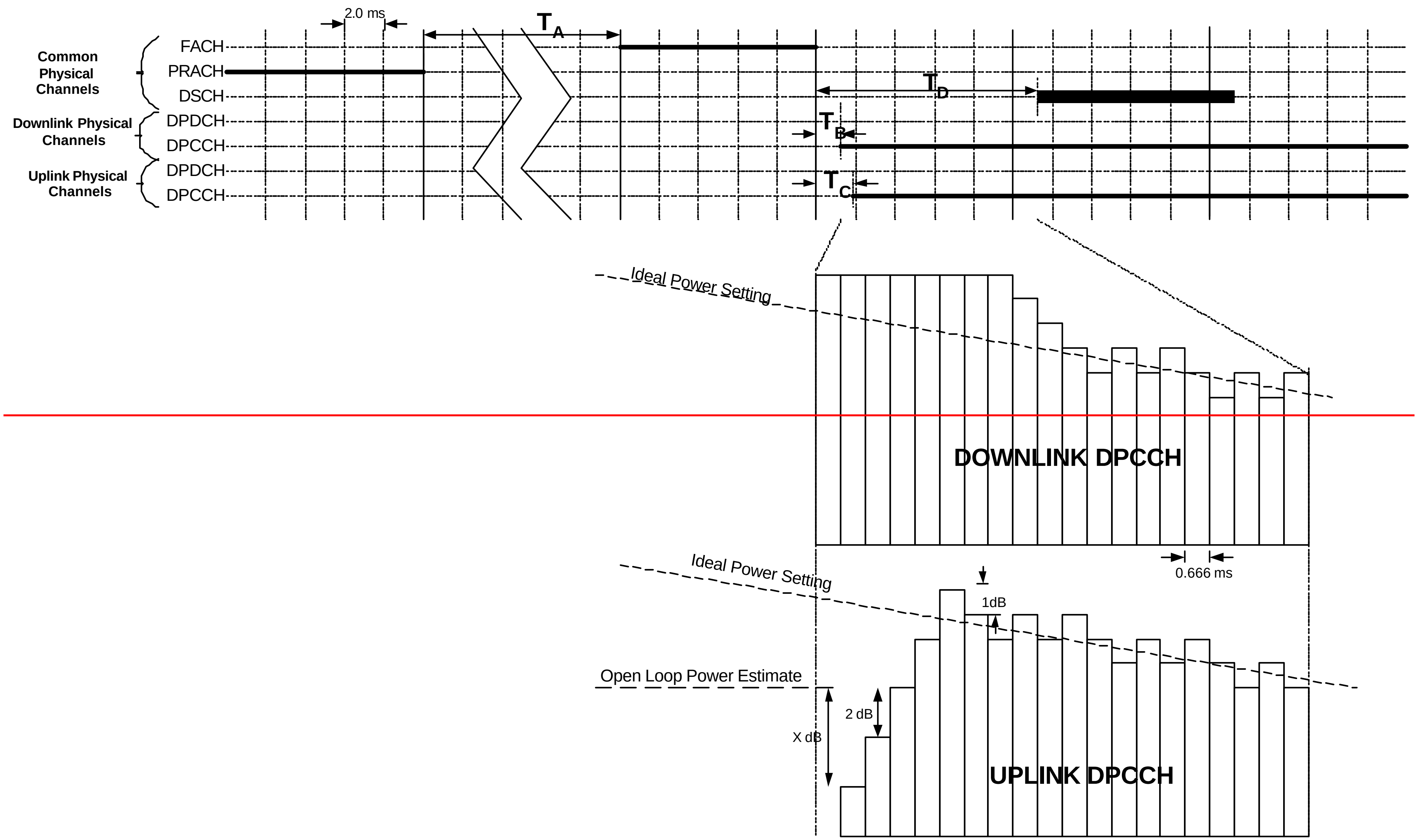
The parameters T_B, T_C, T_D, N_{slots}, P_{offset} and P_{step} may be negotiated with each individual UE or broadcast by the system so that the transition from RACH/FACH to DCH/DCH+DSCH sub-state is optimised.

7.1.2 Rapid Initialization of DCH for Uplink Packet Data Transfer

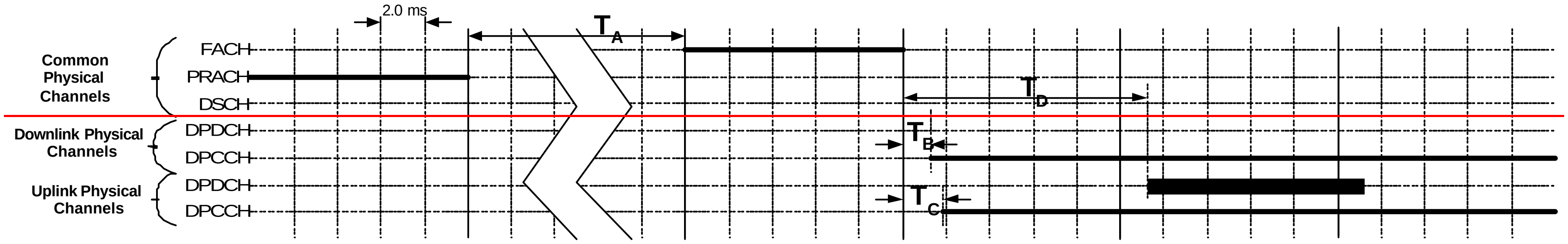
The synchronization of the DCH may also be expedited for the transfer of uplink packet data.. Figure 4 shows the same parameters T_B, T_C, and T_D applied to an uplink packet data transfer. The UE, upon detecting data in its queue, transmits a RACH with measurement report. After the UTRAN assigns the DCH via the FACH message, the downlink DPCCH is started after a time period T_B. The UE then begins transmission of the uplink DPCCH for reasons as outlined in section 7.3.4 at time period T_C. T_C is measured relative to the FACH transmit timing. Finally, the UE begins transmitting the data on the DPDCH after the period. The procedure for starting the uplink DPCCH transmission will be similar to Section 7.3.4.1

7.1.3 Resumption of DCH for Downlink or Uplink Packet Data Transfer

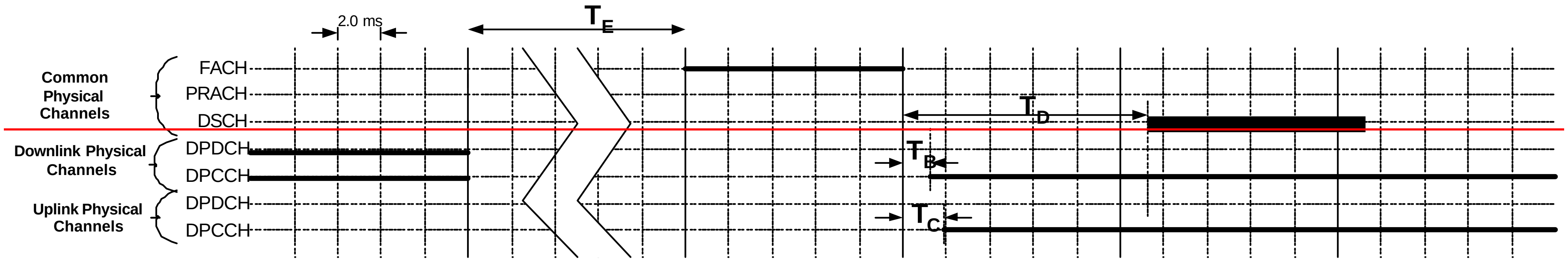
The synchronization of the DCH technique may be used to resume a DCH/DCH+DSCH connection that has been dropped for a short period.. This is applicable for packet data transfer using DSCH or uplink DPDCH or bi-directional data transfer using DSCH/Uplink DPDCH. Figure 5 shows the case where the DCH has been discontinued based on an inactivity timer T_E. The UTRAN, upon detecting data in the queue, may resume the DCH operation provided the period T_E has not elapsed. Typically T_E is set to 1000msec.



~~Figure 3: Rapid Initialization of DCH for packet data transfer over the DSCH~~



~~Figure 4: Rapid initialization of the DCH for transfer of uplink packet data~~



~~Figure 5: Resumption of the DCH for transmission of downlink packet data~~

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***Document* R1-99l04**
e.g. for 3GPP use the format TP-99xxx
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25.214 **CR** **026r2** Current Version: 3.0.0

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

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for approval	X	strategic	
for information		non-strategic	

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

Source: Nokia **Date:** 1999-12-02

Subject: Downlink power control

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: In TS 25.214, section 5.2.1.2 there are still some Notes left. It was agreed that the required addition to the specification text, based on these notes, is the more detailed definition of parameters Maximum_DL_Power and Minimum_DL_Power. The previous notes can be deleted from this section.

Clauses affected: 5.2.1.2 Ordinary transmit 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:

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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.

When the UE is not in soft handover the TPC command generated is transmitted in the first available TPC field in the uplink DPCCH.

When the UE is in soft handover it should check the downlink power control mode (DPC_MODE) before generating the TPC command

- if DPC_MODE = 0 : the UE sends a unique TPC command in each slot and the TPC command generated is transmitted in the first available TPC field in the uplink DPCCH
- if DPC_MODE = 1 : the UE repeats the same TPC command over 3 slots and the new TPC command is transmitted such that there is a new command at the beginning of the frame.

The DPC_MODE parameter is a UE specific parameter controlled by the UTRAN.

As a response to the received TPC commands, UTRAN may adjust the downlink DPCCH/DPDCH power. The average power of transmitted ~~DPCCH/~~DPDCH symbols~~power~~ over one timeslot shall ~~may~~ not exceed Maximum_DL_Power (dBm), nor shall ~~may~~ it be below Minimum_DL_Power (dBm). Transmitted DPDCH symbol means here a complex QPSK symbol before spreading which does not contain DTX.

<Note: It should still be clarified whether Maximum_DL_Power and Minimum_DL_Power are defined for one code or for one CCTrCH>

~~< Note: It should be clarified with WG3 if Maximum_DL_Power and Minimum_DL_Power are given as absolute values or relative. >~~

~~< Note: It is not clear to what extent the UTRAN response to the received TPC commands should be specified. Until this has been clarified, the text in the paragraph below should be seen as an example of UTRAN behaviour. >~~

Changes of power shall be a multiple of the minimum step size $\Delta_{TPC,min}$ dB. It is mandatory for UTRAN to support $\Delta_{TPC,min}$ of 1 dB, while support of 0.5 dB is optional.

~~< Note: It needs to be clarified if an upper limit on the downlink power step should be specified. >~~

When SIR measurements cannot be performed due to downlink out-of-synchronisation, the TPC command transmitted shall be set as “1” during the period of out-of-synchronisation.

5.2.1.3 Power control in compressed mode

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

The UE behaviour is the same in compressed mode as in normal mode, described in subclause 5.2.1.2, i.e. TPC commands should be generated based on the estimated received SIR.

The UTRAN behaviour during compressed mode is not specified. As an example, the algorithm can be similar to uplink power control in downlink compressed mode as described in sub-clause 5.1.2.3.

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

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***Document* R1-99j13**
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25.214	**CR**	**041**	Current Version:	3.0.0

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

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list expected approval meeting # here ↑		for information		non-strategic		*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: NEC **Date:** 1999-11-24

Subject: Revision of power control timing text

Work item:

Category:				**Release:**		
	F	Correction			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: According to the modifications on the downlink slot format introduced by 25.211-CR007, Figure B-1 should be updated. Terminology is also updated.

Clauses affected: Annex B

Other specs Affected:				
	Other 3G core specifications	X	→ List of CRs:	25.211-CR007
	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:

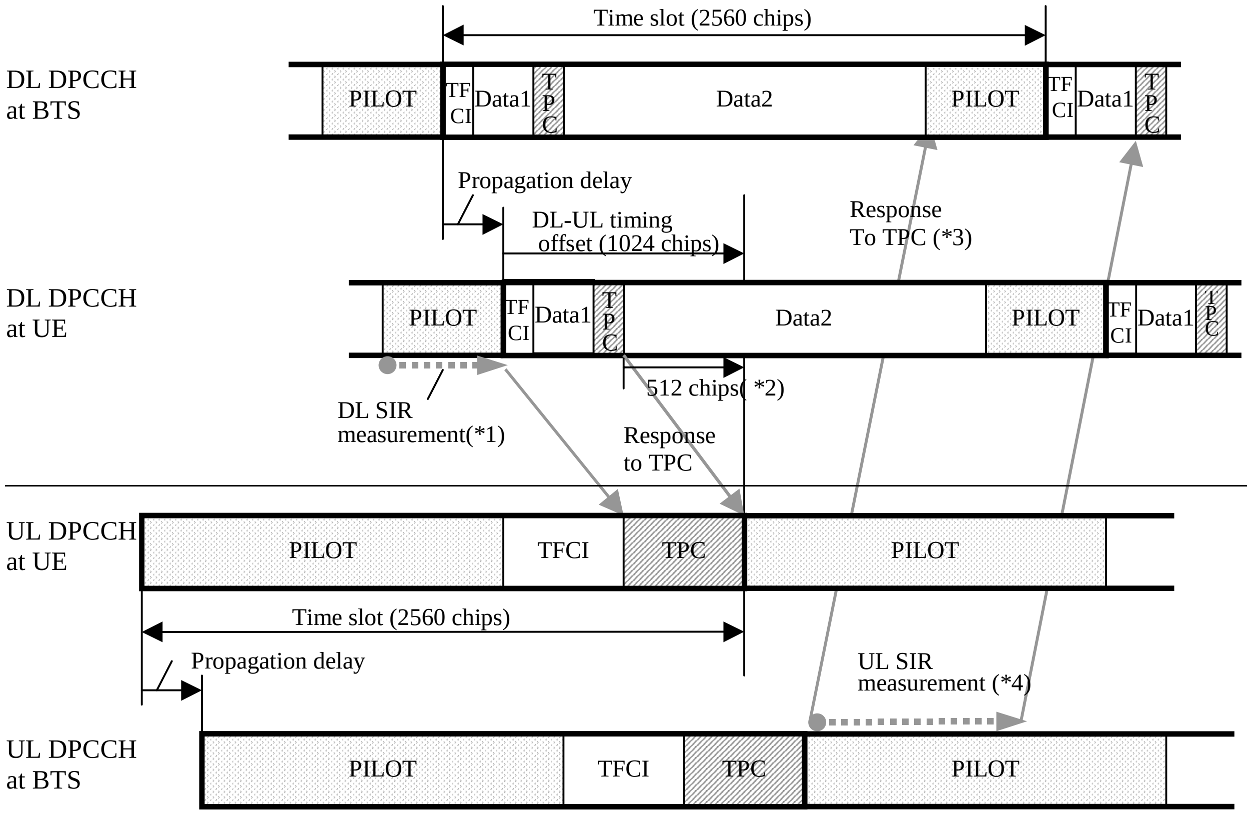
Annex B (Informative): Power control timing

The power control timing described in this annex should be seen as an example on how the control bits have to be placed in order to permit a short TPC delay.

In order to maximise the ~~BTS-UE~~ cell radius distance within which one-slot control delay is achieved, the frame timing of an uplink DPCH is delayed by 1024 chips -from that of the corresponding downlink DPCH measured at the UE antenna.

Responding to a downlink TPC command, the UE -shall change its uplink DPCH output power at the beginning of the first uplink pilot field after the TPC command reception. Responding to an uplink TPC command, ~~BTS~~ the UTRAN access point shall change its DPCH output power at the beginning of the next downlink pilot field after the reception of the whole TPC command. Note that in soft handover, the TPC command is sent over one slot when DPC_MODE is 0 and over three slots when DPC_MODE is 1. Note also that the delay from the uplink TPC command reception to the power change timing is not specified for ~~BTS~~UTRAN. The UE -shall decide and send TPC commands on the uplink based on the downlink SIR measurement. The TPC command field on the uplink starts, when measured at the UE antenna, 512 chips after the end of the downlink pilot field. ~~BTS~~ The UTRAN access point shall decide and send TPC commands based on the uplink SIR measurement. However, the SIR measurement periods are not specified either for UE nor ~~BTS~~UTRAN.

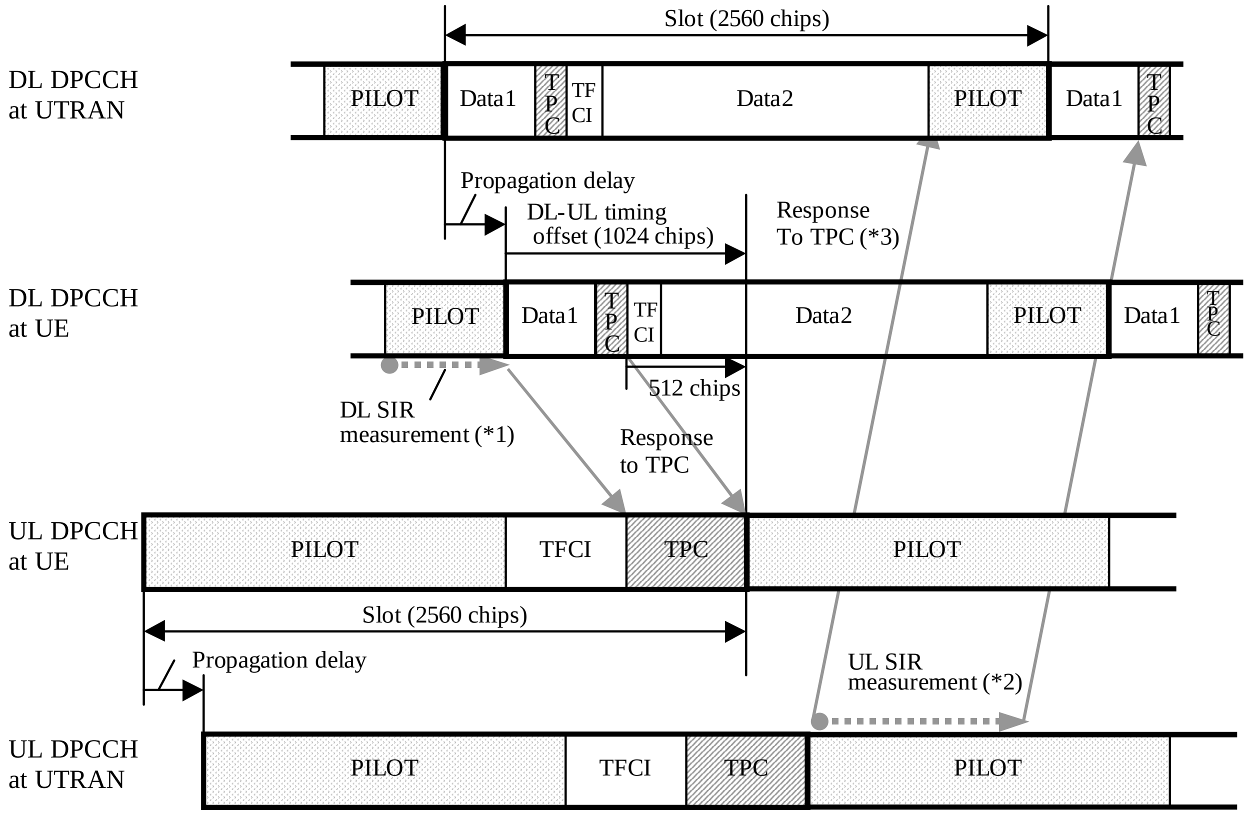
Figure B-1 illustrates an example of transmitter power control timings.



1,4 The SIR measurement periods illustrated here are examples. Other ways of measurement are allowed to achieve accurate SIR estimation.

2 Except the case of DL symbol rate=7.5ksps.

3 If there is not enough time for BTS to respond to the TPC, the action can be delayed until the next slot.



1,2 The SIR measurement periods illustrated here are examples. Other ways of measurement are allowed to achieve accurate SIR estimation.

3 If there is not enough time for UTRAN to respond to the TPC, the action can be delayed until the next slot.

Figure B-1: Transmitter power control tTiming