3GPP TSG Working Group 1#11 **TSGR1#11 (00) 0411**
San Diego, CA USA
February 28 – March 3, 2000

Agenda	**5**
Source:	**GBT**
Subject:	**CR023 r4.0 25.211 CPCH-related editorial changes, technical changes and additions and some clarification on PCPCH/AICH timing relation**
Document for	**Approval**

Current document is a revision of Tdoc#336 which was presented to Ad-Hoc 14. Some more comments were received which have been incorporated here.

Please note that Tdocs R1(00)0200 CR023 r2 of 25.211 and R1(00)0203 CR032 of 25.211 have been combined and are replaced by this Tdoc R1(00)0336 CR023 r3

The first revision of this CR partially included most of the changes that GBT proposed in the WG1#9 meeting. These changes were approved pending changing the format of the document. However, GBT has added new items to this CR that have been discussed on the reflector. Specifically several tables have been added to provide the DPDCH and DPCCH fields for the CPCH message part. Also the editorial change of CD-AICH to CD-ICH necessitates introduction of new physical channel which is also proposed in this CR.

The second revision of this CR (r1.0) included a correction to the previous CR regarding section 5.3.3.7.

This revision of the CR (r2.0) is based on the latest 25.211 version 3.1.1.

TSG Working Group 1 # 11
San Diego, CA, USA, Feb 29 - Mar 3, 2000

Document R1-000336

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

CHANGE REQUEST

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

25.211	**CR**	**023r4.0**	Current Version:	3.1.1

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

For submission to:	RAN#7	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	X	Core Network	

Source:	GBT	**Date:**	Mar 2, 2000

Subject: **CPCH-related editorial changes, technical changes and additions to 25.211 and some clarifications to 7.4 PCPCH/AICH timing relation.**

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	X		Release 99	X
					Release 00	

Reason for change:
1. Addition of tables for CPCH message field
2. Introduction of CD-ICH as a new physical channel
3. Other misc editorial changes and clarifications

Clauses affected: 3.3, 5.2.2.2.1, 5.2.2.2.4, 5.2.2.2.5, 5.3.2.3, 5.3.3.6, 5.3.3.7, 6, 7.4

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:

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AI	Acquisition Indicator
AICH	Acquisition Indicator Channel
AP	Access Preamble
BCH	Broadcast Channel
CCPCH	Common Control Physical Channel
CCTrCH	Coded Composite Transport Channel
CD	Collision Detection
CPCH	Common Packet Channel
CPICH	Common Pilot Channel
DCH	Dedicated Channel
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
DSCH	Downlink Shared Channel
DSMA-CD	Digital Sense Multiple Access – Collison Detection
DTX	Discontinuous Transmission
FACH	Forward Access Channel
FBI	Feedback Information
MUI	Mobile User Identifier
PCH	Paging Channel
P-CCPCH	Primary Common Control Physical Channel
PCPCH	Physical Common Packet Channel
PDSCH	Physical Downlink Shared Channel
PI	Page Indicator
PICH	Page Indicator Channel
PRACH	Physical Random Access Channel
PSC	Primary Synchronisation Code
RACH	Random Access Channel
RNC	Radio Network Controller
S-CCPCH	Secondary Common Control Physical Channel
SCH	Synchronisation Channel
SF	Spreading Factor
SFN	System Frame Number
SSC	Secondary Synchronisation Code
STTD	Space Time Transmit Diversity
TFCI	Transport Format Combination Indicator
TSTD	Time Switched Transmit Diversity
TPC	Transmit Power Control
UE	User Equipment
UTRAN	UMTS Terrestrial Radio Access Network

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 the beginning of a number of well-defined time-intervals, 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 PCPCH ~~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 DPCCH Power Control Preamble (PC-P) which is either 0 slots or 8 slots in length, and a message of variable length Nx10 ms.

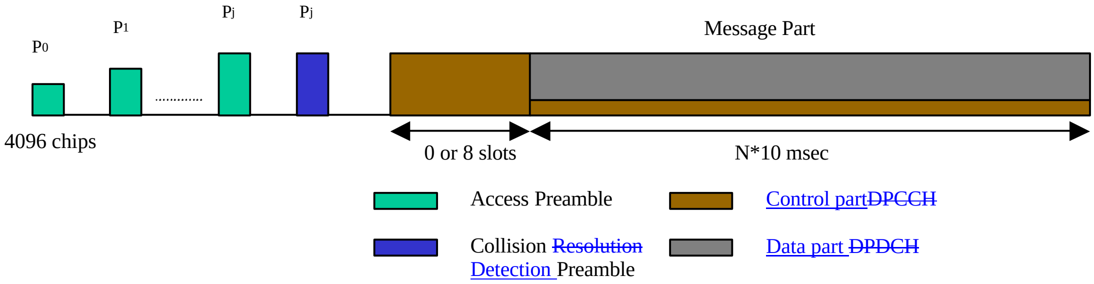

Figure 6: Structure of the CPCH ~~random~~ access transmission

5.2.2.2.4 CPCH power control preamble part

The power control preamble segment is a ~~DPCCH~~ PCPCH 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.

Table 9: DPCCH fields for CPCH power control preamble segment

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

5.2.2.2.5 CPCH message part

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

Figure xxx shows the frame structure of the uplink common packet physical channel. Each frame of length 10 ms is split into 15 slots, each of length T_{slot} = 2560 chips, corresponding to one power-control period.

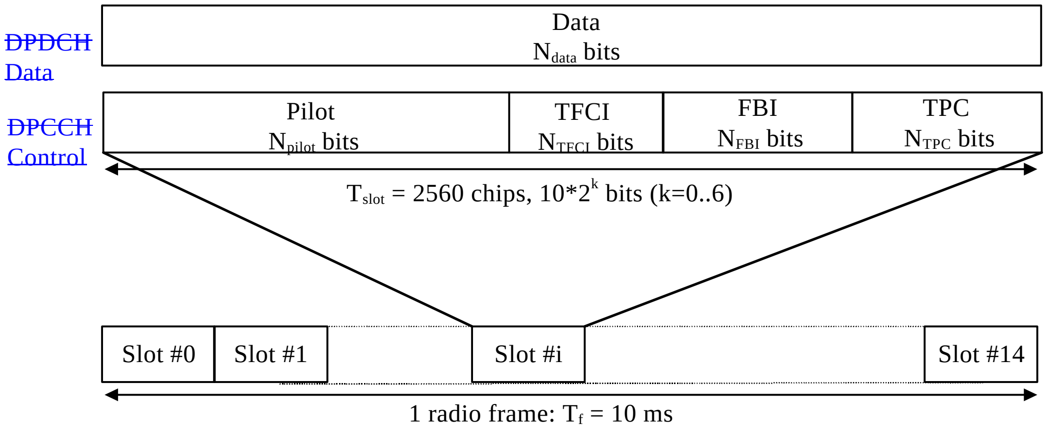

Figure xxx: Frame structure for uplink Data and Control Parts Associated with PCPCH

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

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

Table xxx: Data part - of the PCPCH message part

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{data}
0	15	15	256	150	10	10
1	30	30	128	300	20	20
2	60	60	64	600	40	40
3	120	120	32	1200	80	80
4	240	240	16	2400	160	160
5	480	480	8	4800	320	320
6	960	960	4	9600	640	640

The following table xxx corresponds to the control part of the PCPCH message~~-~~.

Table xxx: Control Part of the PCPCH message

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{pilot}	N_{TPC}	N_{TFCI}	N_{FBI}
0	15	15	256	150	10	6	2	2	0
1	15	15	256	150	10	8	2	0	0
2	15	15	256	150	10	5	2	2	1
3	15	15	256	150	10	7	2	0	1
4	15	15	256	150	10	6	2	0	2
5	15	15	256	150	10	5	1	2	2

5.3.2.3 DL-DPCCH for CPCH

The spreading factor for the UL-DPCCH (message control part) is 256. The spreading factor for the DL-DPCCH (message control part) is 512. The following table 15 shows the DL-DPCCH fields (message control part) which are identical to the first row of table 11 in section 5.3.2.

Table 15: DPDCH and DPCCH fields for CPCH message transmission

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/Frame			Bits/ Slot	DPDCH Bits/Slot		DPCCH Bits/Slot		
				DPDCH	DPCCH	TOT		N_{Data1}	N_{Data2}	N_{TFCI}	N_{TPC}	N_{Pilot}
0	15	7.5	512	60	90	150	10	~~2~~0	~~2~~4	0	2	4

5.3.3.6 Acquisition Indicator Channel (AICH)

The Acquisition Indicator channel (AICH) is a physical channel used to carry Acquisition Indicators (AI). Acquisition Indicator AI_s corresponds to signature s on the PRACH or PCPCH. ~~Note that for PCPCH, the AICH either corresponds to an access preamble or a CD preamble. The AICH corresponding to the access preamble is an AP-AICH and the AICH corresponding to the CD preamble is a CD-AICH. The AP-AICH and CD-AICH use different channelization codes, see further[4], Section 4.3.3.2.~~

Figure 19 illustrates the structure of the AICH. The AICH consists of a repeated sequence of 15 concecutive *access slots* (AS), each of length 40 bit intervals. Each access slot consists of two parts, an *Acquisition-Indicator* (AI) part consisting of 32 real-valued symbols $a_0, \ldots, a_{31}$ and an unused part consisting of 8 real-valued symbols $a_{32}, \ldots, a_{39}$.
The phase reference for the AICH is the Primary CPICH.

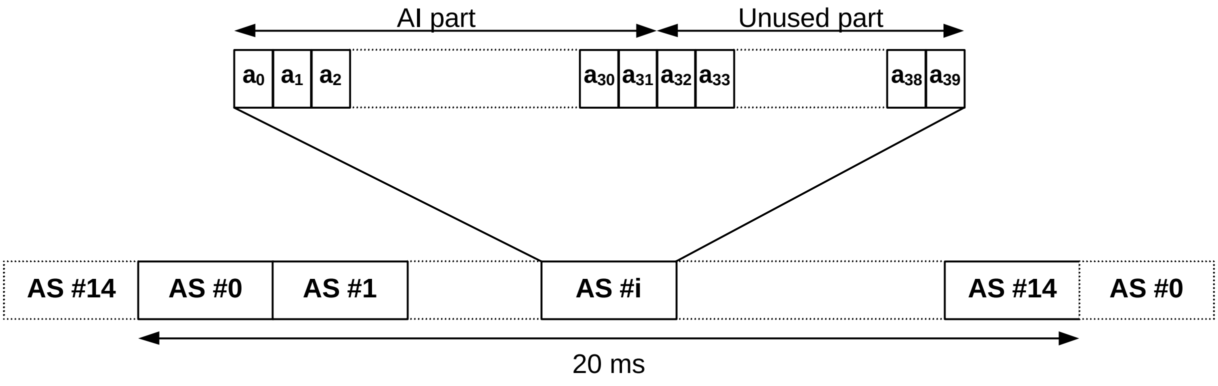

Figure 19: Structure of Acquisition Indicator Channel (AICH)

The real-valued symbols $a_0, a_1, \ldots, a_{31}$ in Figure 19 are given by

$$a_j = \sum_{s=0}^{15} AI_s b_{s,j}$$

where AI_s, taking the values +1, -1, and 0, is the acquisition indicator corresponding to signature s and the sequence $b_{s,0}, \ldots, b_{s,31}$ is given by Table 20.
The real-valued symbols $a_{32}, a_{33}, \ldots, a_{39}$ in Figure 19 are undefined.
In case STTD-based open-loop transmit diversity is applied to AICH, STTD encoding according to section 5.3.1.1.1 is applied to each sequence $b_{s,0}, b_{s,1}, ..., b_{s,31}$ separately before the sequences are combined into AICH symbols $a_0, \ldots, a_{31}$.

Table 20: AICH signature patterns

s	$b_{s,0}, b_{s,1}\dots, b_{s,31}$																														
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1
2	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1
3	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1
4	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1
5	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1
6	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1
7	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
9	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1
10	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
11	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1
12	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	1	1	1	1
13	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1
14	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1
15	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1

5.3.3.8 Page Indicator Channel (PICH)

6 Mapping of transport channels onto physical channels

Figure 21 summarises the mapping of transport channels onto physical channels.

Transport Channels	Physical Channels
DCH	Dedicated Physical Data Channel (DPDCH)
	Dedicated Physical Control Channel (DPCCH)
RACH	Physical Random Access Channel (PRACH)
CPCH	Physical Common Packet Channel (PCPCH)
	Common Pilot Channel (CPICH)
BCH	Primary Common Control Physical Channel (P-CCPCH)
FACH	Secondary Common Control Physical Channel (S-CCPCH)
PCH	
	Synchronisation Channel (SCH)
DSCH	Physical Downlink Shared Channel (PDSCH)
	Acquisition Indication Channel (AICH)
	Page Indication Channel (PICH)

Figure 21: Transport-channel to physical-channel mapping

The DCHs are coded and multiplexed as described in [3] , and the resulting data stream is mapped sequentially (first-in-first-mapped) directly to the physical channel(s). The mapping of BCH and FACH/PCH is equally straightforward, where the data stream after coding and interleaving is mapped sequentially to the Primary and Secondary CCPCH respectively. Also for the RACH, the coded and interleaved bits are sequentially mapped to the physical channel, in this case the message part of the random access burst on the PRACH.

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-~~A~~ICH 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 the following apply when the RACH and CPCH preamble resources are not share~~d~~:

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

$\tau_{p\text{-}p}$ = 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.

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

$\tau_{a1\text{-}cdp}$ = Minimum t~~T~~ime between receipt of AP-AICH and transmission of the CD Preamble has one value: 7680 chips.

$\tau_{p\text{-}cdp}$ = Maximum t~~T~~ime between the last AP and CD Preamble. is either 3 or 4 access slots, depending on T_{cpch}

$\tau_{cdp\text{-}a2}$ = Time between the CD Preamble and the CD-~~A~~ICH has two alternative values: 7680 chips or 12800 chips, depending on T_{cpch}

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

The message transmission shall start 0 or 8 slots after the start of the power control preamble depending on the length of the power control preamble.

Figure 25 illustrates the PCPCH/AICH timing relationship whenT_{cpch} is set to 0 and all access slot subchannels are available for PCPCH.

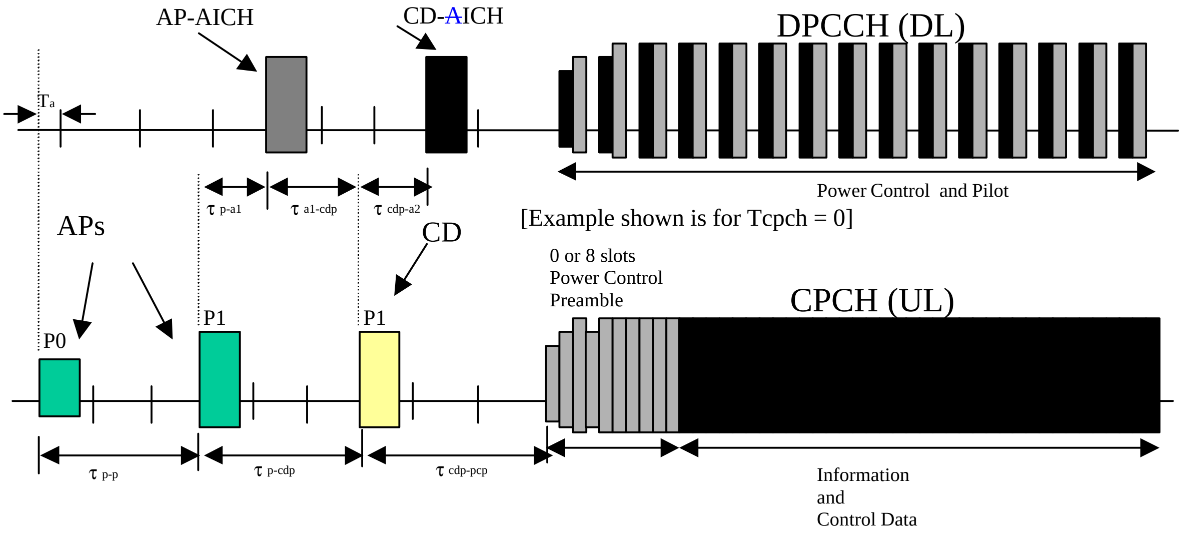

Figure 25: Timing of PCPCH and AICH transmission as seen by the UE, with T_{cpch}= 0