
Agenda Item: Ad hoc 14
Source: Philips
Title: Proposal for code assignment in CPCH
Document for: Decision

The changes described here are only those needed to support the use of Code Assignment in CPCH, as proposed in documents TSGR1#7(99)b13 and TSGR1#7(99)b37. This document supersedes the text proposal TSGR1#7(99)d57.

Specific mappings between the signatures used for the CPCH collision detection preamble and CD-AICH, and also between for CPCH assignment and CA-AICH, are proposed. These mappings are intended to minimise false detection probability.

1. Text Proposal for 25.211

3.3 Abbreviations

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

<ACRONYM> <Explanation>

AI	Acquisition Indicator
AICH	Acquisition Indication Channel
AP	Access Preamble
BCH	Broadcast Channel
<u>CA</u>	<u>Channel Assignment</u>
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
FACH	Forward Access Channel
FBI	Feedback Information
MUI	Mobile User Identifier
PCH	Paging Channel
PCPCH	Physical Common Packet Channel
PDSCH	Physical Downlink Shared Channel

PI	Page Indicator
PICH	Page Indication Channel
PRACH	Physical Random Access Channel
RACH	Random Access Channel
RNC	Radio Network Controller
SCH	Synchronisation Channel
SF	Spreading Factor
SFN	System Frame Number
STTD	Space Time Transmit Diversity
TFCI	Transport Format Combination Indicator
TSTD	Time Switched Transmit Diversity
TPC	Transmit Power Control
UE	User Equipment

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5.3.3.6 Acquisition Indication Channel (AICH)

The Acquisition Indicator channel (AICH) is a physical channel used to carry Acquisition Indicators (AI). Acquisition Indicator AI_i corresponds to signature i on the PRACH or PCPCH. Note that for PCPCH, the AICH is either in response to an access preamble or a CD preamble. The response corresponding to the access preamble AICH is the AP-AICH and the ate corresponding to the CD preamble AICH is the CD-AICH and CA-AICH. The AP-AICH and CD-AICH use different channelization codes, while the CD-AICH and CA-AICH use the same channelization code, see further [4], Section 4.3.3.2.

Figure 21 illustrates the frame structure of the AICH. Two AICH frames of total length 20 ms consist of 15 *access slots* (AS), each of length 20 symbols (5120 chips). Each access slot consists of two parts, an *Acquisition-Indicator* (AI) part and an empty part.

The AI-part of the access slot is generated as described in Figure 21. The empty part of the access slot consists of 4 zeros. The phase reference for the AICH is the CPICH.

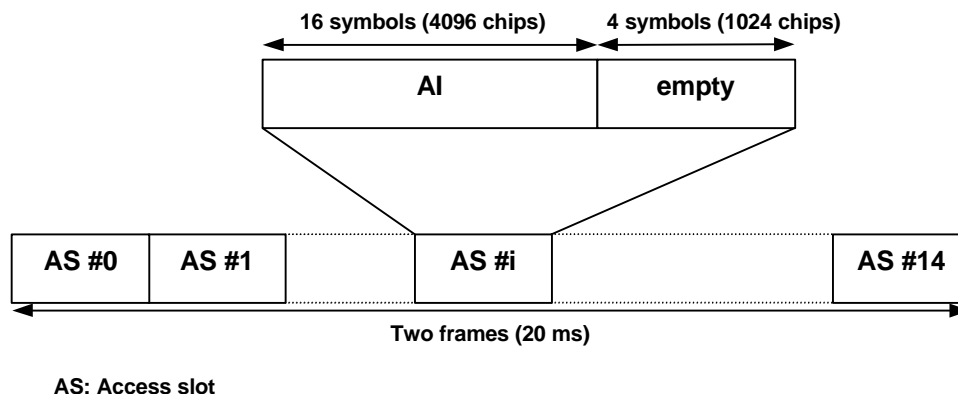


Figure 21: Structure of Acquisition Indicator Channel (AICH)

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7.4 PCPCH/AICH timing relation

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/CA-AICH is identical to RACH Preamble and AICH. The timing relationship between CD/CA-AICH and the Power Control Preamble in CPCH is identical to AICH and the message in RACH. However, the set of values for T_{cpch} is TBD. As an example, 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/CA-AICH.

τ_{p-p} = Time between Access Preamble (AP) to the next AP. is either 3 or 4 access slots, depending on T_{cpch} .

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

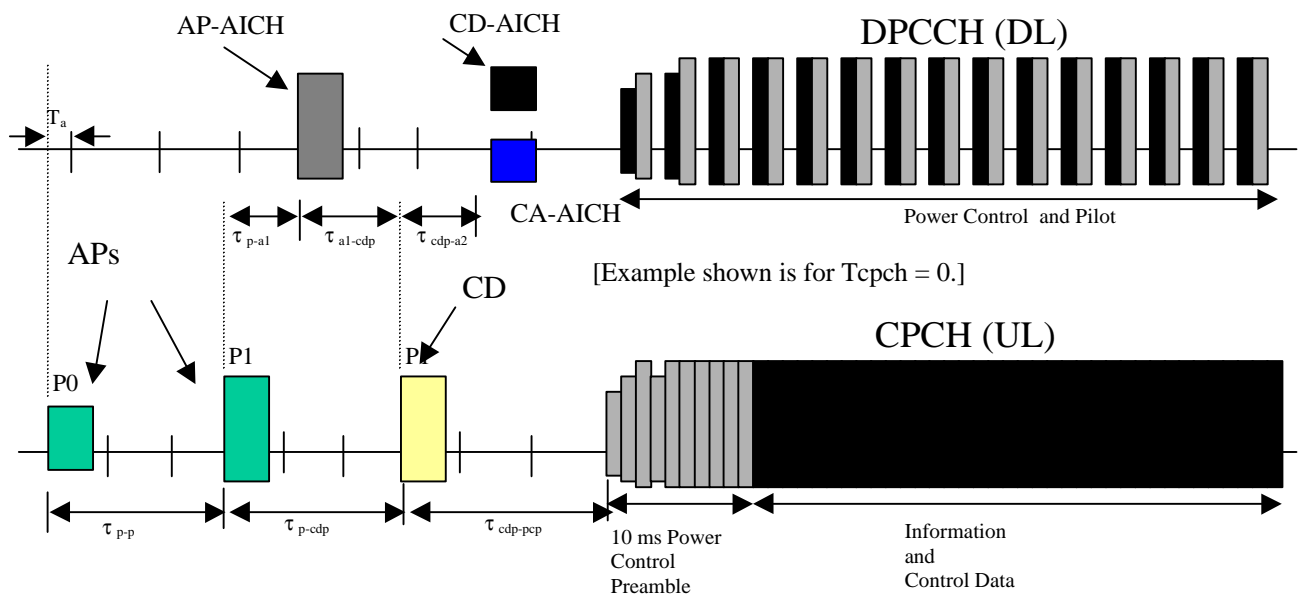
τ_{a1-cdp} = Time between receipt of AP-AICH and transmission of the CD Preamble has one value: 7680 chips.

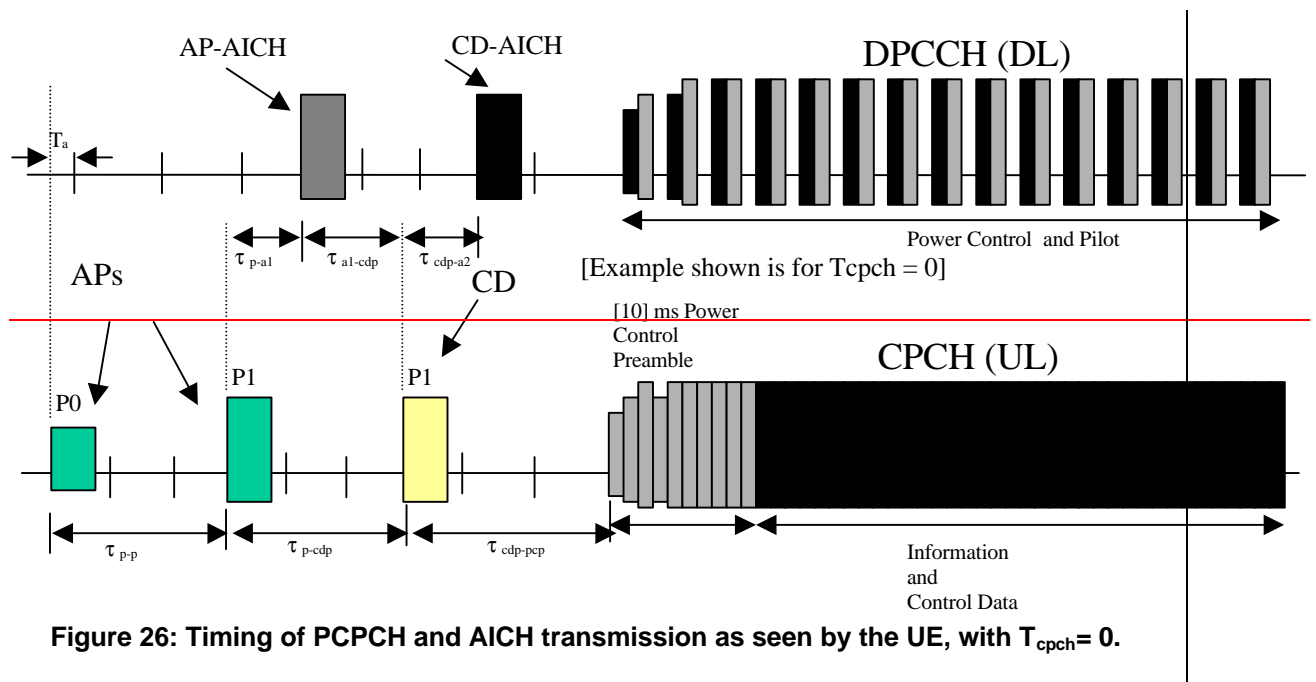
τ_{p-cdp} = Time between the last AP and CD Preamble. is either 3 or 4 access slots, depending on T_{cpch}

τ_{cdp-a2} = Time between the CD Preamble and the CD/CA-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 26 shows the timing of the CPCH uplink transmission with the associated DPCCH control channel in the downlink.





2. Text Proposal for 25.214

3.3 Abbreviations

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

ASC	Access Service Class
AP	Access Preamble
BCH	Broadcast Channel
<u>CA</u>	<u>Channel Assignment</u>
CCPCH	Common Control Physical Channel
CD	Collision Detection
CPCH	Common Packet Channel
DCH	Dedicated Channel
DPCCH	Dedicated Physical Control Channel
DPCH	Dedicated Physical Channel
DPDCH	Dedicated Physical Data Channel
FACH	Forward Access Channel
MUI	Mobile User Identifier
PCH	Paging Channel
PCPCH	Physical Common Packet Channel
PI	Paging Indication
PRACH	Physical Random Access Channel
RACH	Random Access Channel
SCH	Synchronisation Channel
SIR	Signal-to-Interference Ratio
SSDT	Site Selection Diversity TPC
TPC	Transmit Power Control
UE	User Equipment

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6.2 CPCH Access Procedures

<Editor's note: This clause is W.A., not agreement, Contents are to be determined in WG1#7bis>

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

- UL Access Preamble (AP) scrambling codeset.
- AP- AICH preamble channelization code set.
- UL CD preamble scrambling code set.
- CD/CA-AICH preamble channelization code set.
- CPCH UL scrambling code set.
- CPCH UL channelization code set. (variable, data rate dependant)
- DPCCH DL channelization code set.([256] chip)

The following are access, collision detection/resolution and CPCH data transmission parameters:
Power ramp-up, Access and Timing parameters (Physical layer parameters)

The following procedure makes use of mappings between the signatures used for the CPCH collision detection preamble and CD-AICH and also between CPCH assignment and CA-AICH. These mappings are given in [4].

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 [RACH/CPCH]
5. T_{cpch} = CPCH transmission timing parameter: The range of T_{cpch} values is TBD. This parameter is similar to PRACH/AICH transmission timing parameter.

The CPCH -access procedure in the physical layer is:

1. The UE sets the preamble transmit power to the value P_{CPCH} which is supplied by the MAC layer for initial power level for this CPCH access attempt.
2. The UE sets the AP Retransmission Counter to $N_{AP_Retrans_Max}$ (value TBD).
3. The UE transmits the AP using the MAC supplied uplink access slot, signature, and initial preamble transmission power.
4. If the UE does not detect the positive or negative acquisition indicator corresponding to the selected signature in the downlink access slot corresponding to the selected uplink access slot, the UE:
 - a Selects a new uplink access slot. This new access slot must be one of the available access slots. There must be also a distance of three or four access slots from the uplink access slot in which the last preamble was transmitted depending on the CPCH/AICH transmission timing parameter. The selection scheme of this new access slot is TBD.
 - b Increases the preamble transmission power with the specified offset P_0 .
 - c Decrease the Preamble Retransmission Counter by one.
 - d If the Preamble Retransmission Counter < 0 , the UE aborts the access attempt and sends a failure message to the MAC layer.
5. If the UE detects the negative acquisition indicator corresponding to the selected signature in the downlink access slot corresponding to the selected uplink access slot, the UE aborts the access attempt and sends a failure message to the MAC layer.
6. Upon reception of AP-AICH, the access segment ends and the contention resolution segment begins. In this segment, the UE randomly selects one of 16 signatures and transmits a CD Preamble, then waits for a CD-AICH from the base Node.
7. If the UE does not receive a CD-AICH in the designated slot, the UE aborts the access attempt and sends a failure message to the MAC layer.
8. If the UE receives a CD-AICH in the designated slot with a signature that does not match the signature used in the CD Preamble, the UE aborts the access attempt and sends a failure message to the MAC layer.
9. If the UE receives a CD-AICH with a matching signature, the UE decodes the channel assignment information from CA-AICH. Then the UE transmits the power control preamble $\tau_{cd-p-pc-p}$ ms later as measured from initiation of the CD Preamble in the assigned CPCH-. The transmission of the message portion of the burst starts immediately after the power control preamble.
10. During CPCH Packet Data transmission, the UE and UTRAN perform closed loop power control on both the CPCH UL and the DPCCH DL.

- 11.If the UE detects loss of DPCCH DL during transmission of the power control preamble or the packet data, the UE halts CPCH UL transmission, aborts the access attempt and sends a failure message to the MAC layer.
- 12.If the UE completes the transmission of the packet data, the UE sends a success message to the MAC layer.

3. Text Proposal for 25.213

3.3 Abbreviations

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

AICH	Acquisition Indicator Channel
AP	Access Preamble
BCH	Broadcast Control Channel
<u>CA</u>	<u>Code Assignment</u>
CCPCH	Common Control Physical Channel
CD	Collision Detection
CPCCH	Common Packet Channel
DCH	Dedicated Channel
DPCH	Dedicated Physical Channel
DPCCH	Dedicated Physical Control Channel
DPDCH	Dedicated Physical Data Channel
FDD	Frequency Division Duplex
Mcps	Mega Chip Per Second
OVSF	Orthogonal Variable Spreading Factor (codes)
PDSCH	Physical Dedicated Shared Channel
PICH	Page Indication Channel
PRACH	Physical Random Access Channel
RACH	Random Access Channel
SCH	Synchronisation Channel
SF	Spreading Factor
UE	User Equipment

5.1 Spreading

Figure 11 illustrates the detailed generation of an AICH access slot. Note that this is an example implementation.

The AI-part of the access slot consists of the symbol-wise sum of up to 16 orthogonal code words w_1 - w_{16} , multiplied by the value of the corresponding acquisition indicator AI_i . The orthogonal code words w_1, \dots, w_{16} are shown in Table 4.

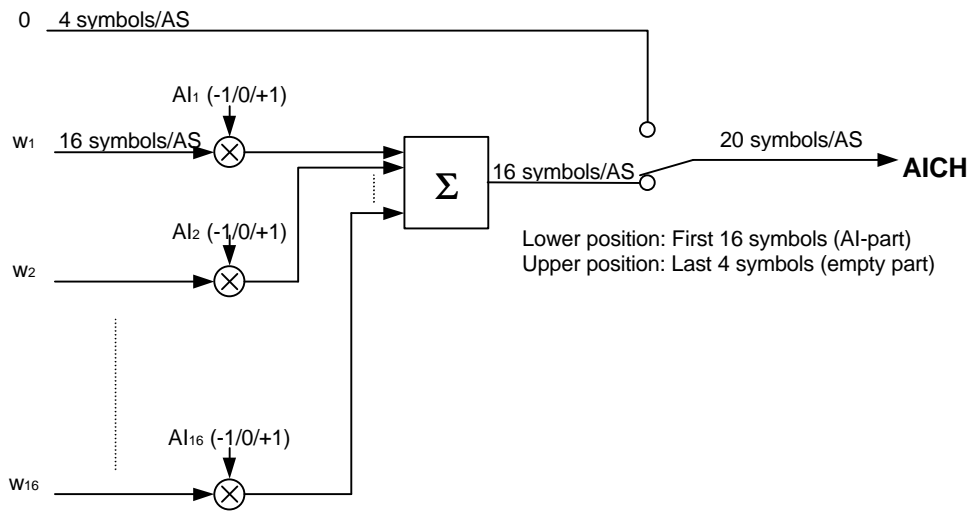


Figure 11 Schematic generation of AICH

I	w_I															
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	-A	A	-A	A	-A	A	-A	A	-A	A	-A	A	-A	A	-A
3	A	A	-A	-A	A	A	-A	-A	A	A	-A	-A	A	A	-A	-A
4	A	-A	-A	A	A	-A	-A	A	A	-A	-A	A	A	-A	-A	A
5	A	A	A	A	-A	-A	-A	-A	A	A	A	A	-A	-A	-A	-A
6	A	-A	A	-A	-A	A	-A	A	A	A	-A	A	-A	-A	A	A
7	A	A	-A	-A	-A	-A	A	A	A	A	-A	-A	-A	-A	A	A
8	A	-A	-A	A	-A	A	A	-A	A	-A	-A	A	-A	A	A	-A
9	A	A	A	A	A	A	A	A	-A	-A	-A	-A	-A	-A	-A	-A
10	A	-A	A	-A	A	-A	A	-A	-A	A	-A	A	-A	A	-A	A
11	A	A	-A	-A	A	A	-A	-A	-A	-A	A	A	-A	-A	A	A
12	A	-A	-A	A	A	-A	-A	-A	A	A	-A	-A	-A	A	A	-A
13	A	A	A	A	-A	-A	-A	-A	-A	-A	-A	-A	A	A	A	A
14	A	-A	A	-A	-A	A	-A	A	-A	A	-A	A	A	-A	A	-A
15	A	A	-A	-A	-A	-A	A	A	-A	-A	A	A	A	A	-A	-A
16	A	-A	-A	A	-A	A	A	-A	-A	A	A	-A	A	-A	-A	A

Table 4 Definition of orthogonal vectors w_1 - w_{16} used in AICH; $A = (1+j)$

When CA AICH is transmitted as a response to a CPCH CD preamble the mapping between CPCH assignment and the CA AICH signature is as shown in Table 5 (where the negative sign indicates that the corresponding signature sequence is inverted.)

<u>CPCH assignment</u>	<u>CA-AICH signature</u>
<u>1</u>	<u>1</u>
<u>2</u>	<u>-1</u>
<u>3</u>	<u>9</u>
<u>4</u>	<u>-9</u>
<u>5</u>	<u>5</u>
<u>6</u>	<u>-5</u>
<u>7</u>	<u>13</u>
<u>8</u>	<u>-13</u>
<u>9</u>	<u>3</u>
<u>10</u>	<u>-3</u>
<u>11</u>	<u>7</u>
<u>12</u>	<u>-7</u>

<u>13</u>	<u>11</u>
<u>14</u>	<u>-11</u>
<u>15</u>	<u>15</u>
<u>16</u>	<u>-15</u>

Table 5 Mapping between CPCH assignment and CA-AICH signatures

When CD AICH is transmitted as a response to a CPCH CD preamble the mapping between signatures in the uplink and downlink is as shown in Table 6 (where the negative sign indicates that the corresponding signature sequence is inverted).

<u>CD preamble signature</u>	<u>CD-AICH signature</u>
<u>1</u>	<u>2</u>
<u>2</u>	<u>-2</u>
<u>3</u>	<u>4</u>
<u>4</u>	<u>-4</u>
<u>5</u>	<u>6</u>
<u>6</u>	<u>-6</u>
<u>7</u>	<u>8</u>
<u>8</u>	<u>-8</u>
<u>9</u>	<u>10</u>
<u>10</u>	<u>-10</u>
<u>11</u>	<u>12</u>
<u>12</u>	<u>-12</u>
<u>13</u>	<u>14</u>
<u>14</u>	<u>-14</u>
<u>15</u>	<u>16</u>
<u>16</u>	<u>-16</u>

Table 6 Mapping between CD preamble signatures and CD-AICH signatures