TSG-RAN Working Group 1 meeting #11 **TSGR1#10(00)0361**

San Diego (USA), February 28 ~ March 3, 2000

Agenda Item :

Source : Samsung, GBT, LGIC, Lucent. Nokia

Title : CD/CA-ICH for dual mode CPCH (rev. 1)

Document for : Discussion and approval

For dual mode CPCH, namely, the UE channel selection method (UCSM) and the Versatile channel assign method (VCAM), the collision detection and/or channel assignment indication channel (CD/CA-ICH) instead of CD-AICH is proposed in this CR. Based on this CR, when the UCSM is used, the CD/CA-ICH operation is same as CD-AICH. In this case, only the CD indicator is transmitted by CD/CA-ICH. On the other hand, for the VCAM, both of the CD indicator and CA indicator are transmitted by CD/CA-ICH. The hardware structure of CD/CA-ICH is same between UCSM and VCAM. Only the meaning of the message is different between CD only case and CD and CA case.

3GPP RAN WG1 Meeting #11
San Diego, USA, 28 Feb – 3 Mar 2000

Document R1-00-0317
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	031r1	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:	TSG-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	X	UTRAN / Radio	X	Core Network	

Source: Samsung, GBT, LGIC, Lucent **Date:** 28-Feb-2000

Subject: Dual mode CPCH

Work item:

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

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

Reason for change: For dual mode CPCH, the CD/CA-ICH is used instead of CD-ICH. In UCSM, only the CD indicator is transmitted by CD/CA-ICH. On the other hand, both of the CD and CA indicators are transmitted by CD/CA-ICH for VCAM with the same hardware structure.

Clauses affected: 5.3.3.6 and 5.3.3.7 of TS25.211

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:

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

A DSCH may be mapped to multiple parallel PDSCHs as well, as negotiated at higher layer prior to starting data transmission. In such a case the parallel PDSCHs shall be operated with frame synchronization between each other.

Table 19: PDSCH fields

Slot format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{data}
0	30	15	256	300	20	20
1	60	30	128	600	40	40
2	120	60	64	1200	80	80
3	240	120	32	2400	160	160
4	480	240	16	4800	320	320
5	960	480	8	9600	640	640
6	1920	960	4	19200	1280	1280

When transmit diversity is employed for the PDSCH, STTD encoding is used on the data bits as described in section 5.3.1.1.1.

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, …, a_{31} and an unused part consisting of 8 real-valued symbols a_{32}, …, a_{39}.

The phase reference for the AICH is the Primary CPICH.

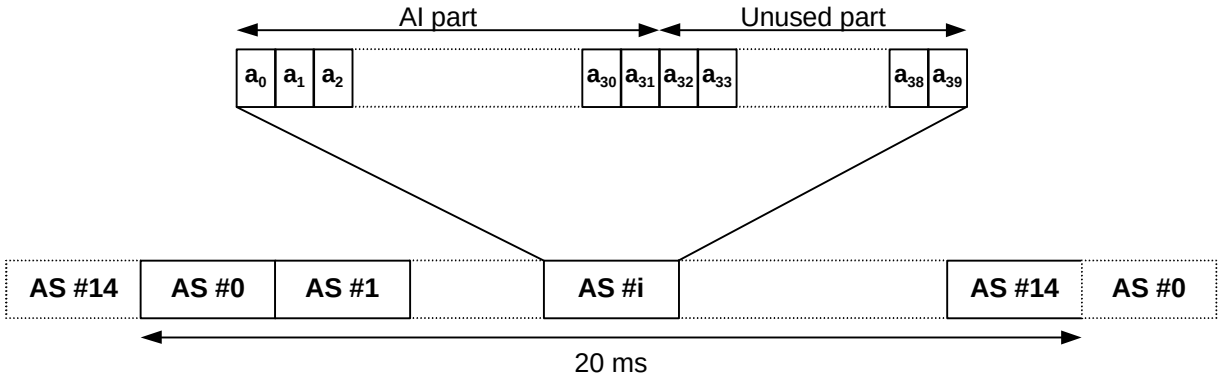

Figure 19: Structure of Acquisition Indicator Channel (AICH)

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

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

where AI_s, taking the values +1, -1, and 0, is the acquisition indicator corresponding to signature s and the sequence $b_{s,0}$, …, $b_{s,31}$ is given by Table 20.

The real-valued symbols a_{32}, a_{33}, …, 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, …, a_{31}.

Table 20: AICH signature patterns

s	$b_{s,0}$, $b_{s,1}$…, $b_{s,31}$																													
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
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

5.3.3.7 CPCH Access Preamble Acquisition Indicator Channel (AP-AICH)

The Access Preamble Acquisition Indicator channel (AP-AICH) is a physical channel used to carry AP acquisition indicators (API) of CPCH. AP acquisition indicator API_s corresponds to signature *s* of AP signature transmitted by UE.

AP-AICH and PRACH/AICH may use the same or different channelisation codes. The phase reference for the AP-AICH is the Primary CPICH. Figure 20 illustrates the structure of the indicator part of CPCH (AP-AICH and CD/CA-ICH).

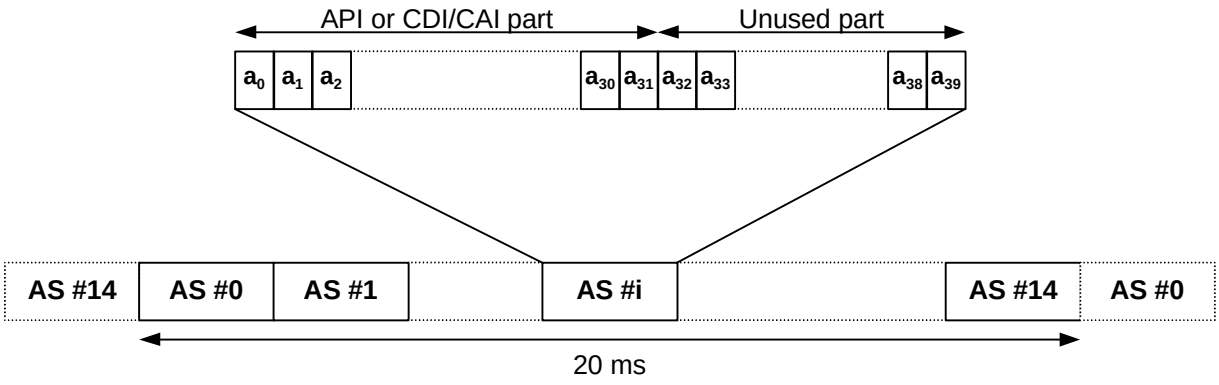

Figure 20: Structure of CPCH Indicator Channel (AP-AICH and CD/CA-ICH)

The real-valued symbols a_0, a_1, …, a_{31} in Figure 20 are given by

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

where API_s, taking the values +1, -1, and 0, is the AP acquisition indicator corresponding to Access Preamble signature s transmitted by UE and the sequence $b_{s,0}$, …, $b_{s,31}$ is given by Table 20. The real-valued symbols a_{32}, a_{33}, …, a_{39} in Figure 20 are undefined.

In case STTD-based open-loop transmit diversity is applied to AP-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 AP-AICH symbols a_0, …, a_{31}.

5.3.3.8 CPCH Collision Detection/Channel Assignment Indicator Channel (CD/CA-ICH)

The Collision Detection/Channel Assignment Indicator channel (CD/CA-ICH) is a physical channel used to carry CD Indicator (CDI_s) only if the Channel Assignment message is not active, or CD Indicator/CA Indicator (CDI_s/CAI_s) at the same time if the Channel Assignment message is active. The structure of CD/CA-ICH is shown in Figure 20. CD/CA-ICH and AP-AICH may use the same or different channelisation codes.

In case STTD-based open-loop transmit diversity is applied to AP-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 CD/CA-ICH symbols $a_0, \ldots, a_{31}$.

If the channel assignment message is not active, the real-valued symbols $a_0, a_1, \ldots, a_{31}$ in Figure 20 are given by

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

where CDI_s, taking the values +1, and 0, is the CD indicator corresponding to CD preamble signature s transmitted by UE 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 20 are undefined.

If the channel assignment message is active, the real-valued symbols $a_0, a_1, \ldots, a_{31}$ in Figure 20 are given by

$$a_j = \sum_{s=1,3,\cdots}^{15} (CDI_{s,0} + CDI_{s,1}) \times b_{s,j} + \sum_{s=0,2,\cdots}^{14} (CAI_{s,0} + CAI_{s,1}) \times b_{s,j}$$

where $CDI_{s,0}$ and $CDI_{s,1}$, taking the values +1/0 or –1/0, together with the odd-numbered signature s as given in table 21, are the CD indicators corresponding to CD preamble transmitted by UE, and $CAI_{s,0}$ and $CAI_{s,1}$, taking the values +1/0 or –1/0, together with the even-numbered signature s are the CA indicator corresponding to assigned channel as given in table 21. The sequence $b_{s,0}, \ldots, b_{s,31}$ is given by Table 20.

Table 21. Generation of CDI_s/CAI_s

UE Transmitted CD Preamble	$CDI_{s,0}$ / $CDI_{s,1}$	s	Assigned Channel Index	$CAI_{s,0}$ / $CAI_{s,1}$	s
0	+1/0	1	0	+1/0	0
1	-1/0		1	-1/0	
2	+1/0	3	2	+1/0	8
3	-1/0		3	-1/0	
4	+1/0	5	4	+1/0	4
5	-1/0		5	-1/0	
6	+1/0	7	6	+1/0	12
7	-1/0		7	-1/0	
8	+1/0	9	8	+1/0	2
9	-1/0		9	-1/0	
10	+1/0	11	10	+1/0	6
11	-1/0		11	-1/0	
12	+1/0	13	12	+1/0	10
13	-1/0		13	-1/0	
14	+1/0	15	14	+1/0	14
15	-1/0		15	-1/0	

5.3.3.~~7~~9 Page Indicator Channel (PICH)

The Page Indicator Channel (PICH) is a fixed rate (SF=256) physical channel used to carry the Page Indicators (PI). The PICH is always associated with an S-CCPCH to which a PCH transport channel is mapped.

Figure 20 illustrates the frame structure of the PICH. One PICH frame of length 10 ms consists of 300 bits (b_0, b_1, …, b_{299}). Of these, 288 bits (b_0, b_1, …, b_{287}) are used to carry Page Indicators. The remaining 12 bits (b_{288}, b_{289}, …, b_{299}) are undefined.

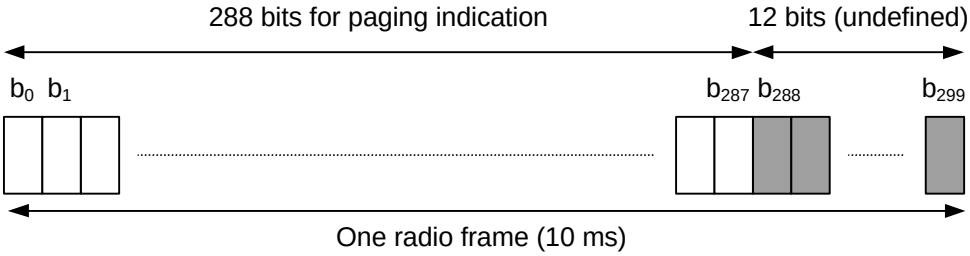

Figure 20: Structure of Page Indicator Channel (PICH)

N Page Indicators {PI_0, …, PI_{N-1}} are transmitted in each PICH frame, where N=18, 36, 72, or 144.

The PI calculated by higher layers for use for a certain UE, is mapped to the paging indicator PI_p, where *p* is computed as a function of the PI computed by higher layers, the SFN of the P-CCPCH radio frame during which the start of the PICH radio frame occurs, and the number of paging indicators per frame (N):