3GPP TSG RAN WG1 Meeting #11
San Diego, USA, Feb 29-Mar 3, 2000

Document ***R1-00-0360***
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**	**043**	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*
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:	Samsung		**Date:**	2000-03-01

Subject:	Addition of a downlink physical channel indicating CPCH status

Work item:	

Category:

(only one category shall be marked with an X)

				Release:		
F	Correction				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:	Broadcast of status information significantly improves performance of CPCH.

Clauses affected:	3, 5.3.1, 5.3.3.6, 5.3.3.8, 6

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:	

help.doc

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

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
CSICH   CPCH Status Indicator Channel
DCH   Dedicated Channel
DPCCH   Dedicated Physical Control Channel
DPCH   Dedicated Physical Channel
DPDCH   Dedicated Physical Data Channel
DSCH   Downlink Shared Channel
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
SI   Status Indicator
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

5.3.1   Downlink Transmit Diversity

Table 10 summarizes the possible application of open and closed loop Transmit diversity modes on different downlink physical channels. Simultaneous use of STTD and closed loop modes on DPCH and PDSCH is not allowed.

Table 10: Application of Tx diversity modes on downlink physical channels
"X" – can be applied, "–" – not applied

Channel	Open loop mode		Closed loop
	TSTD	**STTD**	**Mode**
P-CCPCH	–	X	–
SCH	X	–	–
S-CCPCH	–	X	–
DPCH	–	X	X
PICH	–	X	–
PDSCH (associated with DPCH)	–	X	X
AICH	–	X	–
CSICH	–	X	–

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~~a part ~~consisting of 8 real-valued symbols a_{32}, ..., a_{39}.~~ of duratoin 1024 chips with no transmission.

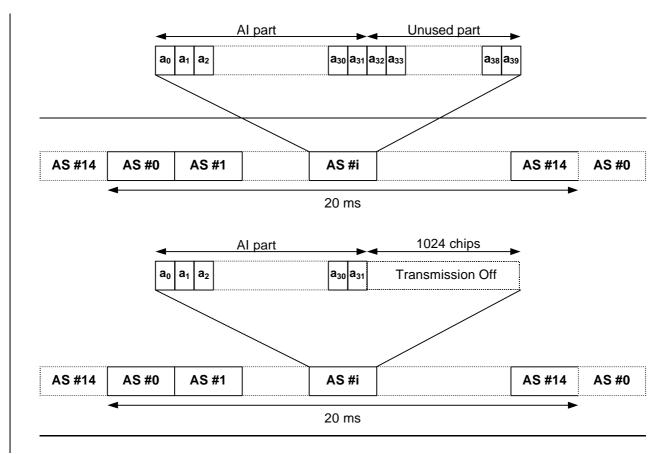The phase reference for the AICH is the Primary CPICH.

Figure 19: Structure of Acquisition Indicator Channel (AICH)

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

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

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	-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 CPCH Status Indicator Channel (CSICH)

The CPCH Status Indicator Channel (CSICH) is a fixed rate (SF=256) physical channel used to carry CPCH status information. A CSICH is always associated with a physical channel used for transmission of CPCH AP-AICH and uses the same channelization and scrambling codes.

Figure 23 illustrates the frame structure of the CSICH. The 20 msec CSICH frame consists of 15 consecutive access slots (AS) each of length 5120 chips. Each access slot consists of two parts, a part of duration 4096 chips with no transmission, and a Status Indicator (SI) part consisting of 8 bits b_{8i}, b_{8i+1},….b_{8i+7}, where i is the access slot number. The phase reference for the CSICH is the Primary CPICH.
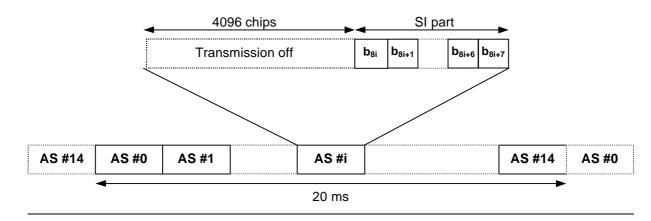

Figure 23: Structure of CPCH Status Indicator Channel (CSICH)

N Status Indicators {SI_0, …, SI_{N-1}} shall be transmitted in each CSICH frame where the allowed values of N are 1, 3, 5, 15, 30 and 60. The mapping from {SI_0, …, SI_{N-1}} to the CSICH bits {b_0, …, b_{119}} is according the following equation.

$$b_{2(i+kN)} = b_{2(i+kN)+1} = \left\{ \begin{array}{ll} 1 & \text{if } SI_i = 1 \\ 0 & \text{if } SI_i = 0 \end{array} \right\}, \quad k = 0,1,..,\frac{120}{2N}-1 \quad \text{and} \quad i = 0,1,...,N\text{-}1$$

The Status Indicators shall be transmitted in all the access slots of the CSICH frame, regardless of whether or not signatures and/or access slots are shared between CPCH and RACH.

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

At the UTRAN the values of the Status Indicators are set by higher layers.

At the UE the number of status indicators per frame is set as a higher layer parameter. The higher layers shall provide Layer 1 with the mapping between the values of the Status Indicators and the availability of CPCH resources.