3GPP TSG-RAN Meeting #16 *RP-020307*
Marco Island, FL, U.S.A., 4 – 7, June, 2002

Title: **Agreed CRs (R99 and Rel-4/Rel-5 Category A) to TS 25.211**

Source: **TSG-RAN WG1**

Agenda item: **7.1.3**

No.	Spec	CR	Rev	R1 T-doc	Subject	Phase	Cat	Work Item	V_old	V_new
1	25.211	143	1	R1-02-0539	SCCPCH structure with STTD encoding	R99	F	TEI	3.10.0	3.11.0
2	25.211	144	1	R1-02-0539	SCCPCH structure with STTD encoding	Rel-4	A	TEI	4.4.0	4.5.0
3	25.211	149	1	R1-02-0539	SCCPCH structure with STTD encoding	Rel-5	A	TEI	5.0.0	5.1.0
4	25.211	151	-	R1-02-0596	Downlink bit mapping	R99	F	TEI	3.10.0	3.11.0
5	25.211	152	-	R1-02-0596	Downlink bit mapping	Rel-4	A	TEI	4.4.0	4.5.0
6	25.211	153	-	R1-02-0596	Downlink bit mapping	Rel-5	A	TEI	5.0.0	5.1.0

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Marco Island, FL, U.S.A., 4 – 7, June 2002

R1-02-0539

CR-Form-v5

CHANGE REQUEST

z	25.211	CR	143	z rev	1	z	Current version:	3.10.0	z

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title:	z	SCCPCH structure with STTD encoding		
Source:	z	TSG RAN WG1		
Work item code:	z	TEI	***Date:*** z	2.05.2002
Category:	z	**F**	***Release:*** z	R99
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	z	The usage of word, "data" is not consistent between sections 5.3.3.4 and 5.3.3.4.1. In 5.3.3.4, 'data' corresponds to field where FACH and PCH is transmitted. In 5.3.3.4.1, 'data symbols' refers to whole structure of SCCPCH. It is proposed to have consistent usage of data aligned with the usage of section 5.3.3.4. Hence, when doing STTD encoding for SCCPCH also TFCI bits has to be included in encoding in addition to data bits.
Summary of change:	z	TFCI is included in STTD encoding with SCCPCH
Consequences if not approved:	z	STTD may not be used with SCCPCH

Clauses affected:	z	5.3.3.4.1		
Other specs affected:	z	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	z	
Other comments:	z	This CR is considered to have isolated impact: Would not affect existing UE or UTRAN implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.		

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked z contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest

version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request

Table 19: Pilot Symbol Pattern

	N_{pilot} = 8				N_{pilot} = 16							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	11	11	10	11	11	11	10	11	11	11	10
1	11	00	11	10	11	00	11	10	11	11	11	00
2	11	01	11	01	11	01	11	01	11	10	11	00
3	11	00	11	00	11	00	11	00	11	01	11	10
4	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	00	11	11	11	00	11	10	11	11
7	11	10	11	00	11	10	11	00	11	10	11	00
8	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	00	11	11
10	11	01	11	01	11	01	11	01	11	11	11	10
11	11	10	11	11	11	10	11	11	11	00	11	10
12	11	10	11	00	11	10	11	00	11	01	11	01
13	11	00	11	11	11	00	11	11	11	00	11	00
14	11	00	11	11	11	00	11	11	11	10	11	01

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

5.3.3.4.1 Secondary CCPCH structure with STTD encoding

In case the diversity antenna is present in UTRAN and the S-CCPCH is to be transmitted using open loop transmit diversity, the data and TFCI bits ~~symbols~~ of the S-CCPCH are STTD encoded as given in subclause 5.3.1.1.1. The pilot symbol pattern for antenna 2 for the S-CCPCH given in table 20 is not supported in this release.

Table 20: Pilot symbol pattern for antenna 2 when STTD encoding is used on the S-CCPCH

	N_{pilot} = 8				N_{pilot} = 16							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	00	00	10	11	00	00	10	11	00	00	10
1	11	00	00	01	11	00	00	01	11	10	00	10
2	11	11	00	00	11	11	00	00	11	10	00	11
3	11	10	00	01	11	10	00	01	11	00	00	00
4	11	11	00	11	11	11	00	11	11	01	00	10
5	11	00	00	10	11	00	00	10	11	11	00	00
6	11	10	00	10	11	10	00	10	11	01	00	11
7	11	10	00	11	11	10	00	11	11	10	00	11
8	11	00	00	00	11	00	00	00	11	01	00	01
9	11	01	00	10	11	01	00	10	11	01	00	01
10	11	11	00	00	11	11	00	00	11	00	00	10
11	11	01	00	11	11	01	00	11	11	00	00	01
12	11	10	00	11	11	10	00	11	11	11	00	00
13	11	01	00	01	11	01	00	01	11	10	00	01
14	11	01	00	01	11	01	00	01	11	11	00	11

5.3.3.5 Synchronisation Channel (SCH)

The Synchronisation Channel (SCH) is a downlink signal used for cell search. The SCH consists of two sub channels, the Primary and Secondary SCH. The 10 ms radio frames of the Primary and Secondary SCH are divided into 15 slots, each of length 2560 chips. Figure 18 illustrates the structure of the SCH radio frame.

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R1-02-0539

CR-Form-v5

CHANGE REQUEST

z	25.211	CR	144	z rev	1	z	Current version:	4.4.0	z

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title:	z	SCCPCH structure with STTD encoding			
Source:	z	TSG RAN WG1			
Work item code:	z	TEI	***Date:***	z	2.05.2002
Category:	z	**A** *Use one of the following categories:* ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	***Release:***	z	REL-4 *Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	z	The usage of word, "data" is not consistent between sections 5.3.3.4 and 5.3.3.4.1. In 5.3.3.4, 'data' corresponds to field where FACH and PCH is transmitted. In 5.3.3.4.1, 'data symbols' refers to whole structure of SCCPCH. It is proposed to have consistent usage of data aligned with the usage of section 5.3.3.4. Hence, when doing STTD encoding for SCCPCH also TFCI bits has to be included in encoding in addition to data bits.
Summary of change:	z	TFCI is included in STTD encoding with SCCPCH
Consequences if not approved:	z	STTD may not be used with SCCPCH

Clauses affected:	z	5.3.3.4.1	
Other specs affected:	z	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	z
Other comments:	z	This CR is considered to have isolated impact: Would not affect existing UE or UTRAN implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.	

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4	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	00	11	11	11	00	11	10	11	11
7	11	10	11	00	11	10	11	00	11	10	11	00
8	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	00	11	11
10	11	01	11	01	11	01	11	01	11	11	11	10
11	11	10	11	11	11	10	11	11	11	00	11	10
12	11	10	11	00	11	10	11	00	11	01	11	01
13	11	00	11	11	11	00	11	11	11	00	11	00
14	11	00	11	11	11	00	11	11	11	10	11	01

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

5.3.3.4.1 Secondary CCPCH structure with STTD encoding

In case the diversity antenna is present in UTRAN and the S-CCPCH is to be transmitted using open loop transmit diversity, the data and TFCI bits ~~symbols~~ of the S-CCPCH are STTD encoded as given in subclause 5.3.1.1.1. The pilot symbol pattern for antenna 2 for the S-CCPCH given in table 20 is not supported in this release.

Table 20: Pilot symbol pattern for antenna 2 when STTD encoding is used on the S-CCPCH

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3	11	10	00	01	11	10	00	01	11	00	00	00
4	11	11	00	11	11	11	00	11	11	01	00	10
5	11	00	00	10	11	00	00	10	11	11	00	00
6	11	10	00	10	11	10	00	10	11	01	00	11
7	11	10	00	11	11	10	00	11	11	10	00	11
8	11	00	00	00	11	00	00	00	11	01	00	01
9	11	01	00	10	11	01	00	10	11	01	00	01
10	11	11	00	00	11	11	00	00	11	00	00	10
11	11	01	00	11	11	01	00	11	11	00	00	01
12	11	10	00	11	11	10	00	11	11	11	00	00
13	11	01	00	01	11	01	00	01	11	10	00	01
14	11	01	00	01	11	01	00	01	11	11	00	11

5.3.3.5 Synchronisation Channel (SCH)

The Synchronisation Channel (SCH) is a downlink signal used for cell search. The SCH consists of two sub channels, the Primary and Secondary SCH. The 10 ms radio frames of the Primary and Secondary SCH are divided into 15 slots, each of length 2560 chips. Figure 18 illustrates the structure of the SCH radio frame.

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R1-02-0539

CR-Form-v5

CHANGE REQUEST

z	**25.211**	**CR**	**149**	z **rev**	**1**	z	Current version:	**5.0.0**	z

For ***HELP*** *on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title:	z	SCCPCH structure with STTD encoding
Source:	z	TSG RAN WG1
Work item code:	z	TEI
Date:	z	2.05.2002
Category:	z	**A**
Release:	z	REL-5

Use one of the following categories:
- ***F*** *(correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(addition of feature),*
- ***C*** *(functional modification of feature)*
- ***D*** *(editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
- 2 *(GSM Phase 2)*
- *R96 (Release 1996)*
- *R97 (Release 1997)*
- *R98 (Release 1998)*
- *R99 (Release 1999)*
- *REL-4 (Release 4)*
- *REL-5 (Release 5)*

Reason for change:	z	The usage of word, "data" is not consistent between sections 5.3.3.4 and 5.3.3.4.1. In 5.3.3.4, 'data' corresponds to field where FACH and PCH is transmitted. In 5.3.3.4.1, 'data symbols' refers to whole structure of SCCPCH. It is proposed to have consistent usage of data aligned with the usage of section 5.3.3.4. Hence, when doing STTD encoding for SCCPCH also TFCI bits has to be included in encoding in addition to data bits.
Summary of change:	z	TFCI is included in STTD encoding with SCCPCH
Consequences if not approved:	z	STTD may not be used with SCCPCH

Clauses affected:	z	5.3.3.4.1
Other specs affected:	z	[ ] Other core specifications z [ ] Test specifications [ ] O&M Specifications
Other comments:	z	This CR is considered to have isolated impact: Would not affect existing UE or UTRAN implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

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4	11	10	11	01	11	10	11	01	11	11	11	11
5	11	11	11	10	11	11	11	10	11	01	11	01
6	11	11	11	00	11	11	11	00	11	10	11	11
7	11	10	11	00	11	10	11	00	11	10	11	00
8	11	01	11	10	11	01	11	10	11	00	11	11
9	11	11	11	11	11	11	11	11	11	00	11	11
10	11	01	11	01	11	01	11	01	11	11	11	10
11	11	10	11	11	11	10	11	11	11	00	11	10
12	11	10	11	00	11	10	11	00	11	01	11	01
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14	11	00	11	11	11	00	11	11	11	10	11	01

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5.3.3.4.1 Secondary CCPCH structure with STTD encoding

In case the diversity antenna is present in UTRAN and the S-CCPCH is to be transmitted using open loop transmit diversity, the data and TFCI bits ~~symbols~~ of the S-CCPCH are STTD encoded as given in subclause 5.3.1.1.1. The pilot symbol pattern for antenna 2 for the S-CCPCH given in Table 21 is not supported in this release.

Table 21: Pilot symbol pattern for antenna 2 when STTD encoding is used on the S-CCPCH

	Npilot = 8				Npilot = 16							
Symbol #	0	1	2	3	0	1	2	3	4	5	6	7
Slot #0	11	00	00	10	11	00	00	10	11	00	00	10
1	11	00	00	01	11	00	00	01	11	10	00	10
2	11	11	00	00	11	11	00	00	11	10	00	11
3	11	10	00	01	11	10	00	01	11	00	00	00
4	11	11	00	11	11	11	00	11	11	01	00	10
5	11	00	00	10	11	00	00	10	11	11	00	00
6	11	10	00	10	11	10	00	10	11	01	00	11
7	11	10	00	11	11	10	00	11	11	10	00	11
8	11	00	00	00	11	00	00	00	11	01	00	01
9	11	01	00	10	11	01	00	10	11	01	00	01
10	11	11	00	00	11	11	00	00	11	00	00	10
11	11	01	00	11	11	01	00	11	11	00	00	01
12	11	10	00	11	11	10	00	11	11	11	00	00
13	11	01	00	01	11	01	00	01	11	10	00	01
14	11	01	00	01	11	01	00	01	11	11	00	11

5.3.3.5 Synchronisation Channel (SCH)

The Synchronisation Channel (SCH) is a downlink signal used for cell search. The SCH consists of two sub channels, the Primary and Secondary SCH. The 10 ms radio frames of the Primary and Secondary SCH are divided into 15 slots, each of length 2560 chips. Figure 19 illustrates the structure of the SCH radio frame.

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Marco Island, FL, U.S.A., 4 – 7, June 2002

R1-02-0596

CR-Form-v5

CHANGE REQUEST

z **25.211**	**CR 151**	z **rev** **-** z	Current version:	**3.10.0** z

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title: z	Downlink bit mapping		
Source: z	TSG RAN WG1		
Work item code: z	TEI	***Date:*** z	2002-04-05
Category: z	**F** *Use one of the following categories:* ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	***Release:*** z	R99 *Use one of the following releases:* 2 *(GSM Phase 2)* R96 *(Release 1996)* R97 *(Release 1997)* R98 *(Release 1998)* R99 *(Release 1999)* REL-4 *(Release 4)* REL-5 *(Release 5)*

Reason for change: z	The current description of signal formats for the interfaces between different RAN1 specifications does not consider all types of signals. The signal formats output from 25.211 and 25.212 are formally not compatible with the spreading operation in 25.213. In particular, there is ambiguity about binary, real-valued and DTX signals and their mapping.
Summary of change: z	For all channels, except AICH-type channels, the output format from 25.211 is specified as 0, 1 and "DTX". STTD description, CPICH, PICH and CSICH definitions are updated accordingly.
Consequences if not approved: z	Misleading information regarding signal formats on the interfaces between RAN1 specifications.

Clauses affected: z	5.3.1.1.1, 5.3.3.1, 5.3.3.10, 5.3.3.11	
Other specs affected: z	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	z
Other comments: z	Isolated impact analysis: The implementation of this CR does not impact existing UE or UTRAN implementations.	

5.3.1.1.1 Space time block coding based transmit antenna diversity (STTD)

The open loop downlink transmit diversity employs a space time block coding based transmit diversity (STTD).

The STTD encoding is optional in UTRAN. STTD support is mandatory at the UE.

If higher layers signal that neither P-CPICH nor S-CPICH can be used as phase reference for the downlink DPCH for a radio link in a cell, the UE shall assume that STTD is not used for the downlink DPCH (and the associated PDSCH if applicable) in that cell.

~~STTD encoding is applied on blocks of 4 consecutive channel bits.~~ A block diagram of a generic STTD encoder ~~for channel bits b_0, b_1, b_2, b_3~~ is shown in the figure 8 below. Channel coding, rate matching and interleaving is done as in the non-diversity mode. The STTD encoder operates on 4 symbols b_0, b_1, b_2, b_3 as shown in figure 8. For AICH, AP-AICH and CD/CA-ICH, t~~T~~he ~~bit~~ b_i ~~b_i~~ are~~is~~ real valued signals ~~{0} for DTX bits and {1, -1} for all other channel bits,~~ and $\overline{b_i}$ is defined as $-b_i$. For channels other than AICH, AP-AICH and CD/CA-ICH, the b_i are 3-valued digits, taking the values 0, 1, "DTX", and $\overline{b_i}$ is defined as follows: if b_i = 0 then $\overline{b_i}$ = 1, if b_i = 1 then $\overline{b_i}$ = 0, otherwise $\overline{b_i}$ = b_i.

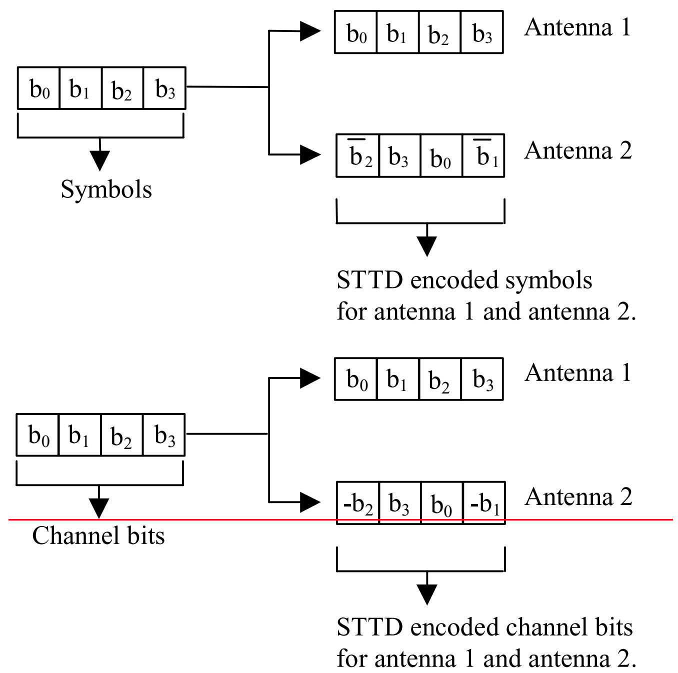


Figure 8: Generic block diagram of the STTD encoder

5.3.3.1 Common Pilot Channel (CPICH)

The CPICH is a fixed rate (30 kbps, SF=256) downlink physical channel that carries a pre-defined bit~~/symbol~~ sequence. Figure 13 shows the frame structure of the CPICH.

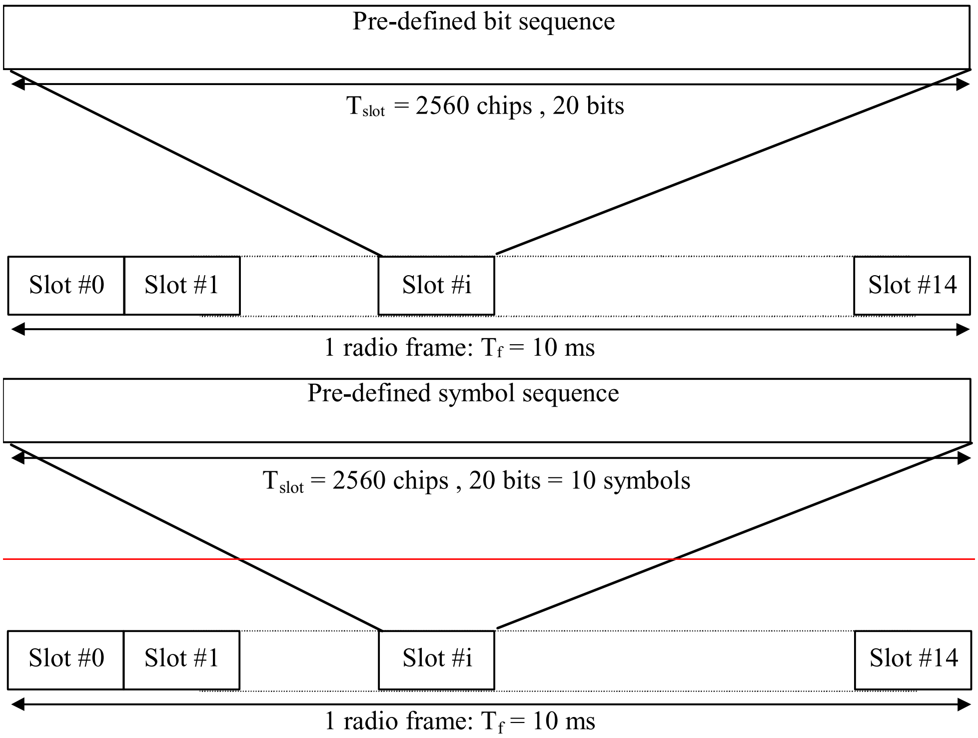


Figure 13: Frame structure for Common Pilot Channel

In case transmit diversity (open or closed loop) is used on any downlink channel in the cell, the CPICH shall be transmitted from both antennas using the same channelization and scrambling code. In this case, the pre-defined ~~symbol~~ bit sequence of the CPICH is different for Antenna 1 and Antenna 2, see figure 14. In case of no transmit diversity, the ~~symbol~~ bit sequence of Antenna 1 in figure 14 is used.

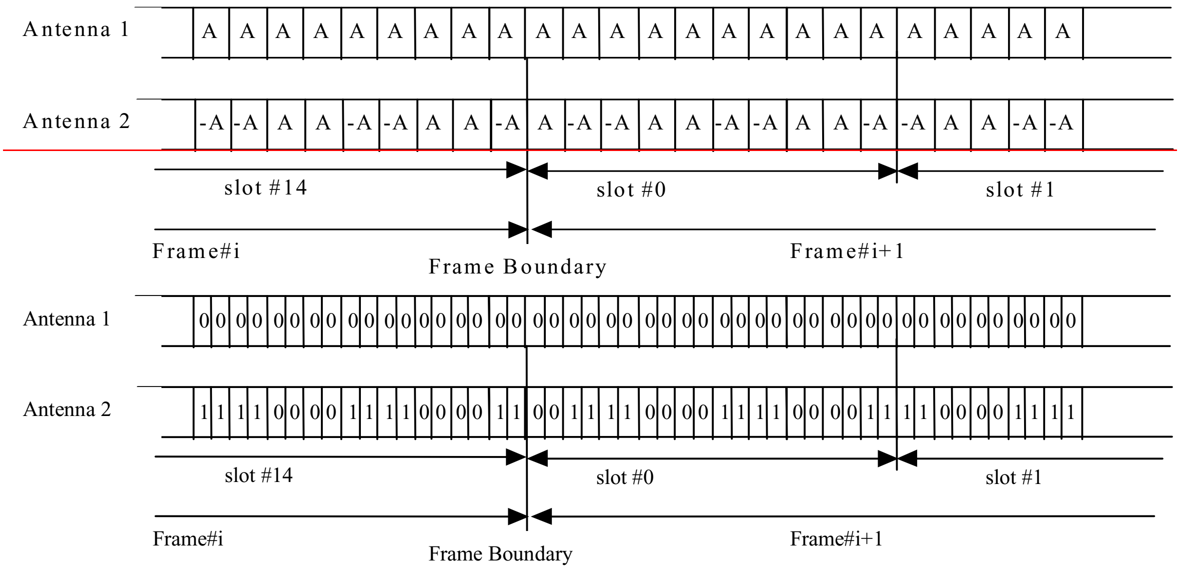


Figure 14: Modulation pattern for Common Pilot Channel ~~(with A = 1+j)~~

There are two types of Common pilot channels, the Primary and Secondary CPICH. They differ in their use and the limitations placed on their physical features.

5.3.3.10 Paging Indicator Channel (PICH)

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

Figure 24 illustrates the frame structure of the PICH. One PICH radio 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 paging indicators. The remaining 12 bits are not formally part of the PICH and shall not be transmitted (DTX). The part of the frame with no transmission is reserved for possible future use.

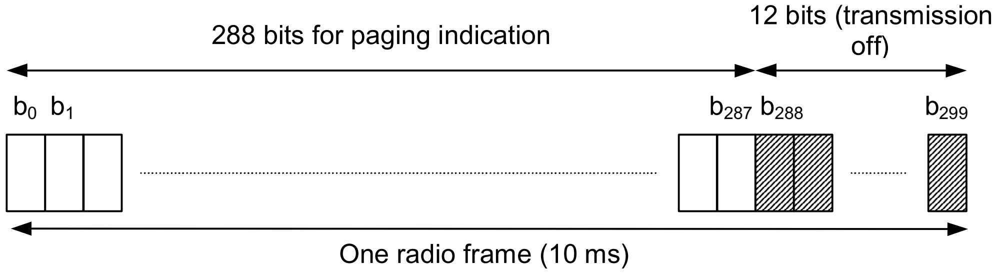


Figure 24: Structure of Paging Indicator Channel (PICH)

In each PICH frame, Np paging indicators {P_0, …, P_{Np-1}} are transmitted, where Np=18, 36, 72, or 144.

The PI calculated by higher layers for use for a certain UE, is associated to the paging indicator P_q, where q 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 (Np):

$$q = \left(PI + \left\lfloor \left(\left(18 \times \left(SFN + \lfloor SFN/8 \rfloor + \lfloor SFN/64 \rfloor + \lfloor SFN/512 \rfloor \right) \right) \bmod 144 \right) \times \frac{Np}{144} \right\rfloor \right) \bmod Np$$

Further, the PI calculated by higher layers is associated with the value of the paging indicator P_q. If a paging indicator in a certain frame is set to "1" it is an indication that UEs associated with this paging indicator and PI should read the corresponding frame of the associated S-CCPCH.

The PI bitmap in the PCH data frames over Iub contains indication values for all higher layer PI values possible. Each bit in the bitmap indicates if the paging indicator associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formula above is to be performed in Node B to make the association between PI and P_q.

The mapping from {P_0, …, P_{Np-1}} to the PICH bits {b_0, …, b_{287}} are according to table 24.

Table 24: Mapping of paging indicators P_q to PICH bits

Number of paging indicators per frame (Np)	P_q = 1	P_q = 0
Np=18	{b_{16q}, …, b_{16q+15}} = {-1,-1,…,-1}	{b_{16q}, …, b_{16q+15}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=36	{b_{8q}, …, b_{8q+7}} = {-1,-1,…,-1}	{b_{8q}, …, b_{8q+7}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=72	{b_{4q}, …, b_{4q+3}} = {-1, -1,…,-1}	{b_{4q}, …, b_{4q+3}} = {~~+1~~0, ~~+1~~0,…,~~+1~~0}
Np=144	{b_{2q}, b_{2q+1}} = {-1,-1}	{b_{2q}, b_{2q+1}} = {~~+1~~0,~~+1~~0}

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

5.3.3.11 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 25 illustrates the frame structure of the CSICH. The CSICH frame consists of 15 consecutive access slots (AS) each of length 40 bits. Each access slot consists of two parts, a part of duration 4096 chips with no transmission that is not formally part of the CSICH, and a Status Indicator (SI) part consisting of 8 bits b_{8i},….b_{8i+7}, where i is the access slot number. The part of the slot with no transmission is reserved for use by AICH, AP-AICH or CD/CA-ICH. The modulation used by the CSICH is the same as for the PICH. The phase reference for the CSICH is the Primary CPICH.

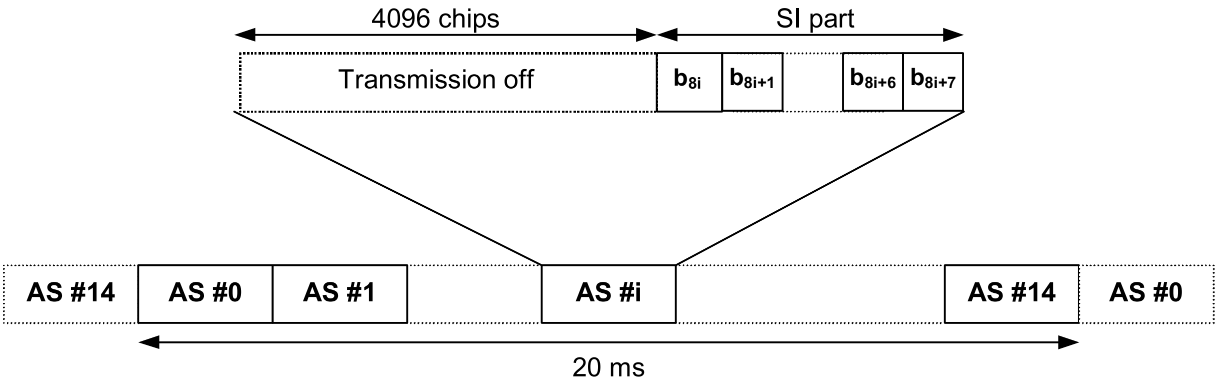


Figure 25: Structure of CPCH Status Indicator Channel (CSICH)

N Status Indicators {SI_0, …, SI_{N-1}} shall be transmitted in each CSICH frame. The mapping from {SI_0, …, SI_{N-1}} to the CSICH bits {b_0, …, b_{119}} is according to table 25. The Status Indicators shall be transmitted in all the access slots of the CSICH frame, even if some signatures and/or access slots are shared between CPCH and RACH.

Table 25: Mapping of Status Indicators (SI) to CSICH bits

Number of SI per frame (N)	SI_n = 1	SI_n = 0
N=1	{b_0, …, b_{119}} = {-1,-1,…,-1}	{b_0, …, b_{119}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=3	{b_{40n}, …, b_{40n+39}} = {-1,-1,…,-1}	{b_{40n}, …, b_{40n+39}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=5	{b_{24n}, …, b_{24n+23}} = {-1,-1,…,-1}	{b_{24n}, …, b_{24n+23}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=15	{b_{8n}, …, b_{8n+7}} = {-1,-1,…,-1}	{b_{8n}, …, b_{8n+7}} = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=30	{b_{4n}, …, b_{4n+3}} = {-1, -1, -1, -1}	{b_{4n}, …, b_{4n+3}} = {~~+1~~0, ~~+1~~0, ~~+1~~0, ~~+1~~0}
N=60	{b_{2n}, b_{2n+1}} = {-1,-1}	{b_{2n}, b_{2n+1}} = {~~+1~~0,~~+1~~0}

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

The CPCH Status Indicator mode (CSICH mode) defines the structure of the information carried on the CSICH. At the UTRAN the value of the CPCH Status Indicator mode is set by higher layers. There are two CSICH modes depending on whether Channel Assignment is active or not. The CSICH mode defines the number of status indicators per frame and the content of each status indicator. Layer 1 transmits the CSICH information according to the CSICH mode and the structures defined in the following paragraphs.

3GPP TSG RAN Meeting #16
Marco Island, FL, U.S.A., 4 – 7, June 2002

R1-02-0596

CR-Form-v5

CHANGE REQUEST

z	**25.211**	**CR**	**152**	z **rev**	**-**	z	Current version:	**4.4.0**	z

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title:	z	Downlink bit mapping		
Source:	z	TSG RAN WG1		
Work item code:	z	TEI	***Date:*** z	2002-04-05
Category:	z	**A**	***Release:*** z	REL-4
		Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	z	The current description of signal formats for the interfaces between different RAN1 specifications does not consider all types of signals. The signal formats output from 25.211 and 25.212 are formally not compatible with the spreading operation in 25.213. In particular, there is ambiguity about binary, real-valued and DTX signals and their mapping.
Summary of change:	z	For all channels, except AICH-type channels, the output format from 25.211 is specified as 0, 1 and "DTX". STTD description, CPICH, PICH and CSICH definitions are updated accordingly.
Consequences if not approved:	z	Misleading information regarding signal formats on the interfaces between RAN1 specifications.

Clauses affected:	z	5.3.1.1.1, 5.3.3.1, 5.3.3.10, 5.3.3.11	
Other specs affected:	z	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	z
Other comments:	z	Isolated impact analysis: The implementation of this CR does not impact existing UE or UTRAN implementations.	

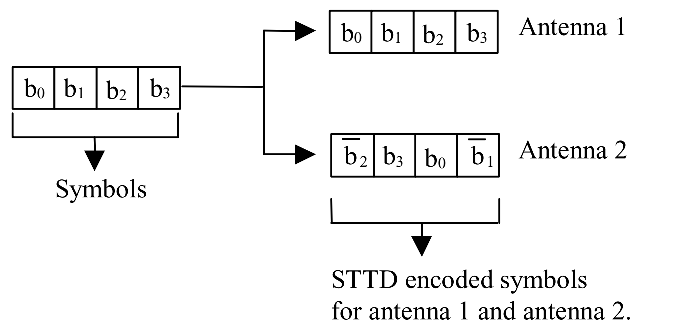
5.3.1.1.1 Space time block coding based transmit antenna diversity (STTD)

The open loop downlink transmit diversity employs a space time block coding based transmit diversity (STTD).

The STTD encoding is optional in UTRAN. STTD support is mandatory at the UE.

If higher layers signal that neither P-CPICH nor S-CPICH can be used as phase reference for the downlink DPCH for a radio link in a cell, the UE shall assume that STTD is not used for the downlink DPCH (and the associated PDSCH if applicable) in that cell.

~~STTD encoding is applied on blocks of 4 consecutive channel bits.~~ A block diagram of a generic STTD encoder ~~for channel bits b_0, b_1, b_2, b_3~~ is shown in the figure 8 below. Channel coding, rate matching and interleaving is done as in the non-diversity mode. The STTD encoder operates on 4 symbols b_0, b_1, b_2, b_3 as shown in figure 8. For AICH, AP-AICH and CD/CA-ICH, t~~T~~he ~~bit~~ b_i ~~b_i~~ are~~is~~ real valued signals ~~{0} for DTX bits and {1, -1} for all other channel bits~~, and $\bar{b}_i$ is defined as $-b_i$. For channels other than AICH, AP-AICH and CD/CA-ICH, the b_i are 3-valued digits, taking the values 0, 1, "DTX", and $\bar{b}_i$ is defined as follows: if b_i = 0 then $\bar{b}_i$ = 1, if b_i = 1 then $\bar{b}_i$ = 0, otherwise $\bar{b}_i$ = b_i.



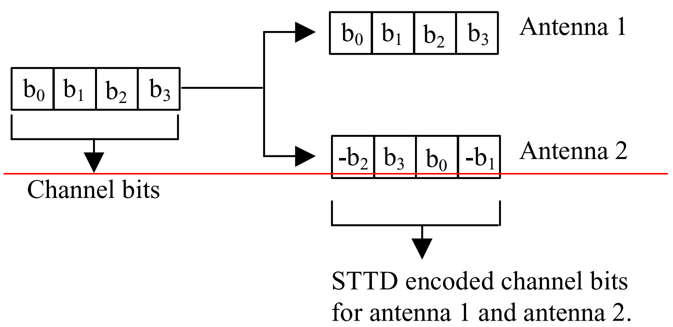


Figure 8: Generic block diagram of the STTD encoder

5.3.3.1 Common Pilot Channel (CPICH)

The CPICH is a fixed rate (30 kbps, SF=256) downlink physical channel that carries a pre-defined bit~~/symbol~~ sequence. Figure 13 shows the frame structure of the CPICH.

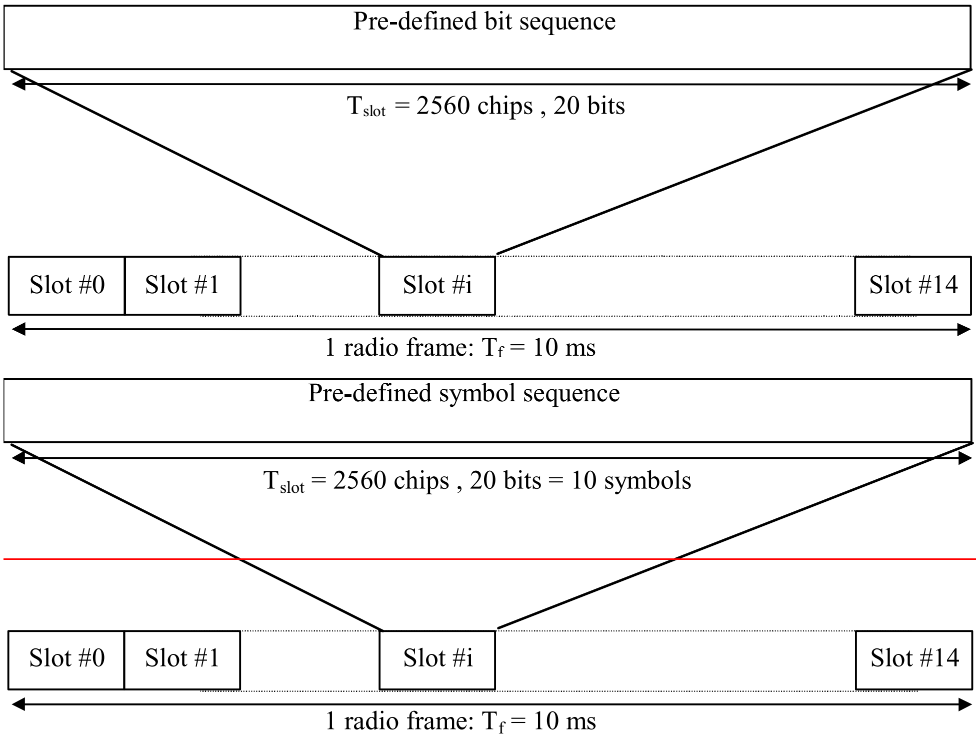


Figure 13: Frame structure for Common Pilot Channel

In case transmit diversity (open or closed loop) is used on any downlink channel in the cell, the CPICH shall be transmitted from both antennas using the same channelization and scrambling code. In this case, the pre-defined ~~symbol~~ bit sequence of the CPICH is different for Antenna 1 and Antenna 2, see figure 14. In case of no transmit diversity, the ~~symbol~~ bit sequence of Antenna 1 in figure 14 is used.

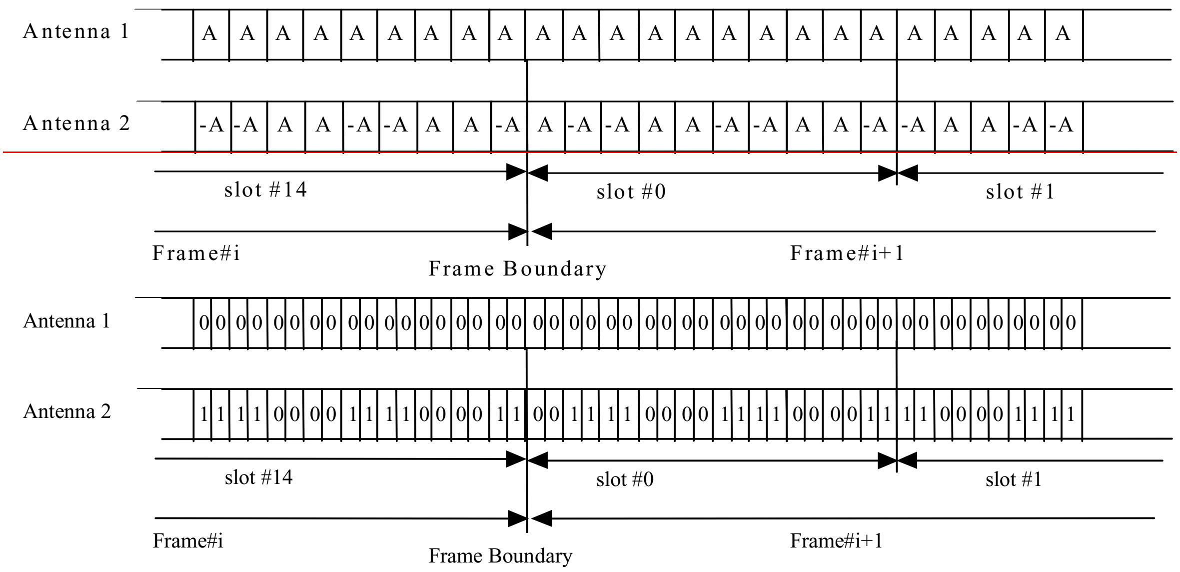


Figure 14: Modulation pattern for Common Pilot Channel ~~(with A = 1+j)~~

There are two types of Common pilot channels, the Primary and Secondary CPICH. They differ in their use and the limitations placed on their physical features.

5.3.3.10 Paging Indicator Channel (PICH)

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

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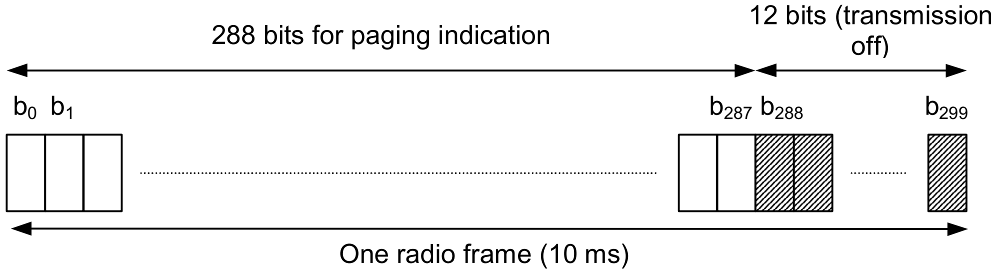

Figure 24: Structure of Paging Indicator Channel (PICH)

In each PICH frame, Np paging indicators $\{P_0, \ldots, P_{Np-1}\}$ are transmitted, where Np=18, 36, 72, or 144.

The PI calculated by higher layers for use for a certain UE, is associated to the paging indicator P_q, where q 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 (Np):

$$q = \left(PI + \left\lfloor \left(\left(18 \times \left(SFN + \lfloor SFN/8 \rfloor + \lfloor SFN/64 \rfloor + \lfloor SFN/512 \rfloor \right) \right) \bmod 144 \right) \times \frac{Np}{144} \right\rfloor \right) \bmod Np$$

Further, the PI calculated by higher layers is associated with the value of the paging indicator P_q. If a paging indicator in a certain frame is set to "1" it is an indication that UEs associated with this paging indicator and PI should read the corresponding frame of the associated S-CCPCH.

The PI bitmap in the PCH data frames over Iub contains indication values for all higher layer PI values possible. Each bit in the bitmap indicates if the paging indicator associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formula above is to be performed in Node B to make the association between PI and P_q.

The mapping from $\{P_0, \ldots, P_{Np-1}\}$ to the PICH bits $\{b_0, \ldots, b_{287}\}$ are according to table 24.

Table 24: Mapping of paging indicators P_q to PICH bits

Number of paging indicators per frame (Np)	P_q = 1	P_q = 0
Np=18	$\{b_{16q}, \ldots, b_{16q+15}\}$ = {-1,-1,…,-1}	$\{b_{16q}, \ldots, b_{16q+15}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=36	$\{b_{8q}, \ldots, b_{8q+7}\}$ = {-1,-1,…,-1}	$\{b_{8q}, \ldots, b_{8q+7}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=72	$\{b_{4q}, \ldots, b_{4q+3}\}$ = {-1, -1,…,-1}	$\{b_{4q}, \ldots, b_{4q+3}\}$ = {~~+1~~0, ~~+1~~0,…,~~+1~~0}
Np=144	$\{b_{2q}, b_{2q+1}\}$ = {-1,-1}	$\{b_{2q}, b_{2q+1}\}$ = {~~+1~~0,~~+1~~0}

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

5.3.3.11 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.

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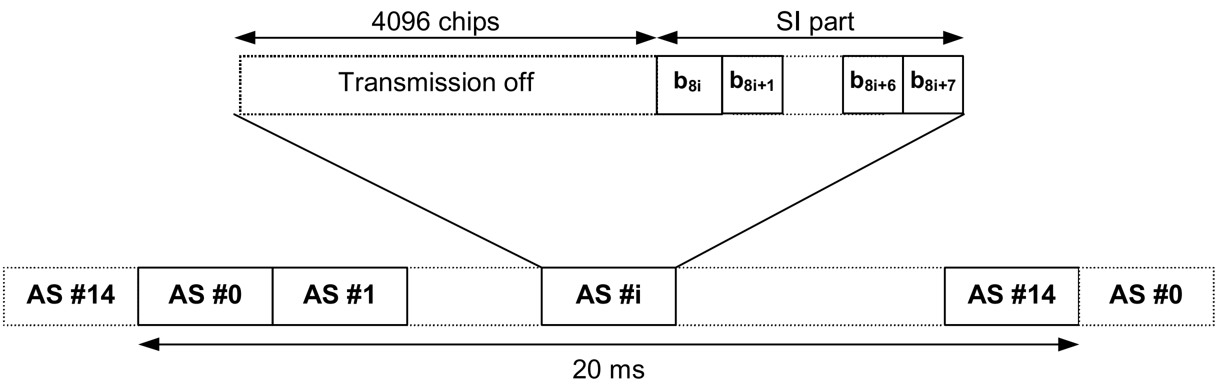

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N=3	$\{b_{40n}, \ldots, b_{40n+39}\}$ = {-1,-1,…,-1}	$\{b_{40n}, \ldots, b_{40n+39}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=5	$\{b_{24n}, \ldots, b_{24n+23}\}$ = {-1,-1,…,-1}	$\{b_{24n}, \ldots, b_{24n+23}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
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N=30	$\{b_{4n}, \ldots, b_{4n+3}\}$ = {-1, -1, -1, -1}	$\{b_{4n}, \ldots, b_{4n+3}\}$ = {~~+1~~0, ~~+1~~0, ~~+1~~0, ~~+1~~0}
N=60	$\{b_{2n}, b_{2n+1}\}$ = {-1,-1}	$\{b_{2n}, b_{2n+1}\}$ = {~~+1~~0,~~+1~~0}

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The CPCH Status Indicator mode (CSICH mode) defines the structure of the information carried on the CSICH. At the UTRAN the value of the CPCH Status Indicator mode is set by higher layers. There are two CSICH modes depending on whether Channel Assignment is active or not. The CSICH mode defines the number of status indicators per frame and the content of each status indicator. Layer 1 transmits the CSICH information according to the CSICH mode and the structures defined in the following paragraphs.

R1-02-0596

CR-Form-v5

CHANGE REQUEST

z	**25.211**	**CR**	**153**	z **rev**	**-**	z Current version:	**5.0.0** z

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the z symbols.*

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

Title: z	Downlink bit mapping		
Source: z	TSG RAN WG1		
Work item code: z	TEI	***Date:*** z	2002-04-05
Category: z	**A**	***Release:*** z	REL-5
	Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: z	The current description of signal formats for the interfaces between different RAN1 specifications does not consider all types of signals. The signal formats output from 25.211 and 25.212 are formally not compatible with the spreading operation in 25.213. In particular, there is ambiguity about binary, real-valued and DTX signals and their mapping.
Summary of change: z	For all channels, except AICH-type channels, the output format from 25.211 is specified as 0, 1 and “DTX”. STTD description, CPICH, PICH and CSICH definitions are updated accordingly.
Consequences if not approved: z	Misleading information regarding signal formats on the interfaces between RAN1 specifications.

Clauses affected: z	5.3.1.1.1, 5.3.3.1, 5.3.3.10, 5.3.3.11	
Other specs affected: z	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	z
Other comments: z	Isolated impact analysis: The implementation of this CR does not impact existing UE or UTRAN implementations.	

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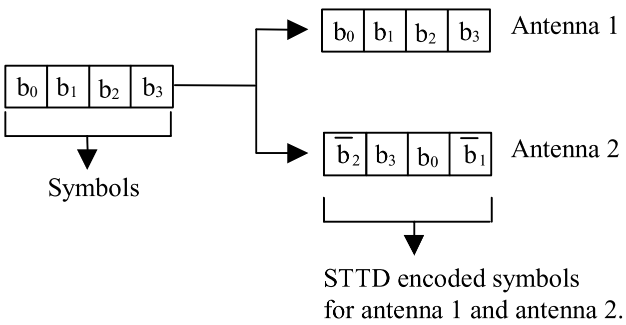

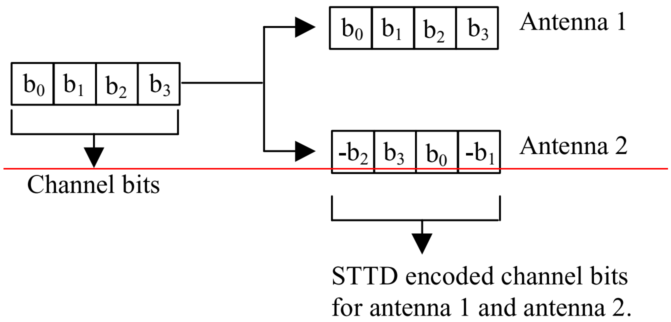

Figure 8: Generic block diagram of the STTD encoder

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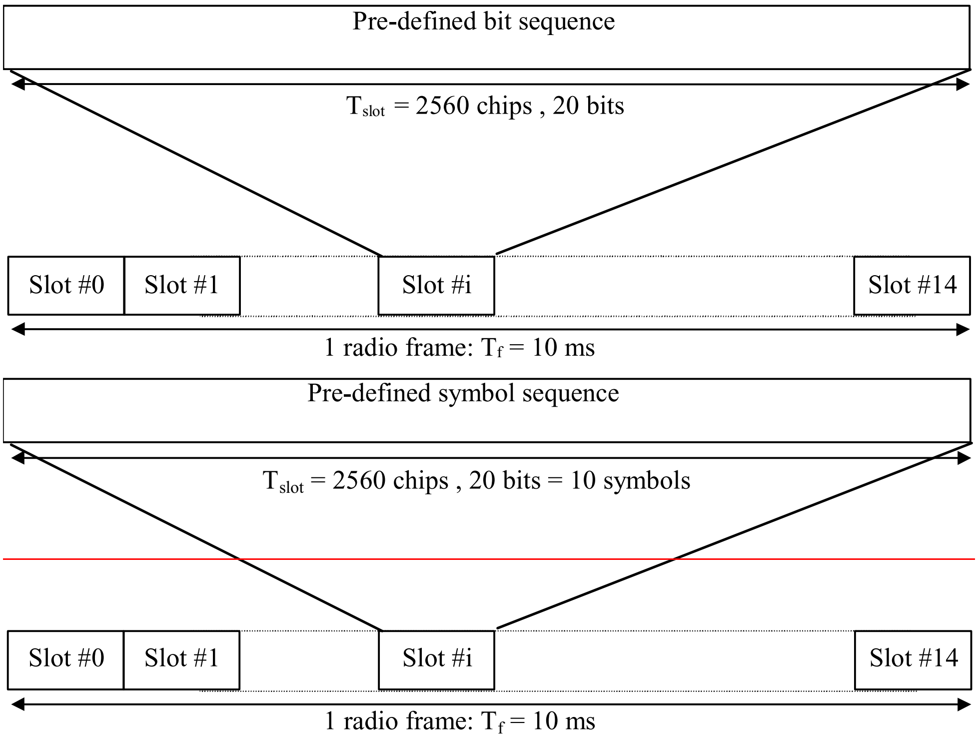

Figure 13: Frame structure for Common Pilot Channel

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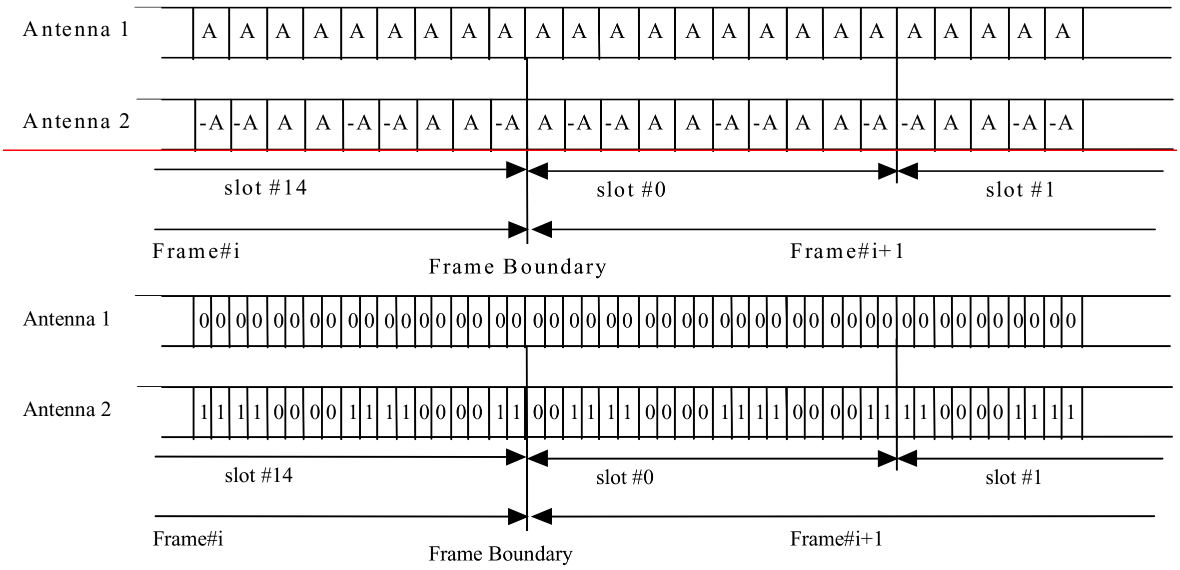

Figure 14: Modulation pattern for Common Pilot Channel ~~(with A = 1+j)~~

There are two types of Common pilot channels, the Primary and Secondary CPICH. They differ in their use and the limitations placed on their physical features.

5.3.3.10 Paging Indicator Channel (PICH)

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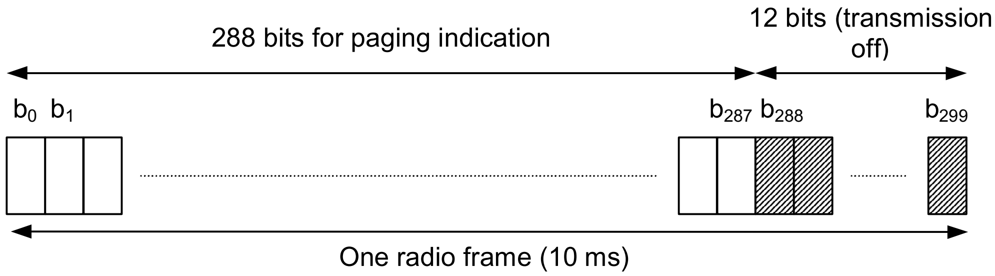

Figure 24: Structure of Paging Indicator Channel (PICH)

In each PICH frame, Np paging indicators $\{P_0, \ldots, P_{Np-1}\}$ are transmitted, where Np=18, 36, 72, or 144.

The PI calculated by higher layers for use for a certain UE, is associated to the paging indicator P_q, where q 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 (Np):

$$q = \left(PI + \left\lfloor \left(\left(18 \times \left(SFN + \lfloor SFN/8 \rfloor + \lfloor SFN/64 \rfloor + \lfloor SFN/512 \rfloor \right) \right) \bmod 144 \right) \times \frac{Np}{144} \right\rfloor \right) \bmod Np$$

Further, the PI calculated by higher layers is associated with the value of the paging indicator P_q. If a paging indicator in a certain frame is set to "1" it is an indication that UEs associated with this paging indicator and PI should read the corresponding frame of the associated S-CCPCH.

The PI bitmap in the PCH data frames over Iub contains indication values for all higher layer PI values possible. Each bit in the bitmap indicates if the paging indicator associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formula above is to be performed in Node B to make the association between PI and P_q.

The mapping from $\{P_0, \ldots, P_{Np-1}\}$ to the PICH bits $\{b_0, \ldots, b_{287}\}$ are according to table 24.

Table 24: Mapping of paging indicators P_q to PICH bits

Number of paging indicators per frame (Np)	P_q = 1	P_q = 0
Np=18	$\{b_{16q}, \ldots, b_{16q+15}\}$ = {-1,-1,…,-1}	$\{b_{16q}, \ldots, b_{16q+15}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=36	$\{b_{8q}, \ldots, b_{8q+7}\}$ = {-1,-1,…,-1}	$\{b_{8q}, \ldots, b_{8q+7}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
Np=72	$\{b_{4q}, \ldots, b_{4q+3}\}$ = {-1, -1,…,-1}	$\{b_{4q}, \ldots, b_{4q+3}\}$ = {~~+1~~0, ~~+1~~0,…,~~+1~~0}
Np=144	$\{b_{2q}, b_{2q+1}\}$ = {-1,-1}	$\{b_{2q}, b_{2q+1}\}$ = {~~+1~~0,~~+1~~0}

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

5.3.3.11 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 25 illustrates the frame structure of the CSICH. The CSICH frame consists of 15 consecutive access slots (AS) each of length 40 bits. Each access slot consists of two parts, a part of duration 4096 chips with no transmission that is not formally part of the CSICH, and a Status Indicator (SI) part consisting of 8 bits $b_{8i}, \ldots, b_{8i+7}$, where i is the access slot number. The part of the slot with no transmission is reserved for use by AICH, AP-AICH or CD/CA-ICH. The modulation used by the CSICH is the same as for the PICH. The phase reference for the CSICH is the Primary CPICH.

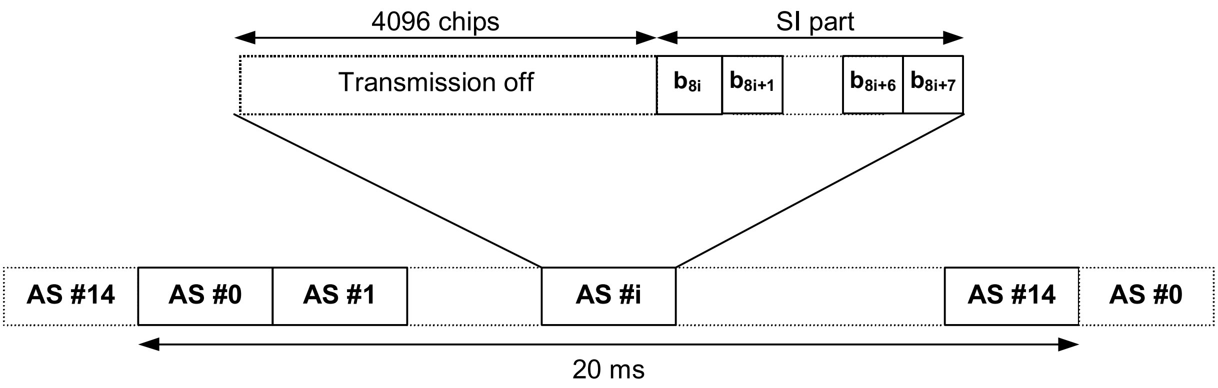

Figure 25: Structure of CPCH Status Indicator Channel (CSICH)

N Status Indicators $\{SI_0, \ldots, SI_{N-1}\}$ shall be transmitted in each CSICH frame. The mapping from $\{SI_0, \ldots, SI_{N-1}\}$ to the CSICH bits $\{b_0, \ldots, b_{119}\}$ is according to table 25. The Status Indicators shall be transmitted in all the access slots of the CSICH frame, even if some signatures and/or access slots are shared between CPCH and RACH.

Table 25: Mapping of Status Indicators (SI) to CSICH bits

Number of SI per frame (N)	$SI_n = 1$	$SI_n = 0$
N=1	$\{b_0, \ldots, b_{119}\} = \{-1,-1,\ldots,-1\}$	$\{b_0, \ldots, b_{119}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=3	$\{b_{40n}, \ldots, b_{40n+39}\} = \{-1,-1,\ldots,-1\}$	$\{b_{40n}, \ldots, b_{40n+39}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=5	$\{b_{24n}, \ldots, b_{24n+23}\} = \{-1,-1,\ldots,-1\}$	$\{b_{24n}, \ldots, b_{24n+23}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=15	$\{b_{8n}, \ldots, b_{8n+7}\} = \{-1,-1,\ldots,-1\}$	$\{b_{8n}, \ldots, b_{8n+7}\}$ = {~~+1~~0,~~+1~~0,…,~~+1~~0}
N=30	$\{b_{4n}, \ldots, b_{4n+3}\} = \{-1, -1, -1, -1\}$	$\{b_{4n}, \ldots, b_{4n+3}\}$ = {~~+1~~0, ~~+1~~0, ~~+1~~0, ~~+1~~0}
N=60	$\{b_{2n}, b_{2n+1}\} = \{-1,-1\}$	$\{b_{2n}, b_{2n+1}\}$ = {~~+1~~0,~~+1~~0}

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

The CPCH Status Indicator mode (CSICH mode) defines the structure of the information carried on the CSICH. At the UTRAN the value of the CPCH Status Indicator mode is set by higher layers. There are two CSICH modes depending on whether Channel Assignment is active or not. The CSICH mode defines the number of status indicators per frame and the content of each status indicator. Layer 1 transmits the CSICH information according to the CSICH mode and the structures defined in the following paragraphs.