TSG-RAN Meeting #14 ***RP-010746***
Kyoto, Japan, 11 – 14, December, 2001

Title: **Agreed CR (Rel-4) to TS 25.221**

Source: **TSG-RAN WG1**

Agenda item: **8.1.4**

No.	Spec	CR	Rev	R1 T-doc	Subject	Release	Cat	W/I Code	V_old	V_new
1	25.221	059	-	R1-01-0807	Bit Scrambling for 1.28 Mcps TDD	Rel-4	F	LCRTDD-Phys	4.2.0	4.3.0
2	25.221	068	-	R1-01-1111	Transmit diversity for P-CCPCH and PICH	Rel-4	F	LCRTDD-Phys	4.2.0	4.3.0
3	25.221	069	-	R1-01-1148	Corrections of reference numbers in TS 25.221	Rel-4	F	LCRTDD-Phys	4.2.0	4.3.0

R1-01-0807

CR-Form-v3

CHANGE REQUEST

⌘	**25.221 CR 059**	⌘	rev	**-**	⌘ Current version:	**4.2.0** ⌘

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

Title:	⌘	Bit Scrambling for 1.28 Mcps TDD		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘	LCRTDD-Phys	***Date:*** ⌘	01.11.2001
Category:	⌘	**F**	***Release:*** ⌘	REL-4
		Use one of the following categories: ***F*** *(essential 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:	⌘	In specific situations, when the transmitted data contain a lot of the same symbols the data bursts will contain a DC offset that leads to not acceptable degradations in the link level performance if it is discarded.
Summary of change:	⌘	Bit Scrambling is used to avoid possible DC offsets. This affects the PICH section which has been redrafted. The removed parts of the section have been re-included in the proposed CR for TS 25.222.
Consequences if not approved:	⌘	Not tolerable restrictions in implementation or not acceptable degradations in the link level performance. Inconsistency in set of specification, since Bit Scrambling introduced for 3.84 Mcps TDD and common sections have been modified and do not longer “fit” to 1.28 Mcps TDD.

Clauses affected:	⌘	6.3.8 The Page Indicator Channel (PICH)		
Other specs affected:	⌘	[X] Other core specifications	⌘	TS25.222 CR 059
		[ ] Test specifications		
		[ ] O&M Specifications		
Other comments:	⌘			

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6.3.8 The Page Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

6.3.8.1 Mapping of Paging Indicators to the PICH bits

Figure 29 depicts the structure of a PICH transmission and the numbering of the bits within the bursts. The burst type as described in [6.2.2 'Burst Format'] is used for the PICH. N_{PIB} bits are used to carry the paging indicators, where N_{PIB}=352.

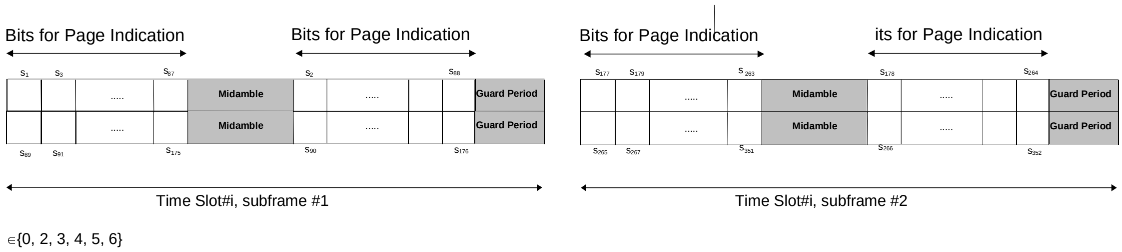

Figure 29: Transmission and numbering of paging indicator carrying bits in the PICH bursts

Each paging indicator P_q (where P_q, q = 0, ..., N_{PI}-1, $P_q \in \{0, 1\}$) in one radio frame is mapped to the bits $\{s_{2L_{PI}*q+1},\ldots,s_{2L_{PI}*(q+1)}\}$ in subframe #1 or subframe #2. ~~There are $N_{PIB} = 2*N_{PI}*L_{PI}$ bits used for the paging indicator transmission in one radio frame. The mapping of the paging indicators to the bits s_i, i = 1, ..., N_{PIB} is shown in table 19.~~

~~**Table 19: Mapping of the paging indicator**~~

~~P_q~~	~~Bits $\{s_{2L_{PI}*q+1}, s_{2L_{PI}*q+2}, \ldots, s_{2L_{PI}*(q+1)}\}$~~	~~Meaning~~
~~0~~	~~{0, 0, ..., 0}~~	~~There is no necessity to receive the PCH~~
~~1~~	~~{1, 1, ..., 1}~~	~~There is the necessity to receive the PCH~~

~~The bits s_k, k = 1, ..., S are then transmitted over the air as shown in [7].~~

The setting of the paging indicators and the corresponding PICH bits is described in [7].

In each radio frame, N_{PI} paging indicators are transmitted, using L_{PI}=2, L_{PI}=4 or L_{PI}=8 symbols. The number of paging indicators N_{PI} per radio frame is given by the paging indicator length, which signalled by higher layers. In table 20 this number is shown for the different possibilities of paging indicator lengths.

Table 20: Number N_{PI} of paging indicators per radio frame for different paging indicator lengths L_{PI}

	L_{PI}=2	L_{PI}=4	L_{PI}=8
N_{PI} per radio frame	88	44	22

R1-01-1111

CR-Form-v4

CHANGE REQUEST

⌘	**25.221**	**CR**	**068**	⌘ rev	**-**	⌘ Current version:	**4.2.0**	⌘

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

Title:	⌘	Transmit Diversity for P-CCPCH and PICH		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘	LCRTDD-Phys	***Date:*** ⌘	12-11-2001
Category:	⌘	**F**	***Release:*** ⌘	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:	⌘	Block STTD for the P-CCPCH in TDD is optional for the UTRAN, however, its support is mandatory for the UE. While during the standardisation phase, Block STTD has been evaluated for its computational complexity, less emphasis has been put on HW implementation and practical design aspects of the method. This CR corrects Block STTD by a suitable alternative (SCTD). For other channels than P-CCPCH, SCTD is already implicitly allowed by the standard, as long as the transport channel are mapped to multiple codes in one time slot. To align the PICH in this respect with all other channels, the PI to bit mapping needs to be modified.
Summary of change:	⌘	Replace 'Block STTD' by 'SCTD' and change the PI to PICH bit mapping. In addition PDSCH is added to the list of channels that allow TSTD and closed loop TxDiversity. This is in alignment with 3.84 Mcps TDD and was just missing.
Consequences if not approved:	⌘	The current TxDiversity solution for the P-CCPCH in TDD will lead to major HW and design restrictions that will be burdened to TDD UE manufacturers and that will lead to not acceptable increase in complexity and costs. System will not benefit from the P-CCPCH TxDiversity, as this gain is not provided to other common channels, too. This will be critical especially at cell borders where the UE may suffer from strong interference that is Ioc is almost equal to Ior.

Clauses affected:	⌘	6.3.1.3, 6.4, 6.5.2		
Other specs Affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	
Other comments:	⌘			

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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.

6.3.1.3 P-CCPCH Training sequences

The training sequences, i.e. midambles, as described in subclause 6.2.3 are used for the P-CCPCH. For timeslots#0 in which the P-CCPCH is transmitted, the midambles $m^{(1)}$ and $m^{(2)}$ are reserved for P-CCPCH in order to support Space Code Transmit Diversity (SCTD)~~Block STTD antenna diversity~~ and the beacon function, see 6.4 and 6.5. The use of midambles depends on whether SCTD~~Block STTD~~ is applied to the P-CCPCH:

- If no antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used and $m^{(2)}$ is left unused.

- If ~~Block STTD~~SCTD antenna diversity is applied to P-CCPCH, $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna.

6.3.8.1 Mapping of Paging Indicators to the PICH bits

Figure 29 depicts the structure of a PICH transmission and the numbering of the bits within the bursts. The burst type as described in [6.2.2 'Burst Format'] is used for the PICH. N_{PIB} bits are used to carry the paging indicators, where N_{PIB}=352.

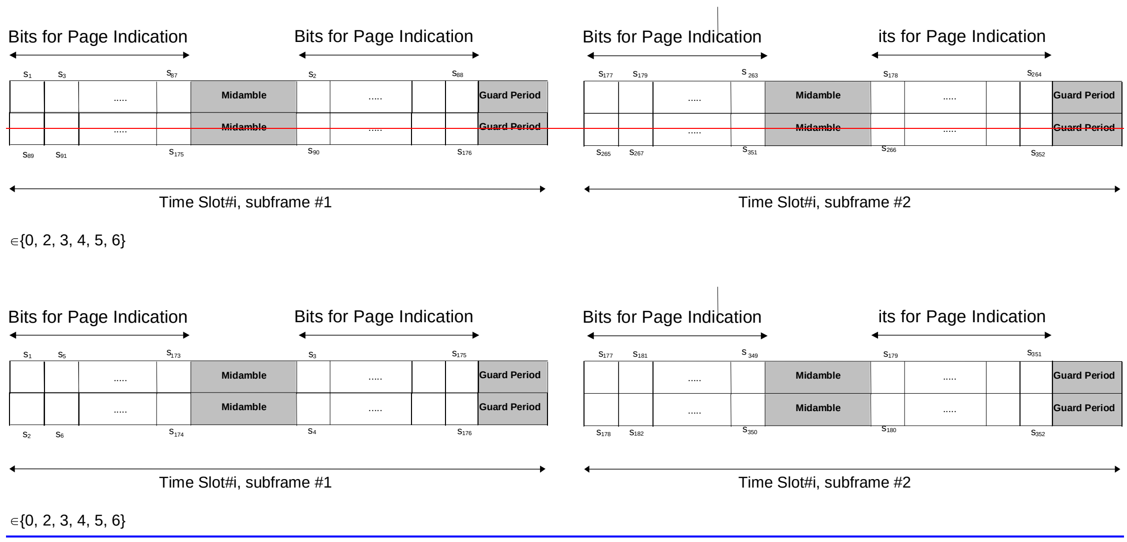

Figure 29: Transmission and numbering of paging indicator carrying bits in the PICH bursts

Each paging indicator P_q (where P_q, q = 0, ..., N_{PI}-1, $P_q \in \{0, 1\}$) in one radio frame is mapped to the bits $\{s_{2L_{PI}*q+1},...,s_{2L_{PI}*(q+1)}\}$ in subframe #1 or subframe #2. There are $N_{PIB} = 2*N_{PI}*L_{PI}$ bits used for the paging indicator transmission in one radio frame. The mapping of the paging indicators to the bits s_i, i = 1, ..., N_{PIB} is shown in table 19.

Table 19: Mapping of the paging indicator

P_q	Bits $\{s_{2L_{PI}*q+1}, s_{2L_{PI}*q+2}, \ldots, s_{2L_{PI}*(q+1)}\}$	Meaning
0	{0, 0, ..., 0}	There is no necessity to receive the PCH
1	{1, 1, ..., 1}	There is the necessity to receive the PCH

The bits s_k, k = 1, ..., S are then transmitted over the air as shown in [7].

In each radio frame, N_{PI} paging indicators are transmitted, using L_{PI}=2, L_{PI}=4 or L_{PI}=8 symbols. In table 20 this number is shown for the different possibilities of paging indicator lengths.

Table 20: Number N_{PI} of paging indicators per radio frame for different paging indicator lengths L_{PI}

	L_{PI}=2	L_{PI}=4	L_{PI}=8
N_{PI} per radio frame	88	44	22

6.4 Transmit Diversity for DL Physical Channels

Table 21 summarizes the different transmit diversity schemes for different downlink physical channel types in 1.28Mcps TDD that are described in [9].

Table 21: Application of Tx diversity schemes on downlink physical channel types in 1.28Mcps TDD "X" – can be applied, "–" – must not be applied

Physical channel type	Open loop TxDiversity		Closed loop TxDiversity
	TSTD	~~Block~~ SC~~T~~TD	
P-CCPCH	X	X	–
DwPCH	X	–	–
DPCH	X	–	X
PDSCH	X	–	X

6.5.2 Physical characteristics of the beacon function

The beacon channels shall have the following physical characteristics.

They:

- are transmitted with reference power;
- are transmitted without beamforming;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively in this time slot

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no ~~Block STTD~~ antenna diversity is applied to the P-CCPCH, all the reference power of any beacon channel is allocated to $m^{(1)}$.
- If ~~Block STTD~~SCTD antenna diversity is applied to the P-CCPCH, for any beacon channel midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power. Midamble $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna. SCTD ~~Block STTD encoding~~ is applied ~~used for~~to the ~~data in~~ P-CCPCH, see [9]; for all other beacon channels identical spread data sequences are transmitted on both antennas.

3GPP TSG RAN Meeting #14
Kyoto, Japan, 11th-14th, December, 2001

R1-01-1148

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CHANGE REQUEST

⌘	**25.221**	**CR**	**069**	⌘	rev	**-**	⌘	Current version:	**4.2.0**	⌘

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

Title:	⌘	Corrections of reference numbers in TS 25.221		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘	LCRTDD-Phys	***Date:*** ⌘	Nov.12th, 2001
Category:	⌘	**F**	***Release:*** ⌘	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:	⌘	Reference numbers to 'Synchronisation Codes' and ' Mapping of PICH' are incorrect.
Summary of change:	⌘	The reference numbers are corrected.
Consequences if not approved:	⌘	Reference numbers are incorrect and thus confusion will be caused.

Clauses affected:	⌘	5.3.4 and 8.2.2		
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	
Other comments:	⌘			

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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.

5.3.4 The synchronisation channel (SCH)

In TDD mode code group of a cell can be derived from the synchronisation channel. In order not to limit the uplink/downlink asymmetry the SCH is mapped on one or two downlink slots per frame only.

There are two cases of SCH and P-CCPCH allocation as follows:

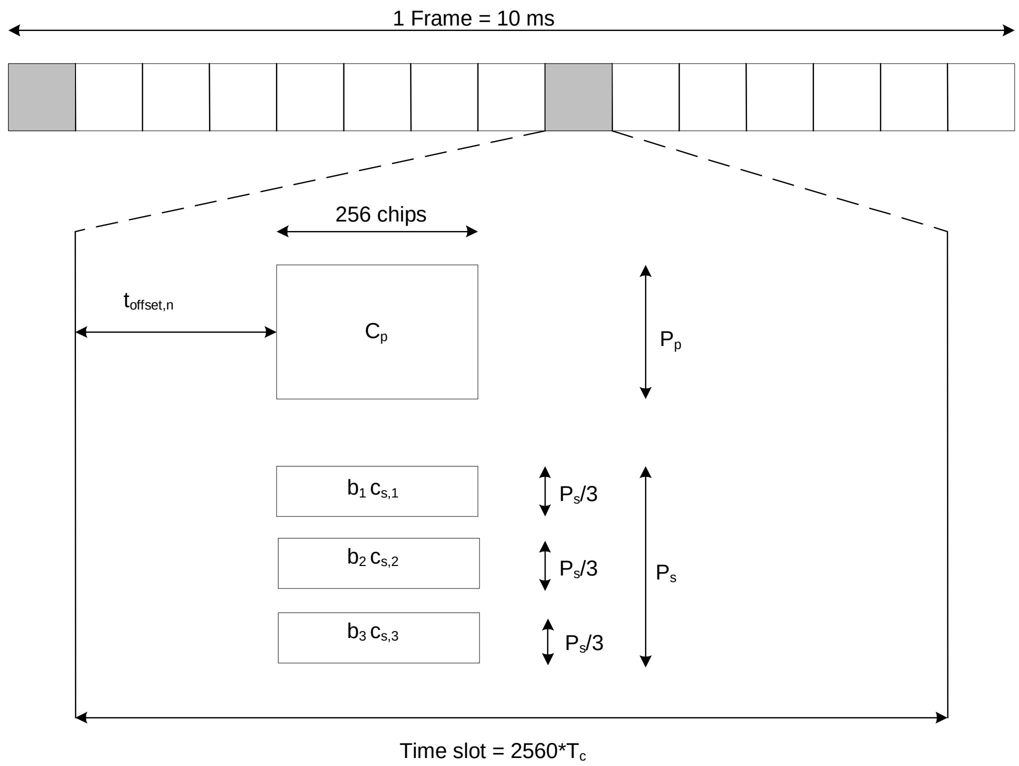
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

Case 2) SCH allocated in two TS: TS#k and TS#k+8, k=0…6; P-CCPCH allocated in TS#k.

The position of SCH (value of k) in frame can change on a long term basis in any case.

Due to this SCH scheme, the position of P-CCPCH is known from the SCH.

Figure 14 is an example for transmission of SCH, k=0, of Case 2.



$b_i \in \{\pm 1, \pm j\}$, $C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i=1,2,3; see [8]

Figure 14: Scheme for Synchronisation channel SCH consisting of one primary sequence C_p and 3 parallel secondary sequences $C_{s,i}$ in slot k and k+8 (example for k=0 in Case 2)

As depicted in figure 14, the SCH consists of a primary and three secondary code sequences each 256 chips long. The primary and secondary code sequences are defined in [8] clause 8~~7~~ 'Synchronisation codes for the 3.84 Mcps option'.

Due to mobile to mobile interference, it is mandatory for public TDD systems to keep synchronisation between base stations. As a consequence of this, a capture effect concerning SCH can arise. The time offset $t_{offset,n}$ enables the system to overcome the capture effect.

The time offset $t_{offset,n}$ is one of 32 values, depending on the code group of the cell, n, cf. 'table 6 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{offset}' in [8]. Note that the cell parameter will change from frame to frame, cf. 'Table 7 Alignment of cell parameter cycling and system frame number' in [8], but the cell will belong to only one code group and thus have one time offset $t_{offset,n}$. The exact value for $t_{offset,n}$, regarding column 'Associated t_{offset}' in table 6 in [8] is given by:

$$t_{offset,n} = \begin{cases} n \cdot 48 \cdot T_c & n < 16 \\ (720 + n \cdot 48)T_c & n \geq 16 \end{cases}; \quad n = 0, \ldots., 31$$

8.2.2 The Paging Channel (PCH)

The mapping of Paging Channels onto S-CCPCHs and the association between PCHs and Paging Indicator Channels is the same as in the 3.84 Mcps TDD option, cf. ~~6~~7.2.2 ‘The paging Channel’ and ~~6~~7.2.2.1 ‘PCH/PICH Association’ respectively.