

3GPP TSG-RAN WG1 Meeting #18
 Boston, USA, 15th – 18th January 20001

R1-01-0111

CR-Formv3
CHANGE REQUEST
⚡ 25.221 CR 039r1 ⚡ rev - ⚡ Current version: 3.5.0 ⚡

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

Proposed change affects: ⚡ (U)SIM ME/UE Radio Access Network Core Network

Title: ⚡	Corrections of PUSCH and PDSCH		
Source: ⚡	Siemens		
Work item code: ⚡		Date: ⚡	17 Jan. 2001
Category: ⚡	F	Release: ⚡	R99
	Use <u>one</u> 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)		Use <u>one</u> 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)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		

Reason for change: ⚡	The actual specification is incomplete with respect to the description of the PUSCH and PDSCH in TDD. More specifically, spreading, burst types and training sequences are not specified. Also, it is not clear whether Tx diversity may be applied to the PDSCH or not.
Summary of change: ⚡	The CR defines the spreading to be applied to PUSCH and PDSCH. It also describes the burst types and training sequences to be used for these channels.
Consequences if not approved: ⚡	Based on the actual specification it is not possible to implement the PUSCH and PDSCH.

Clauses affected: ⚡	5.3.5, 5.3.6, 5.4		
Other specs affected: ⚡	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⚡	
Other comments: ⚡			

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 ⚡ 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://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

5.3.5 Physical Uplink Shared Channel (PUSCH)

The USCH as described in subclause 4.1.2 is mapped onto one or more physical uplink shared channels (PUSCH). Timing advance, as described in [9], subclause 4.3, is applied to the PUSCH.

~~For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 5.2 shall be used. User specific physical layer parameters like power control, timing advance or directive antenna settings are derived from the associated channel (FACH or DCH). PUSCH provides the possibility for transmission of TFCI in uplink.~~

5.3.5.1 PUSCH Spreading

The spreading factors that can be applied to the PUSCH are SF = 1, 2, 4, 8, 16 as described in subclause 5.2.1.2.

5.3.5.2 PUSCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5.2.2 can be used for PUSCH. TFCI and TPC can be transmitted on the PUSCH.

5.3.5.3 PUSCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the PUSCH.

5.3.5.4 UE Selection

The UE that shall transmit on the PUSCH is selected by higher layer signalling.

5.3.6 Physical Downlink Shared Channel (PDSCH)

The DSCH as described in subclause 4.1.2 is mapped onto one or more physical downlink shared channels (PDSCH).

~~For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 5.2 shall be used. User specific physical layer parameters like power control or directive antenna settings are derived from the associated channel (FACH or DCH). PDSCH provides the possibility for transmission of TFCI in downlink.~~

5.3.6.1 PDSCH Spreading

The PDSCH uses either spreading factor SF = 16 or SF = 1 as described in subclause 5.2.1.1.

5.3.6.2 PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5.2.2 can be used for PDSCH. TFCI can be transmitted on the PDSCH.

5.3.6.3 PDSCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the PDSCH.

5.3.6.4 UE Selection

To indicate to the UE that there is data to decode on the DSCH, three signalling methods are available:

- 1) using the TFCI field of the associated channel or PDSCH;
- 2) using on the DSCH user specific midamble derived from the set of midambles used for that cell;
- 3) using higher layer signalling.

When the midamble based method is used, the UE specific midamble allocation method shall be employed (see subclause 5.6), and the UE shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the

UE by UTRAN, see 5.5.1.1.2. For this method no other physical channels may use the same time slot as the PDSCH and only one UE may share the PDSCH time slot within one TTI at the same time.

Note: From the above mentioned signalling methods, only the higher layer signalling method is supported by higher layers in R99.

5.3.7 The Paging Indicator Channel (PICH)

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

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the paging indicators, where N_{PIB} depends on the burst type: $N_{PIB}=240$ for burst type 1 and $N_{PIB}=272$ for burst type 2. The bits $b_{N_{PIB}}, \dots, b_{N_{PIB}+3}$ adjacent to the midamble are reserved for possible future use. They shall be set to 0 and transmitted with the same power as the paging indicator carrying bits.

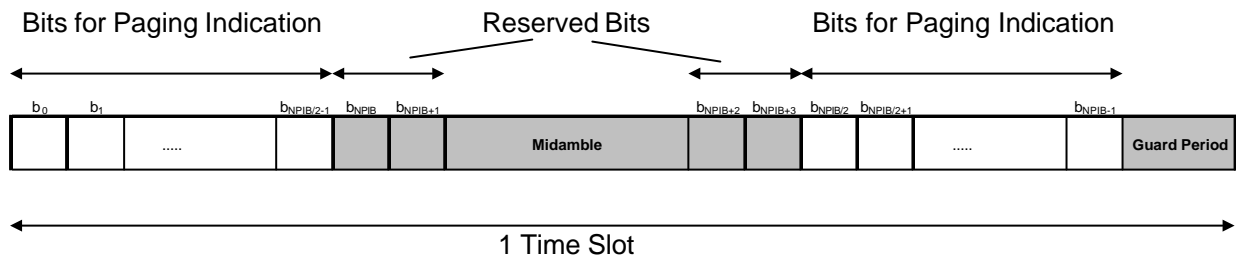


Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst

In each time slot, N_{PI} paging indicators are transmitted, using $L_{PI}=2, L_{PI}=4$ or $L_{PI}=8$ symbols. L_{PI} is called the paging indicator length. The number of paging indicators N_{PI} per time slot is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 8 this number is shown for the different possibilities of burst types and paging indicator lengths.

Table 8: Number N_{PI} of paging indicators per time slot for the different burst types and paging indicator lengths L_{PI}

	$L_{PI}=2$	$L_{PI}=4$	$L_{PI}=8$
Burst Type 1	$N_{PI}=60$	$N_{PI}=30$	$N_{PI}=15$
Burst Type 2	$N_{PI}=68$	$N_{PI}=34$	$N_{PI}=17$

As shown in figure 16, the paging indicators of N_{PICH} consecutive frames form a PICH block, N_{PICH} is configured by higher layers. Thus, $N_P=N_{PICH} \cdot N_{PI}$ paging indicators are transmitted in each PICH block.

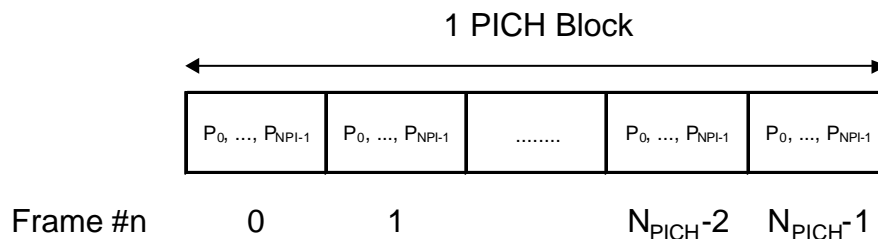


Figure 16: Structure of a PICH block

The value PI ($PI = 0, \dots, N_P-1$) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_q in the n th frame of one PICH block, where q is given by

$$q = PI \bmod N_{PI}$$

and n is given by

$$n = \text{PI} \text{ div } N_{PI}$$

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [16]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q .

The paging indicator P_q in one time slot is mapped to the bits $\{b_{L_{PI} \cdot q}, \dots, b_{L_{PI} \cdot q + L_{PI} - 1}, b_{N_{PI} \cdot 2 + L_{PI} \cdot q}, \dots, b_{N_{PI} \cdot 2 + L_{PI} \cdot q + L_{PI} - 1}\}$ within this time slot, as exemplary shown in figure 17. Thus, half of the L_{PI} symbols used for each paging indicator are transmitted in the first data part, and the other half of the L_{PI} symbols are transmitted in the second data part.

The coding of the paging indicator P_q is given in [7].

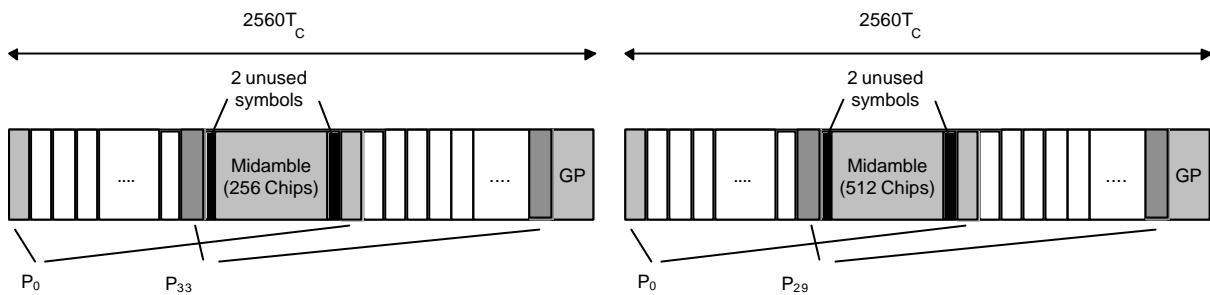


Figure 17: Example of mapping of paging indicators on PICH bits for $L_{PI}=4$

5.4 Transmit Diversity for DL Physical Channels

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

Table 9: Application of Tx diversity schemes on downlink physical channel types
 "X" – can be applied, "-" – must not be applied

Physical channel type	Open loop Tx Diversity		Closed loop Tx Diversity
	TSTD	Block STTD	
P-CCPCH	-	X	-
SCH	X	-	-
DPCH	-	-	X
PDSCH	=	=	X