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| **Agenda Item:** | AH21 |
| **Source:** | CWTS |
| **To:** | TSG RAN WG1 |
| **Title:** | PUSCH PDSCH PICH for 1.28Mcps TDD |
| **Document for:** | Decision |

# 1. Summary

The sections 6.3.5 and 6.3.6 have been copied from the 3.84 Mcps TDD related sections, since they were noted to be "Common with the 3.84 Mcps TDD". Section 6.3.7 has been drafted according to the technical report TR25.928 in alignment with the 3.84Mcps TDD related section in 25.221.

# 2. Proposal

We propose to modify the following paragraphs in the working CR for the TS25.221 as the description of the physical shared channels and the paging indicator channel of the 1.28Mcps TDD.

## 6.3.5     Physical Uplink Shared Channel (PUSCH)

For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 6.2 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.

## 6.3.6     Physical Downlink Shared Channel (PDSCH)

For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 6.2 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.

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 shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the UE by UTRAN, see 6.6.1.1.2 . 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 at the same time.

## 6.3.7     The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the Paging Indicators.  The PICH is always transmitted at the same reference power level and with the same antenna pattern configuration as the P-CCPCH.

The same burst type is used for the PICH in every cell. The usage of two codes allows an easy time multiplexing with the P/S-CCPCH and about the same number of PIs per slot as in the 3.84 Mcps TDD. Figure [XX] depicts the PICH structure and the numbering order of the transported bits, $N_{PIB}$, where $N_{PIB}$ is equal to 176 bits.
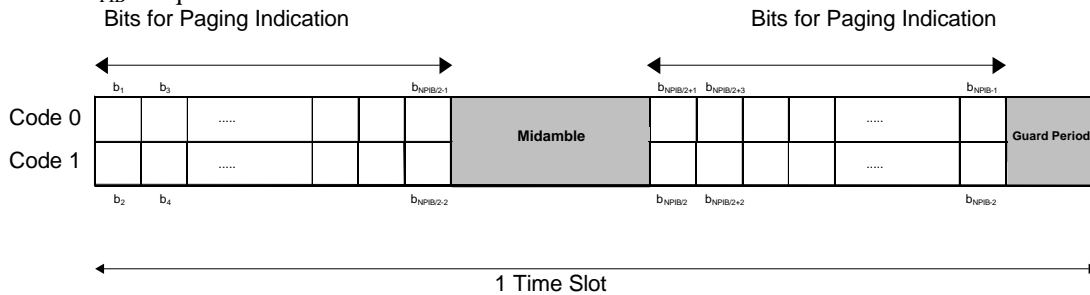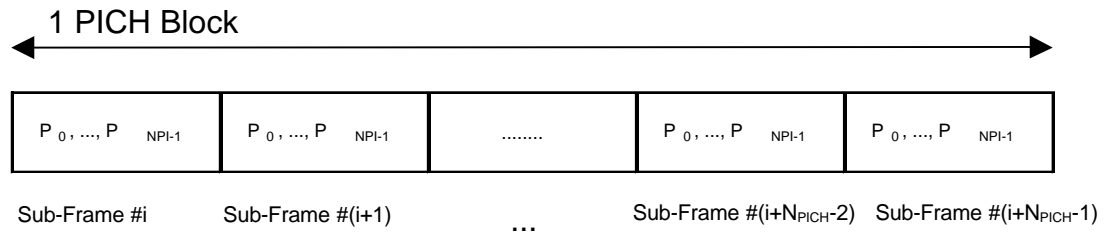


*Figure: Transmission and numbering of paging indicators carrying bits on the PICH burst*

In each PICH burst, $N_{PI}$ 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 PICH burst is given by the paging indicator length, which are both known by higher layer signalling. In table [XX] this number is shown for the different possibilities of burst types and paging indicator lengths.

*Table [XX] : Number $N_{PI}$ of paging indicators in a PICH burst for the different paging indicator lengths ($L_{PI}$)*

|  | $L_{PI}$ = 2 | $L_{PI}$ = 4 | $L_{PI}$ = 8 |
|---|---|---|---|
| Number of PI per timeslot | $N_{PI}$=44 | $N_{PI}$=22 | $N_{PI}$=11 |

As shown in figure [XX], the paging indicators of $N_{PICH}$ consecutive sub-frames form a PICH block, $N_{PICH}$ is configured by higher layers. Thus, $N_P=N_{PICH}*N_{PI}$ paging indicators are transmitted in each PICH block.

## 1 PICH Block

| $P_0, ..., P_{NPI-1}$ | $P_0, ..., P_{NPI-1}$ | ........ | $P_0, ..., P_{NPI-1}$ | $P_0, ..., P_{NPI-1}$ |
|---|---|---|---|---|

| Sub-Frame #i | Sub-Frame #(i+1) | … | Sub-Frame #(i+$N_{PICH}$-2) | Sub-Frame #(i+$N_{PICH}$-1) |

**Figure [XX]: Structure of a PICH block**

The value PI (PI = 0, ..., $N_P$-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

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

$n = PI \operatorname{div} N_{PI}$.

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 $P_q$.