

Agenda Item: AH21
Source: CWTS, Siemens
To: TSG RAN WG1
Title: Page Indicator Channel
Document for: Discussion and Approval

Introduction

This paper describes the Page Indicator Channel (PICH) in the low chip rate TDD option.

The PICH physical channel is already included both in the 3.84 MCPS TDD and in the FDD mode to provide a more efficient DRx mode at the UEs.

Due to the different burst structure with respect to the 3.84 MCPS TDD option, a different PICH burst has to be defined for the 1.28 MCPS TDD.

Conclusion

It is proposed to discuss and include the following text into the corresponding section in TR25.928.

----- changes to TR25.928 begin -----

7.2.3 Common physical channels

7.2.3.x The Page Indicator Channel (PICH)

[Description:]

The Page Indicator Channel (PICH) is a physical channel used, as in 3.84 MCPS TDD option, to carry the Page Indicators (PI).

The PICH is transmitted time multiplexed with a P/S-CCPCH and it is sent at the same reference power level and with the same antenna pattern configuration as the P-CCPCH.

As in the 1.28 MCPS TDD option one burst type only is defined having a different structure with respect to the ones foreseen in the 3.84 MCPS TDD, the PICH structure will be different as well. The structure is chosen so that without defining reserved bits and for all possible PI lengths the bits corresponding to one PI can be symmetrically located in the time slot with respect to the midamble, as in 3.84 MCPS TDD. Moreover, 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 mode. Figure XX depicts the PICH structure and the numbering order of the transported bits, N_{PIB} , where N_{PIB} is equal to 176 bits.

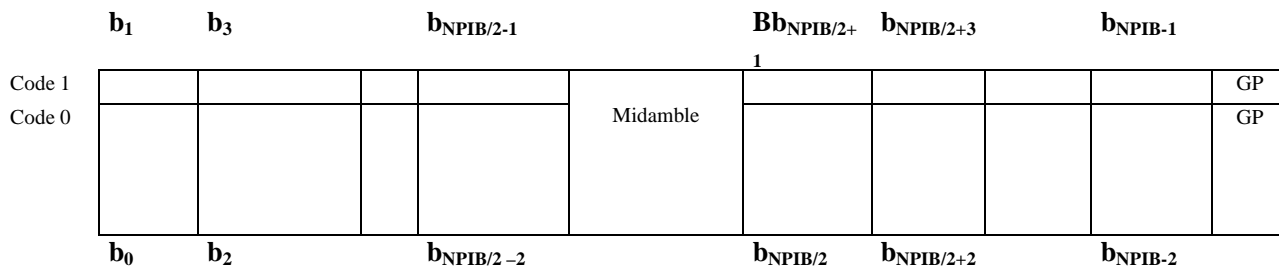


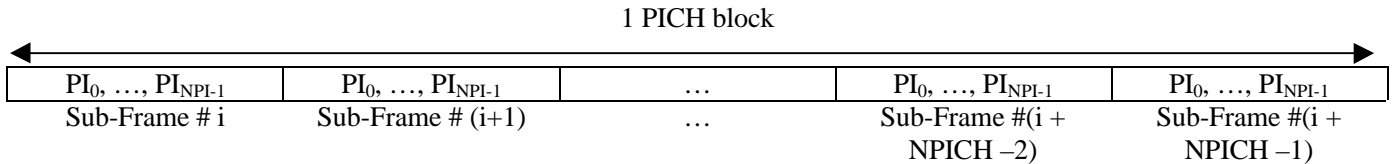
Figure XX: Transmission and numbering of PI carrying bits on the PICH

As in 3.84 MCPS TDD, Page Indicators can have different length (L_{PI}), where $L_{PI} = 2$ or 4 or 8 symbols respectively, as configured by the network. Therefore, the number of page indicators in a PICH burst are the ones reported in Table YY.

Table YY: Number of Page Indicators (PI) in a PICH burst for the different PI length (P_{IL})

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

Similar to the 3.84 MCPS TDD option, Page Indicators can be transmitted for N_{PICH} consecutive sub-frames, which form a PICH block as described in figure ZZ. N_{PICH} is configurable by the higher layers so that $N = N_{PICH} * N_{PI}$ Page Indicators are transmitted in each PICH block.



The structure of a paging block, consisting of a PICH and a PCH block is the same as in the 3.84 MCPS TDD option. As for the 3.84 MCPS TDD option, Page Indicator and Paging Group (PG) for a given user are computed by the higher layers in the network, where PI and PG are assigned independently one to the other.

A given PI corresponds to a PI_p in the PICH burst of a PICH block at sub-frame number “n”, according to the following rule:

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

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

As in 3.84 MCPS TDD, the Page Indicator PI_p is mapped to two bit strings, where the first bit string consists of the bits ($b_{L_{PI} * p}; \dots; b_{L_{PI} * p + L_{PI} - 1}$) and the second bit string consists of the bits ($b_{N_{PI} / 2 + L_{PI} * p}; \dots; b_{N_{PI} / 2 + L_{PI} * p + L_{PI} - 1}$) within that burst. This mapping scheme allows for an equal distribution of all PIs within the PICH burst.

[Rationale:]

PICH physical channel allows to improve the DRX mode at the UE, saving power consumption. The benefit of this channel have already been evaluated for 3.84 MCPS TDD and FDD mode where it is now included; therefore it is recommended for its inclusion in the 1.28 MCPS TDD option as well.

[Differences:]

While no difference exists in principle between 3.84 MCPS TDD and 1.28 MCPS TDD PICH physical channel, there are differences in the burst structure coming from the different burst formats and the different number of supporting resource units in the respective TDD options.

----- changes to TR25.928 end -----