STTD Encoding of PCCPCH and 7.5 KSPS data channels for Harmonisation

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In this document we address the issue of STTD encoding the data symbols for the PCCPCH and the 7.5 KSPS channel because of changing the number of slots per frame from 16 to 15 for harmonization. As suggested in the section 2.12 of Tdoc 677/99 “Impact of OHG harmonization recommendation on UTRA/FDD and UTRA/TDD” one possibility is to not STTD encode the final odd data symbol in every 10 msec. Thus, a maximum of one symbol per frame would not see the diversity gains for the BCH and the 7.5 KSPS data channels. In this document we show simulations that indeed by not STTD encoding the one data symbol gives negligible loss in the STTD diversity gains.

Let us first consider the 7.5 KSPS data channel. In this case, we there are a total of 30 data + 15 TPC symbols in each frame. Since the data symbols are STTD encoded with the TPC symbols, an odd data symbol at the end cannot be STTD encoded. This would mean that out of the 30 data symbols only 29 symbols will see the path diversity due to STTD and 1 symbol will not get the path diversity. Figure (1) gives the overall raw BER simulations for an indoor-to-outdoor pedestrian channel showing the loss in diversity gain for the above scenario.

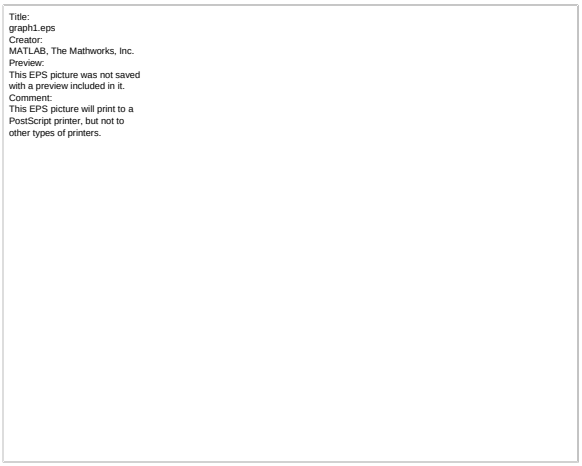

Figure (1): The loss in STTD diversity gains for the 7.5 KSPS channel by not STTD encoding 1 odd data symbol in each frame are shown. We can see that even for a raw ber of 10^{-2} the loss in diversity gains is only about 0.1 dB.

As can be seen from the figure above, the loss in diversity gains by not STTD encoding 1 odd data symbol in each frame for the 7.5 KSPS channel only gives a small loss of 0.1 dB in the overall diversity gains.

Similarly, for the BCH channel there are a total of 5*15 = 75 data symbols out of which 1 data symbol will not be STTD encoded over a period of 10 msec. which implies 1 data symbol amongst 75 symbols will not be STTD encoded. Thus the loss in diversity gains will be even less than those in figure (1) and hence be negligible.

Hence, we propose that as mentioned in section 2.12 of Tdoc 677/99 one odd data symbol in each frame of the 7.5 KSPS DPCH be not STTD encoded. Similarly, for the PCCPCH 1 odd data symbol in every 10 msec. be not STTD encoded.

----------Begin text proposal for section 5.3.1 of S25.211----------

5.3.1 Downlink Transmit Diversity

Table 1 summarizes the possible application of open and closed loop Transmit diversity modes on different downlink physical channels.

Table 1: Application of Tx diversity modes on downlink physical channels.

Channel	Open loop mode	Closed loop mode	Note
PCCPCH	X	N/A	STTD applied only to data symbols. The last odd data symbol in every 10 msec. is not STTD encoded.
SCH	X	N/A	TSTD used
SCCPCH	X	N/A	
DPCH	X	X	For the 7.5 KSPS channel, the last odd data symbol in every 10 msec. is not STTD encoded
PDSCH (associated with DPCH)	X	X	
AICH	X	N/A	Only if closed loop Tx diversity is used in the cell and/or open loop mode is used on PCCPCH

N/A = Not applied
X = Can be applied

----------End proposal for section 5.3.1 of S25.211 ----------
----------Begin text proposal for section 5.3.2.1 of S25.211----------

5.3.2.1 STTD for DPCH

The block diagrams shown in figure 6 and 7 are used to STTD encode the DPDCH, TPC and TFCI symbols. The pilot symbol pattern for the DPCH channel transmitted on the diversity antenna is given in table12. For the 7.5 KSPS DPCH the last odd data symbol in every 10 msec. is not STTD encoded and the same symbol is transmitted with equal power from the two antennas.

----------End proposal for section 5.3.2.1 of S25.211 ----------
----------Begin text proposal for section 5.3.3.1.1 of S25.211----------

5.3.3.1.1 Primary CCPCH structure with STTD encoding

In case the diversity antenna is present at the base station and the PCCPCH is to be transmitted using open loop transmit diversity, the data symbols of the PCCPCH are STTD encoded as given in section 5.3.1.1.1 figures 6 and 7. The last odd data symbol in every 10 msec. is not STTD encoded and the same symbol is transmitted with equal power from the two antennas.

----------End proposal for section 5.3.3.1.1 of S25.211 ----------
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