

Impact of STTD encoding the PCCPCH on Stages 1, 2 and 3 of initial synchronization

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 March 17th, 1999

1.0 Introduction

One of the issues in STTD encoding the PCCPCH is whether it impacts in any way the initial fast cell search acquisition performance, in particular the stage 3 of acquisition. In this report we show that STTD encoding the PCCPCH does not have any impact on the overall acquisition process, *in fact it slightly improves the overall acquisition time*. We use the same simulation parameters/conditions as that used in [1] to compare the overall performance with and without STTD encoding the PCCPCH. For completeness, table 1 gives the simulation parameters used and figure (1) gives the simulation results.

Number of cells simulated	19
Number of paths/cell	6 (Vehicular B)
Median Eb/N0 at cell edge for data channel	15 dB
Log-normal fading standard deviation	8 dB
Doppler frequency	80 Hz.
Data rate	64 KSPS, QPSK, rate 1/3, k = 9
Long code masked symbol frequency	16 Ks/s
Chip rate	4.096 Mc/s
Path loss decay factor	3.8
Time slot interval	0.625 msec
R = ratio of transmit power in sync channel (SCH) over data channel (DPCH)	3 dB
C/PG = system efficiency, number of users C normalized by the processing gain PG	33 %
Acquisition stages simulated	Stages 1, 2, 3
Stage 1: (performance exactly same for with/without STTD encoding the PCCPCH)	PCCPCH not STTD encoded: Non coherent PCCPCH STTD encoded: Non coherent
Stage 2: (performance exactly same for with/without STTD encoding the PCCPCH)	PCCPCH not STTD encoded: Non coherent PCCPCH STTD encoded: Non coherent
Stage 3	PCCPCH not STTD encoded: Non coherent PCCPCH STTD encoded: Non coherent
Acquisition time for <i>non STTD encoded PCCPCH</i> (95 % locations)	100 msec.
Acquisition time for <i>STTD encoded PCCPCH</i> (95 % locations)	80 msec.

Table 1: Simulations parameters for comparing the performance of the initial fast cell search with and without STTD encoding of the PCCPCH. We can see that STTD encoding the PCCPCH slightly improves the over all acquisition time.

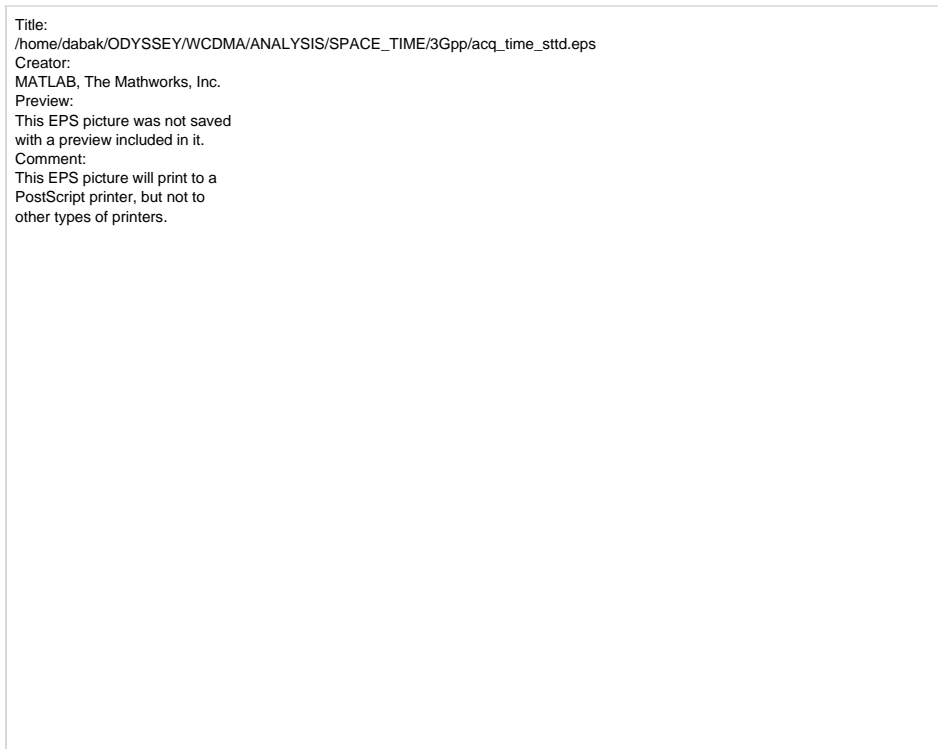


Figure 1: Initial fast cell search initial acquisition time for with and without STTD encoding the PCCPCH. We can see that STTD encoding the PCCPCH improves the overall acquisition time for 95 % of the locations from 100 msec. to 80 msec.

2.0 Conclusions

As can be seen from the simulations in figure 1, STTD encoding the PCCPCH improves the overall acquisition time from 100 msec. to 80 msec. This improvement comes from diversity in stage 3 of acquisition since stages 1 and 2 of acquisition are the same whether PCCPCH is STTD encoded or not.

We can therefore conclude that STTD encoding the PCCPCH does not have any impact on the overall acquisition process. In fact, as the simulations in this report show, the overall acquisition time is actually improved by STTD encoding the PCCPCH.

References:

[1] AIF/SWG2-24-9(C), Texas Instruments “Comma Free Codes for Acquisition: Code construction and simulation results”.