Simulation results for advantages of using STTD in conjunction with SSDT

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March 17th, 1999

1.0 Introduction

In this report we present link level simulations showing the advantages of using STTD in conjunction with SSDT. The simulation parameters are described in table 1 and the simulation results are shown in figure 1.

Simulation environment	Indoor-to-outdoor pedestrian
Velocity	3 kmph
Data rate	32 KSPS
Information bit rate	8 Kb/s
Info/CRC/tail bit per frame	80/16/8
Convolutional coding rate	1/3, k = 9
Repetition	8 bits/10 ms (312 -> 320)
Interleaver	10 ms, 16*20
DCCH bits/frame	96
Pilot/TPC/TFI bits per slot	8/2/0
Shadowing/path loss	Not simulated
Channel Estimation	Perfect
Number of base stations in soft handoff	3
Simulation condition: only SSDT	No antenna diversity at any of the 3 base stations
Simulation condition: STTD + SSDT	Two transmit antennas with STTD encoding at each of the 3 base stations
Relative average powers of soft handoff base stations at the mobile	equal
Base station selection at mobile	Only SSDT :Based upon maximum received power STTD+SSDT: Based upon maximum received power
Frequency of base station selection for SSDT	Once per frame (10 msec.)
Up link errors in base station selection for SSDT (FBI bit error rate)	None
Forward link power control	Only SSDT: One slot averaging for the selected base station STTD+SSDT: One slot averaging for the selected base station
Power control step (dB)	1
Power control rate (Hz)	1600
TPC update delay (slots)	1
TPC error rate	5%
Desired coded BER	10^{-3}
Performance improvement, STTD+SSDT over only SSDT	***1.1 dB (figure1)***

Table 1: The simulation parameters for analyzing the advantage of using STTD with SSDT over only SSDT are given. We can see that if STTD is used in conjunction with SSDT, there is a 1.1 dB advantage over using only SSDT.

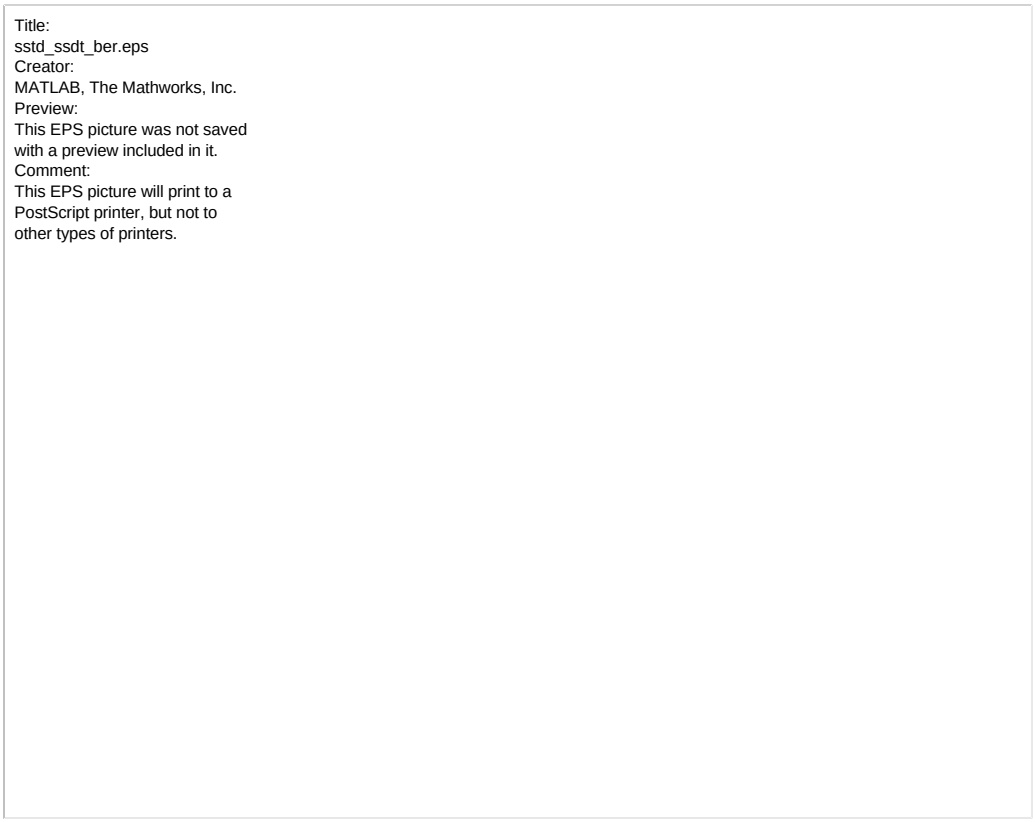

Figure 1: Link level simulations comparing the performance of the only SSDT system with that of STTD+SSDT, for a 3 Km/h indoor-to-outdoor pedestrian environment and a 3 base station soft handoff scenario. We can see that STTD+SSDT gives about *1.1 dB* gain over the only SSDT system.

To simplify the simulations, we do not consider any path loss/shadowing and we assume that the three soft handoff base stations are nominally received with the same average power at the mobile. However, in presence of the shadowing and unequal average powers of the base stations at the mobile, we would expect that the STTD+SSDT gain over only SSDT should in fact *increase*. Similarly, the simulation conditions in this report assumed that all the three SSDT base stations have/do not have the diversity antenna. In case not all the base stations have the diversity antenna, we would expect the STTD+SSDT gain over only SSDT to be *even more* than that reported in this submission. Hence, the gains reported in this submission should be representative of the actual gains that will be obtained by using STTD+SSDT over only SSDT, for different simulation conditions.

2.0 Conclusions

We can see that using STTD in conjunction with SSDT gives about *1.1 dB* gain over using only SSDT. Further it should be very simple, with no over head signaling, to incorporate STTD with SSDT in a network that is already using STTD and SSDT separately. Hence we propose that STTD should be used in conjunction with SSDT.