

New York, USA

12. – 15. October 1999

Agenda Item: AdHoc 6

Source: Bosch

TDD transmit diversity with Joint Predistortion – further simulation results

1. Introduction

This paper presents further link level simulation results of dual Tx antenna Joint Predistortion (JP) in indoor environments. Tx diversity with JP was introduced at WG1#6 in July [1]. In addition to results already presented in [2] at WG1#7 the realistic UL channel estimation at different mobile velocities is addressed here.

2. Simulation parameters

Simulations have been carried out to evaluate the raw bit error rate performance of the TDD downlink in a multi user scenario with 8 active users in a time slot. The following parameters have been used:

carrier frequency	2 GHz
duration of a time slot	10000/15 μ s
data modulation	QPSK
chip pulse shaping	root raised cosine, $\alpha=0.22$
chip pulse length	10 chip periods
number of chips per symbol	16
chip duration	1/3.840 μ s
chip over sampling	2
burst type	traffic burst 1 (old midamble)
data detection	MMSE-BLE (Single Tx,TxAA), MF (JP)
channel estimation	correlation, 2(IA)/4(IB) strongest taps sel.
channel type	IndoorA, IndoorB

Two different frame structures were investigated:

FS1: Single switching points with nearly symmetric DL/UL allocation (8/7)

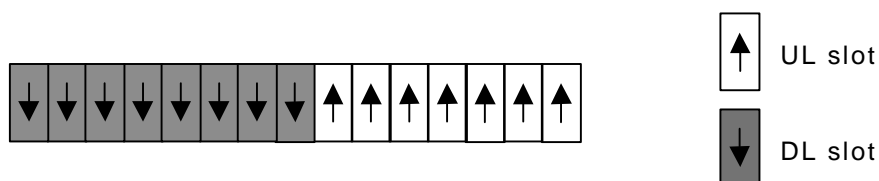


Figure 1: TDD FS1.

FS2: Multiple switching points with asymmetric DL/UL allocation (4/11)

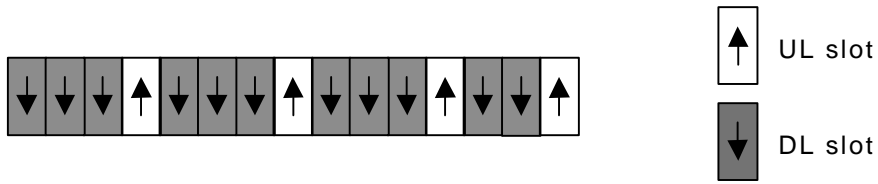


Figure 2: TDD FS2.

3. Simulation results

The following two figures present the obtained simulation results for the IndoorA and IndoorB channel model. The $E_b/N_0=8$ dB in UL and DL. We compare the single Tx antenna Joint Detection (JD) performance with dual Tx antenna TxAA and JP in terms of raw BER.

The worst case with respect to UL channel estimation was always used, which means that UL and DL slots have the maximum time separation.

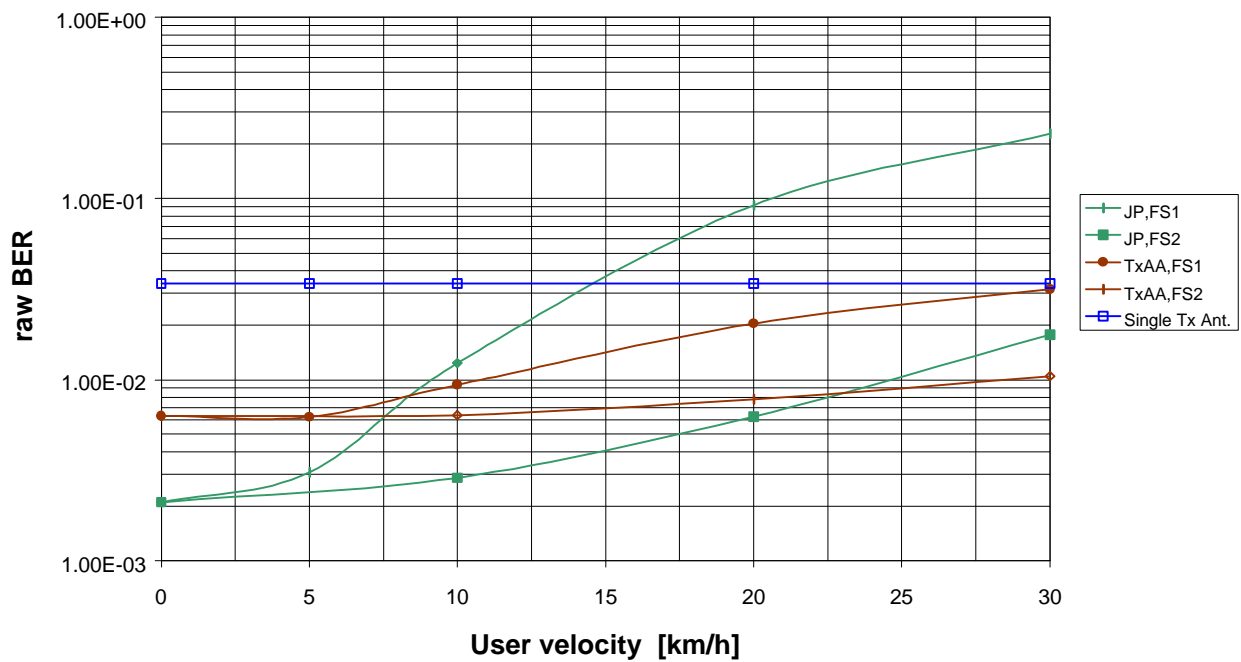


Figure 3: Raw BER performance of single Tx antenna JD, dual Tx antenna TxAA and JP in the IndoorA environment.

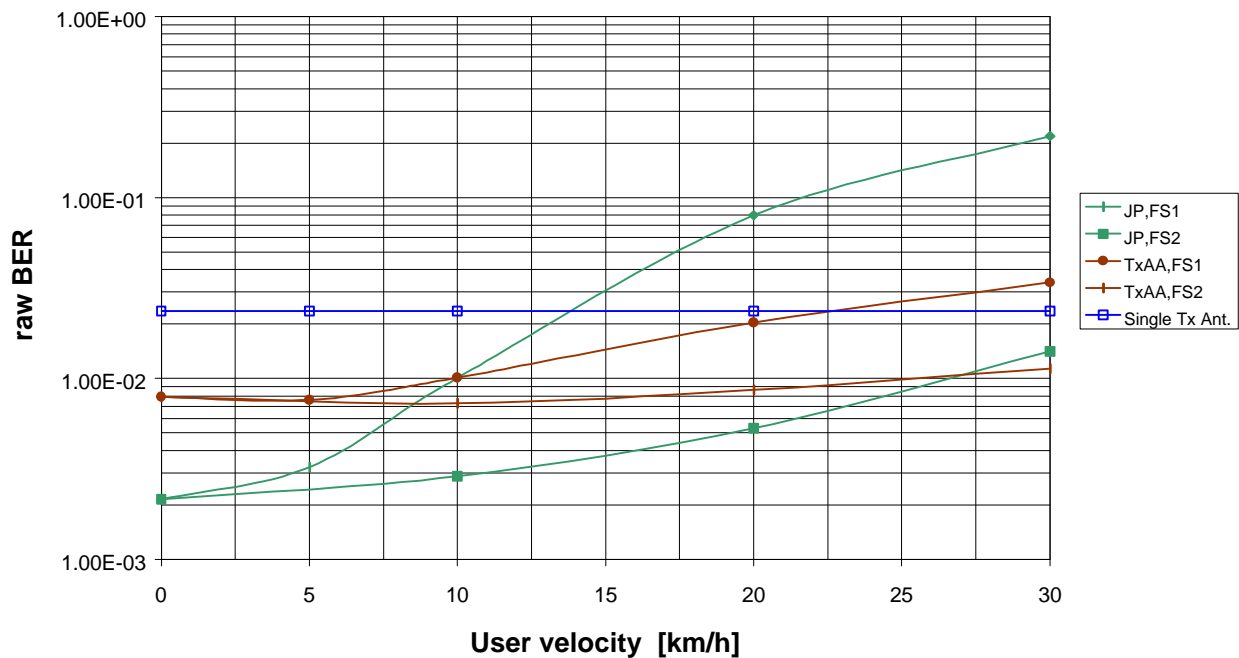


Figure 4: Raw BER performance of single Tx antenna JD, dual Tx antenna TxAA and JP in the IndoorB environment.

4. Conclusions

The presented simulation results show that in indoor environments with low mobile velocity Tx diversity with JP leads to a significant performance improvement in terms of raw BER compared to the single Tx antenna case and also compared to TxAA.

With FS1 JP outperforms TxAA up to a user velocity of 8 km/h in the IndoorA channel and up to 10 km/h user velocity in the IndoorB channel. With FS2 an improvement with JP can be maintained up to 23 km/h in the IndoorA channel and up to 27 km/h in the IndoorB channel. This improvement is already present in the worst case situation with respect to the UL/DL time difference.

5. References

- [1] Tdoc 3GPP TSGR1#6(99)918, "Tx Diversity with Joint Predistortion", source: Bosch, July 1999.
- [2] Tdoc 3GPP TSGR1#7(99)a82, "TDD downlink performance in indoor environments", source: Bosch, August 1999.