3GPP TSG-RAN WG1#8 TSGR1#8(99)f17

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Agenda Item: AdHoc 6

Source: Bosch

Impact of transceiver chain phase imbalances on Joint Predistortion performance

1. Introduction

This paper presents further link level simulation results of dual Tx antenna Joint Predistortion (JP) in indoor environments. In particular the impact of transceiver chain phase imbalances in the Node B is addressed. This is a supplement to contribution [1] which has been presented at WG1#7.

Tx diversity with JP is described in [2]. More simulation results on the subject can be found in [3].

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 μs
data modulation	QPSK
chip pulse shaping	root raised cosine, α=0.22
chip pulse length	10 chip periods
number of chips per symbol	16
chip duration	1/3.840 μs
chip over sampling	2
burst type	traffic burst 1 (old midamble)
data detection	MMSE-BLE (Single Tx,TxAA), MF (JP)
channel estimation	correlation, 4 strongest taps sel.
channel type	IndoorA at low mobile velocity

If required, ideal uplink channel estimation (no noise, no time difference between uplink reception and downlink transmission) is applied.

The system model already applied for TxAA in [1] is also used in this contribution. The resulting Node B model in the case of JP is shown in Figure 1. The absolute phase difference of the two transceiver chains is defined with:

$$\Delta\Phi=|(\phi_{1t} - \phi_{1r}) - (\phi_{2t} - \phi_{2r})|.$$

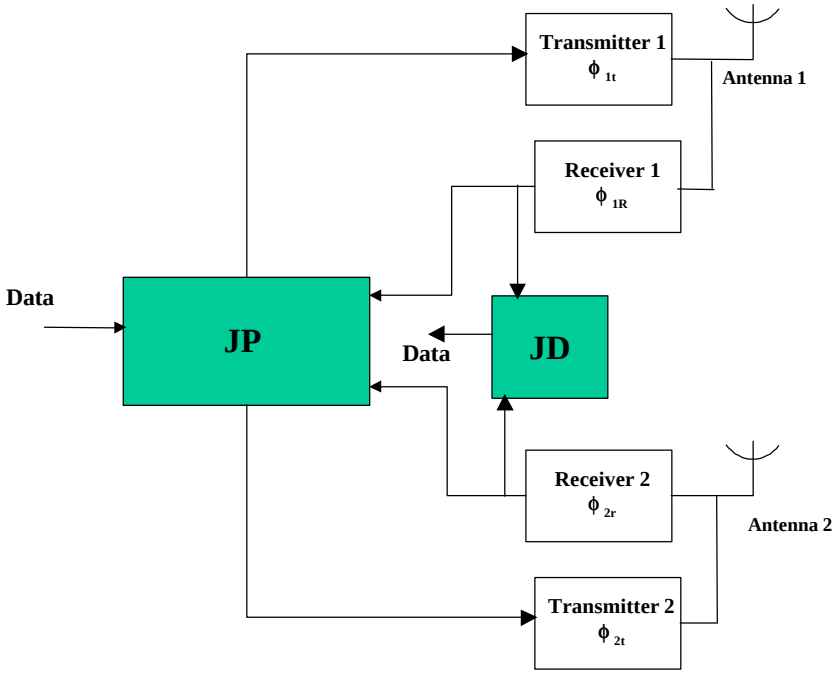

Figure 1: System model for dual Tx antenna JP.

3. Simulation results

The following figure shows the obtained simulation results:

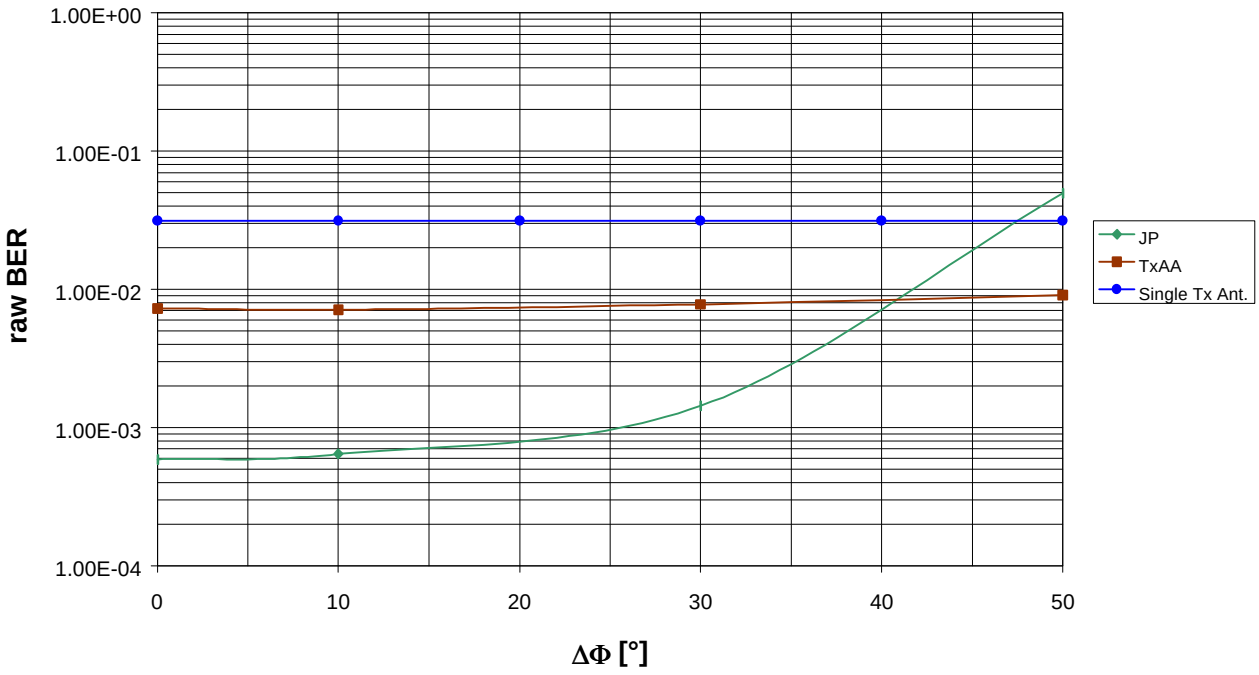

Figure 2: Impact of phase imbalance on JP and TxAA compared to the single Tx case.

4. Conclusions

The simulation results presented in this contribution show that JP leads to better performance than TxAA for phase imbalances up to 41°. The single Tx antenna performance is reached with a phase imbalance of 47°.

As long as the phase imbalance can be kept below 30° no severe performance degradation of JP is expected.

5. References

[1] Tdoc 3GPP TSGR1#7(99)c06, “Influence of Transceiver chain phase imbalance on TxAA performance”, source: Motorola, August 1999.

[2] Tdoc 3GPP TSGR1#6(99)918, “Tx Diversity with Joint Predistortion”, source: Bosch, July 1999.

[3] Tdoc 3GPP TSGR1#7(99)a82, “TDD downlink performance in indoor environments”, source: Bosch, August 1999.