Agenda Item:

Source: Siemens[1]

Title: First simulation results of Tx diversity using the eigenbeamformer
                  concept

Document for: Information

1. Introduction

At the last TSG RAN WG1 meeting #14 we presented a new concept for closed loop Tx diversity for more than 2 antennas [1]. The main principle was to exploit long-term spatial channel properties to make antenna and diversity gain also available at higher velocities.

With this contribution we present a first simulation result using the partial correlated channel model according to [3].

2. Simulation parameters

For the simulation the parameters in Table 1 of the recommended simulation parameters in [2] have been used. A geometry of 0 dB was set. The correlation between the antennas was modified as specified in [3] and applied to the Ped. A channel model. Since the covariance matrix was assumed not to change in time the long-term feedback of the eigenvectors (based on the covariance matrix R) was assumed to be error-free. The short-term feedback for choosing the appropriate eigenvector was also assumed to be error-free. Channel estimation was obtained by the CPICH (extended to have 4 orthogonal sequences).The total CPICH power was 10 % of the transmit power at Node B.

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3. Simulation results

In Figure 1 the eigenbeam concept is compared with the concept proposed by Nokia (R2F2), [4]. There will be more simulations provided to verify the gain compared to the current Tx diversity modes in Release '99.
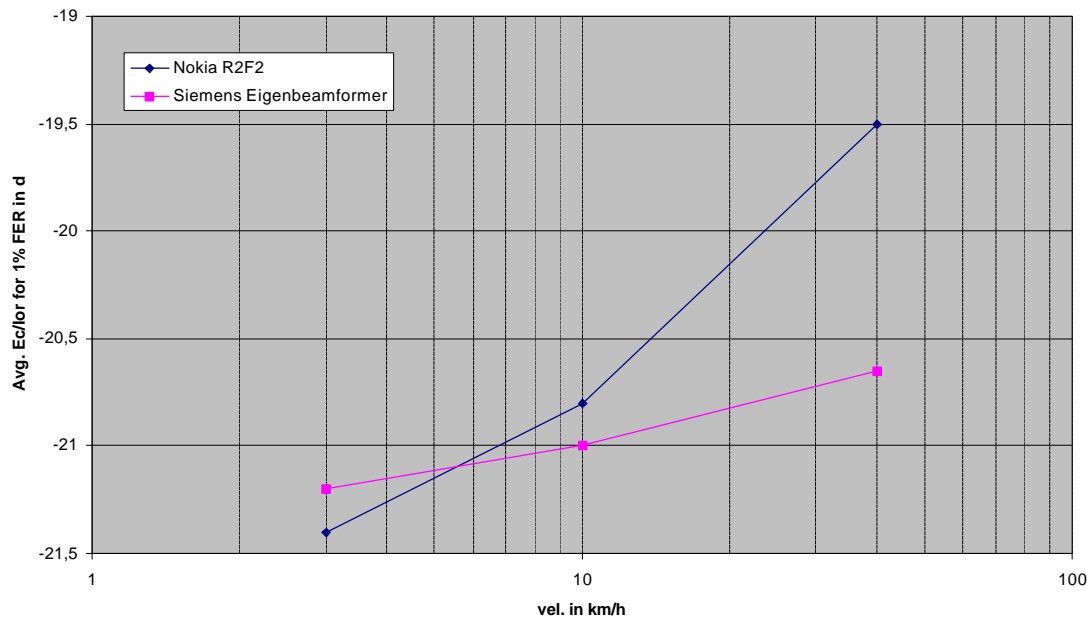

Figure 1: Simulation results for Ped. A channel with partial antenna correlation

The simulation shows an improvement of more than 1 dB at velocity of the UE of 40 km/h. This can be explained by the fact that with the eigenbeam method only the information of which eigenbeam to choose needs to be transmitted.

4. Conclusion

A performance gain at higher velocities was shown with this initial simulation. This is in line with the principle of the eigenbeamformer concept. Obviously, further simulations need to be provided in future contributions. Especially, the effect of feedback errors of the short-term and long term-long term updates will be investigated. Also the variation in time of the covariance matrix R (long-term channel properties) needs to be evaluated.

5. References

[1]   Siemens. Advanced closed loop Tx diversity concept (eigenbeamformer). TSG-R WG 1 document, TSGR1#14(00)0853, 4-7th, July, 2000, Oulu, Finland.
[2]   Nokia. Recommended simulation parameters for Tx diversity simulations. TSG-R WG 1 document, TSGR1#14(00)0867, 4-7th, July, 2000, Oulu, Finland.
[3]   Siemens. Channel model for Tx diversity simulations using correlated antennas. TSG-R WG 1 document, TSGR1#15(00)1067, 22-25th, August, 2000, Berlin, Germany.
[4]   Nokia. An extension of closed loop Tx diversity mode 1 for multiple Tx antennas. TSG-R WG 1 document, TSGR1#13(00)0712, 22-25th, May, 2000, Tokyo, Japan.