TSG-RAN Working Group 1 meeting No. 19 ***TSGR1#19(01)-0410***
February 27 – March 2, 2001, Las Vegas, USA

Agenda item:	**AH24: HSDPA**
Source:	**Fujitsu**
Title:	**Text Proposal for MIMO and Tx Diversity Comparison Section**
Document for:	**Approval**

1. Introduction

This document proposes MIMO and Tx diversity comparison content for the TR25.848. The simulation analysis for this contribution was presented in R1-01-0286. [1]

2. Text Proposal

7.4.4. MIMO and Tx Diversity Comparison

7.4.4.1. Introduction

The link level simulation results using the multiple antennas diversity with STTD and closed-loop Tx diversity schemes are demonstrated to compare to the MIMO performance. The frame error rate (FER) performance for the same total data rate of 10.8 Mbps is compared in a flat Rayleigh fading channel.

7.4.4.2. Simulation Parameters

The data rates and antenna architectures are shown in Table 1. The number of antennas for the conventional, STTD and closed-loop Tx diversity schemes are chosen between 1 and 4. The STTD with only two transmit antennas is considered, since the optimum STTD coding scheme for four antennas does not exist. The Mode 1 operation specified in Release99 or simple extension of Mode 1 is assumed for the closed-loop Tx diversity.

Table 1. Transmission architectures

(*M*,*N*)	Tx technique	Code rate	Modu-lation	Data rate per substream	# sub-streams	Total data rate
(1,N)	Conventional	¾	64QAM	540Kbps	20	10.8Mbps
(2,N)	STTD	¾	64QAM	540Kbps	20	10.8Mbps
(M,N)	CL Tx Diversity	¾	64QAM	540Kbps	20	10.8Mbps
(2,2)	MIMO	¾	8PSK	270Kbps	40	10.8Mbps
(4,4)	MIMO	~½	QPSK	135Kbps	80	10.8Mbps

7.4.4.3. Simulation Results

Figure 1 gives the performance for the conventional single antenna transmission. The perfect channel estimation and an uncorrelated channel are assumed at 3 km/h. The maximal ratio combining (MRC) is done when multiple antennas are used at the receiver. As references, the MIMO performances are shown in the same figure. Figure 2 gives the performance for the STTD coding schemes. Figure 3 shows the results for the closed-loop Tx diversity where one slot feedback loop delay and 4% feedback bit error rate are assumed. In Figure 4, the effect of UE velocity is measured comparing the performance at 3 km/h and 30 km/h. The channel estimation is performed with one slot averaging of CPICH, where the CPICH has –10 dB of total transmit power.

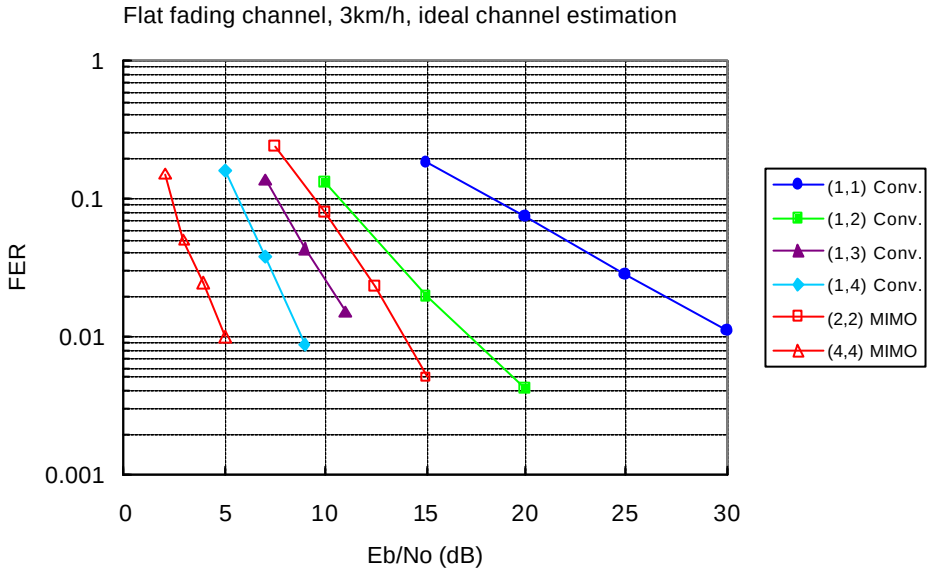

Figure 1. FER performance for the conventional antenna diversity

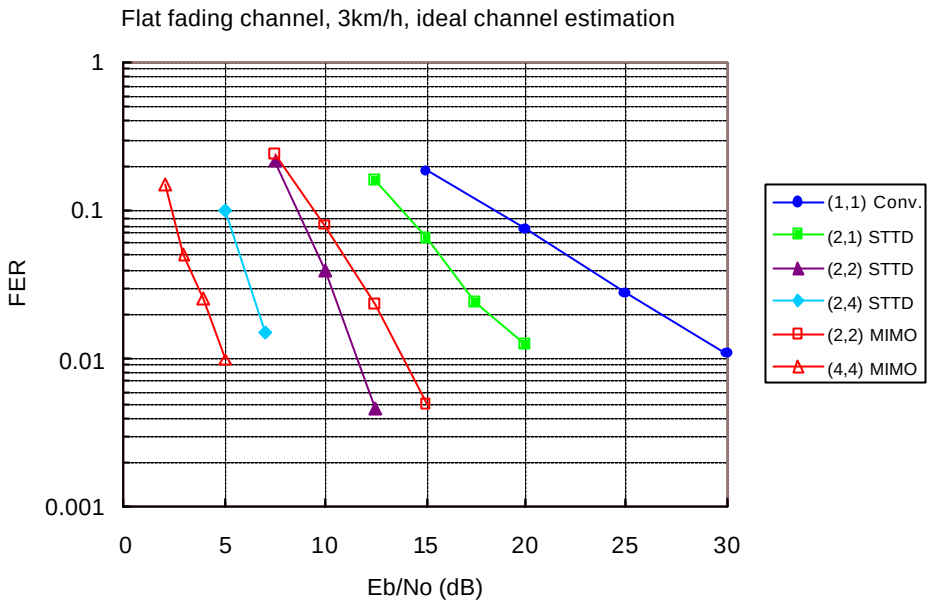

Figure 2. FER performance for the STTD system

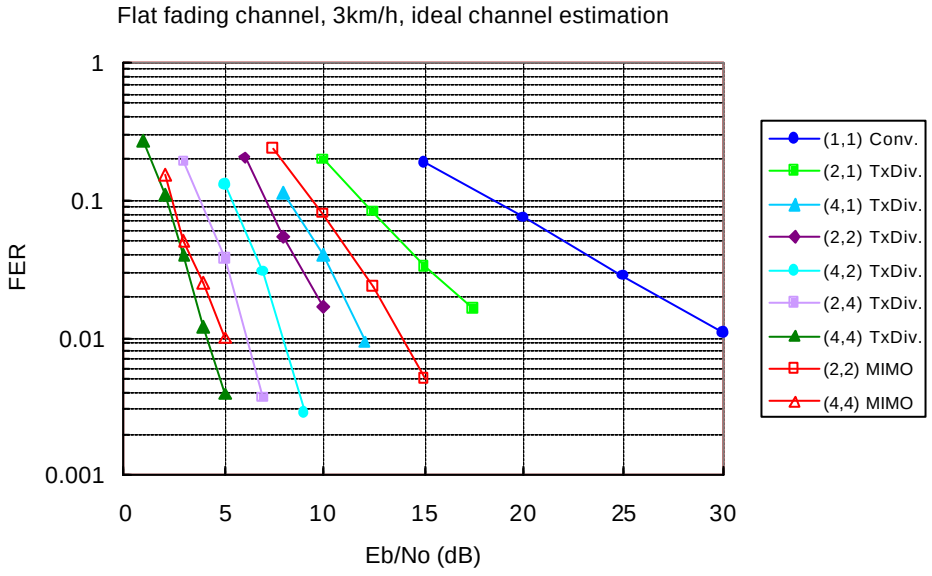

Figure 3. FER performance for the closed-loop Tx diversity

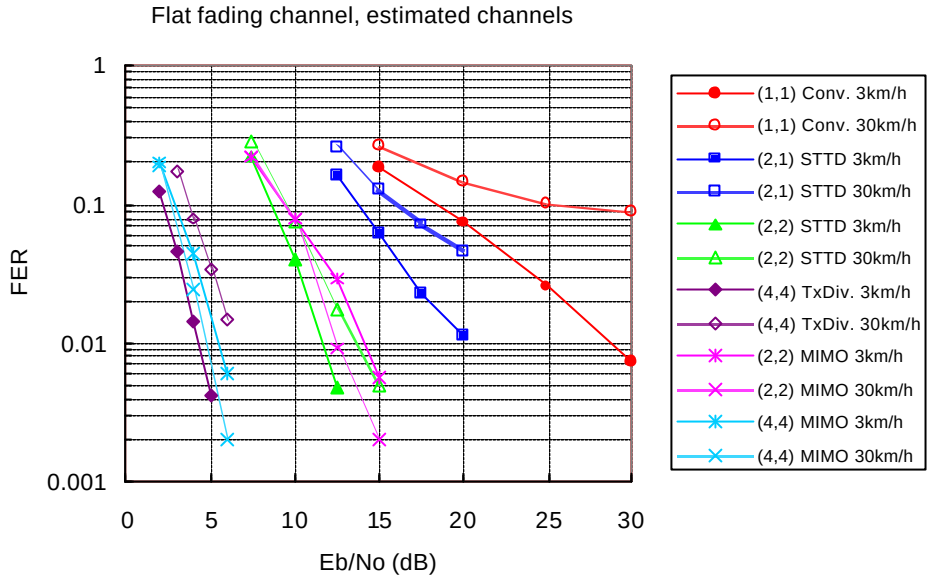

Figure 4. Effect of UE velocity

7.4.4.4. Conclusion

The link level simulation results for the schemes based on Tx diversity and MRC reception diversity are demonstrated and compared to MIMO code-reuse at the total data rate of 10.8 Mbps. Although MIMO architecture has an advantage to support higher data rate more than 10.8 Mbps, the similar performance was obtained when the same number of antennas are assumed at transmitter and receiver.

Reference

[1] Fujitsu. Link level simulation results for HSDPA: comparison between MIMO and Tx diversity. TSG-R WG1 document, TSGR1#19(01)0286, Feb27-Mar2, 2001, Las Vegas, USA.