TSG-RAN Working Group1 meeting#19 TSGR1#19, R1-01-0240
Las Vegas, USA Feb 27.- Mar 2. 2001

Source: Siemens

Agenda Item: [AH24] HSDPA

AMCS Performance Evaluation for TDD

1 Introduction

On the last WG1 meeting in Boston, it was agreed to have an additional section for TDD in the HSDPA technical report [1]. The section describes TDD related physical layer aspects and differences compared to FDD are highlighted.
This paper presents TDD Link Level simulation assumptions and performance results for different Adaptive Modulation and Coding Schemes (AMCS). It is designated to the previous mentioned section of the technical report. The results are compared with the performance results for FDD presented in [3]. This paper does not investigate the optimum number of AMC schemes.

2 Simulation Assumptions

The simulation assumptions in Table 1 and
Table 2 are based on the FDD assumptions in [1] section 12 Annex A. The Tables are nevertheless presented due to TDD specific parameters which were not yet considered in the technical report [1].

Parameter	Value	Comments
Carrier Frequency	2GHz	
Propagation conditions	AWGN, Indoor A	
Vehicle Speed for Flat Fading	3 kmh	
Closed loop Power Control	OFF	
HSDPA frame Length	10ms	
Ior/Ioc	Variable	
Channel Estimation	Real	on the midamble
Fast fading model	Jakes spectrum	
Channel coding	Turbo Decoder and Rate Matching as Specified in Release-99 Specification	see AMCS Table, see [2]
Tail bits	6 per RSC encoder	
Max no. of iterations for Turbo Coder	4	
Input to Turbo Decoder	Soft	
Hybrid ARQ	No	
Information Bit Rates (Kbps)	As defined	see AMCS Table
Number of Multicodes Simulated	As defined	see AMCS Table
TFCI model	Random symbols, ignored in the receiver but it is assumed that the receiver gets error free reception of TFCI information	
Reciever	Joint Detection (ZF-BLE)	
Oversampling	No	
Chiprate	3.84 Mcps	
Framestructure	15 TS per 10ms	see AMCS Table
SF	16	
Burstform No.	2	
Modulation Scheme	As defined	see AMCS Table
Other L1 Parameters	As Specified in Release-99 Specification	

Table 1: Link Level simulation assumptions

Table 2 presents the simulated AMCS levels with their analytical derived data rate.

MCS	Modulation	Coderate	13 Time slots 14 Codes (Mbps)
7	64 QAM	3/4	11,3
6	16 QAM	3/4	7,53
5	16 QAM	1/2	5,02
4	8 PSK	3/4	5,64
3	QPSK	3/4	3,76
2	QPSK	1/2	2,51
1	QPSK	1/4	1,26

Table 2: Simulated AMCS level

3 Simulation Results

In Figure 1 and Figure 2 the FER vs. Eb/No of seven MCS are shown for the AWGN and Indoor_a channel.

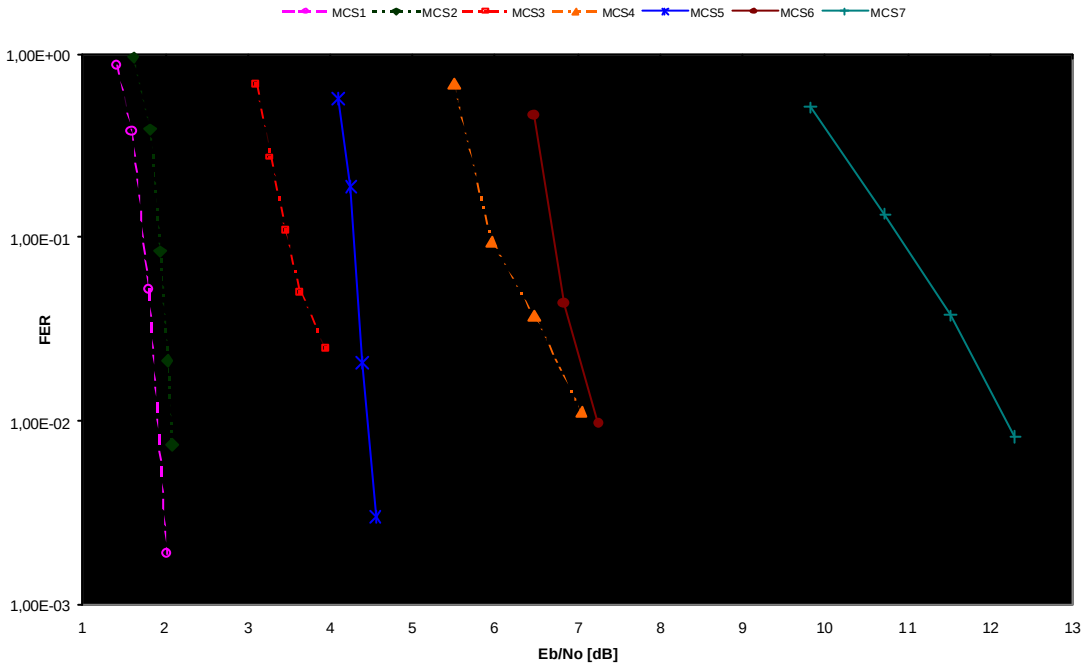

Figure 1: FER, AWGN channel

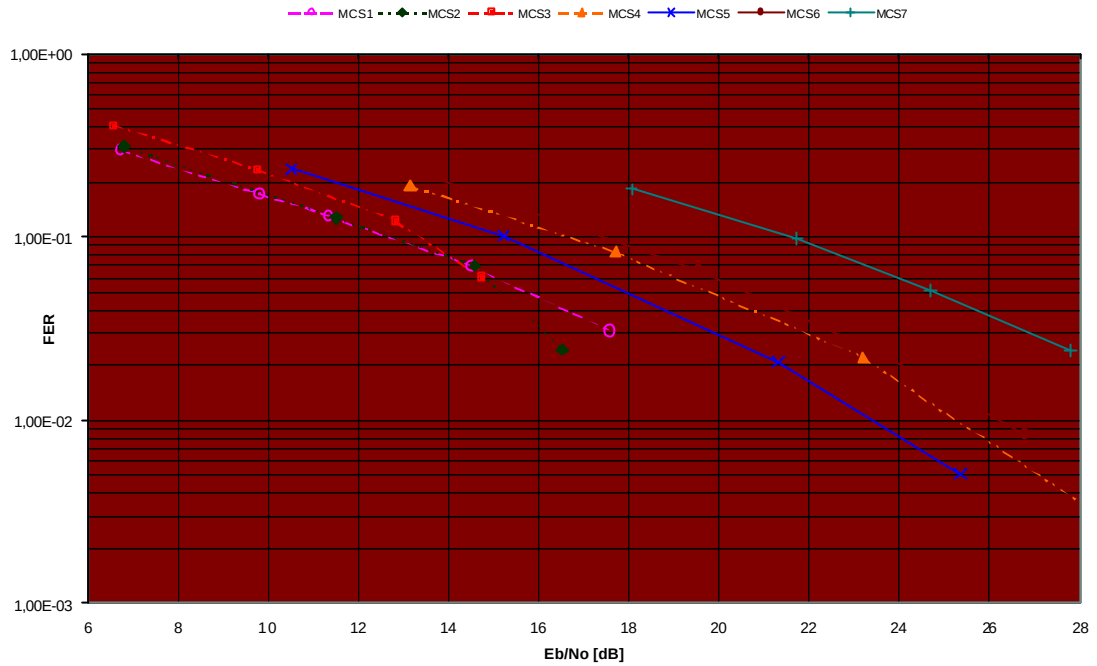

Figure 2: FER, Indoor_a channel

4 Conclusion

It is shown that higher order modulation is applicable for the TDD mode. The presented link level performance results are comparable with the performance results for FDD shown in [3]. However, a direct numerical comparison is not possible due to some differences in the simulation assumptions. The TDD simulations are using real channel estimation on the midamble in contrast to the FDD simulations presented in [3], which are based on ideal channel estimation. Furthermore the Indoor_a model was selected instead of the simple one ray model used in [3].

As a result of the performance similarities between TDD and FDD an alignment of the AMC Schemes for both modes seems to be possible. However the interaction between AMC and H-ARQ is not yet considered.

It is recommended that the presented simulation assumptions and simulation results are reflected in the technical report TR25.848 [1].

5 References

[1] 3rd Generation Partnership Project (3GPP); Technical Specification Group Radio Access Network; Physical Layer Aspects of UTRA High Speed Downlink Packet Access (Release 2000); 3G TR25.848 V0.3.1 (2000-05)

[2] 3rd Generation Partnership Project (3GPP); Technical Specification Group Radio Access Network; Multiplexing and channel coding (TDD) (Release 1999); 3G TR25.222 V3.5.0 (2000-12)

[3] Motorola; TSG-RAN WG1#13; High Speed Downlink Packet Access; Tokyo, Japan, 22.-25.5.2000; Tdoc R1-00-0727