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Source: Siemens
Nokia

Text Proposals for TR25.848 and TR25.950

1 Introduction

At the RAN WG1#18 meeting document [1] was discussed which presents techniques for the TDD mode to support high speed packet access. It was agreed to include in TR25.848 an additional section with a description of the physical layer aspects related to TDD. The text proposal for TR25.950 is a reference to the previous mentioned TDD section in TR25.848.
This document presents text proposals for both Technical Reports.

2 Text Proposal for TR25.848

---------- Beginning of the test proposal for TR25.848 ----------

8 Physical Layer Aspects for TDD mode

This section describes the techniques behind the concept of HSDPA for the TDD mode.

8.1 Techniques to support HSDPA for TDD mode

In the previous chapters technologies were presented to improve the air interface utilisation. The principles of the described technologies are applicable for both, FDD and TDD, however the methods and details have only been considered for FDD. The following sections present the applicability of the proposed techniques for the TDD mode. TDD mode specific differences compared to FDD are highlighted.

8.1.1 Adaptive Modulation and Coding

Adaptive Modulation and Coding is a kind of link adaptation [see section 5.1]. MCS is changed depending on the channel conditions. A high data rate is achieved with high modulation-order and coding rate in good radio conditions. Following considerations show that AMC may be used to compensate long term channel variations.
In order to react correctly on the channel situation, averaging and long term observation of the channel is necessary. In addition H-ARQ may be the appropriate method to counteract fast channel variations. Finally changing of the MCS between HARQ retransmissions should be avoided. Possible benefits do not seem to justify the implementation effort.
In the following table peak data rates for different parameter settings (modulation, code rate, number of codes, and number of timeslots) for the TDD mode are calculated. The parameter settings are based on the FDD assumptions in section [13.1.7]. Simulation Parameters. Optimum parameter settings are for further study.

Chip Rate = 3.84 Mchip/s
Burst Type 2
Frame Length = 10ms
Spreading Factor = 16
Bandwidth = 5 MHz

Modulation	Coderate	1 Timeslot 1 Code (kbps)	1 Timeslot 12 Codes (Mbps)	12 Timeslots 12 Codes (Mbps)	13 Timeslots 14 Codes (Mbps)
64	¾	62,1	0,745	8,94	11,3
16	¾	41,4	0,497	5,96	7,53
16	½	27,6	0,331	3,97	5,02
8	¾	31	0,372	4,46	5,64
4	¾	20,7	0,248	2,97	3,76
4	½	13,8	0,166	1,99	2,51
4	¼	6,9	0,083	1	1,26

Table 1

8.1.2 Hybrid ARQ (H-ARQ)

H-ARQ is used to improve the system throughput due to the compensation of the short term variations. The TDD mode can support all H-ARQ protocols, as presented in [5.2].
For fast channel adaptation and to avoid unnecessary delays for the acknowledgements in the protocol, a fast back channel, which is terminated in Node B, is required. The fast back channel can be implemented with either very low bit rate transmitting Ack/Nack only, or with higher bit rate transmitting more detailed information (measurements, PDU sequence numbers,...).
The TDD Mode is a time slot based transmission system with a time slot granularity of 666µs. The flexible configuration of the time slots in TDD already supports a variable delay for acknowledgements and retransmissions to enable faster channel adaptation. Like with the FDD mode necessary processing time for TDD Node B and UE should be ensured as well when limitations for the parameterisation of the ARQ process are considered. The resulting UE memory requirements should be evaluated so that they are comparable with FDD mode. The same channel encoding/decoding solutions should be used as with UTRA FDD to facilitate dual mode terminal implementation in-line with Rel'99.

8.1.3 Fast Cell Selection (FCS)

FCS has been proposed with the FDD mode for HS-DSCH to be used in case of soft handover is applied with the associated DCH. With TDD mode FCS is not directly applicable, since with the TDD mode in Rel'99 UEs can send and receive from a single Node B only. Additionally UTRAN needs to control in TDD mode the transmission in time domain in terms of which slot(s) accommodate the UE transmission. Thus FCS implementation effort does not seem to reflect possible benefits.

8.1.4 MIMO

The use of Multiple Input Multiple Output (MIMO) techniques haven been proposed for FDD mode. As such these techniques are applicable for UTRA TDD as well, but there are issues that require TDD specific considerations for UTRA TDD. Especially the impact on the TDD UE receiver should be carefully considered.

---------- End of the test proposal for TR25.848 ----------

3 Text Proposal for TR25.950

---------- Beginning of the test proposal for TR25.950 ----------

5 Overview of Techniques considered to support UTRA High Speed Downlink Packet Access

The following chapter contains techniques considered to support UTRA HSDPA for FDD. TDD mode specific considerations and differences compared to FDD are described in TR25.848 section 8.

---------- End of the test proposal for TR25.950 ----------

4 References

[1] Siemens; TSG-RAN WG1#18; Techniques to Support HSDPA for TDD Mode; Boston, USA, 15.-18.01.2001; Tdoc R1-01-0018