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**Agenda Item:** AH24: High Speed Downlink Packet Access  
**Source:** Wiscom Technologies  
**Title:** Proposal of a HSDPA Frame Structure in TDD Mode  
**Document for:** Discussion

## 1 Introduction

In last RAN1 AH24 meeting, techniques to support HSDPA for TDD mode has been proposed and included in the HSDPA TR [1,2]. However, no detailed frame structure has been defined. Since the frame structure in TDD mode is very flexible [3], it is very important that a common frame structure can be used. Thus the simulation results from different parties can be easily compared. It is important for both link level simulation and system level simulation. This contribution proposes a simple HSDPA frame structure for TDD mode.

## 2 Frame Structure and Information Bit Rate

In 3GPP TDD mode [3], the radio frame has duration of 10 ms. One radio frame consists of 15 time slots, each allocated to either the uplink or the downlink. With such flexibility, more time slots can be allocated for downlink for asymmetric traffic in HSDPA. Also, in any configuration at least one time slot has to be allocated for the downlink and at least one time slot has to be allocated for the uplink.

For higher data throughput, burst type 2 is assumed in HSDPA TDD mode. Considering total 12 time slots in a radio frame used for HSDPA, 12 time slots can form a single HSDPA frame. But it will prevent the fast adaptive MCS selection. Thus we propose a 4-time-slot HSDPA frame with a structure shown in Figure 1. The HSDPA frame duration is 2.67ms. The uplink slots between HSDPA frames can be used for channel quality measurement, ARQ feedback from UE and any other uplink. Such frame structure allows fast adaptive MCS selection with reasonable overhead. It is comparable to the commonly used 5-time-slot HSDPA frame in FDD mode. Table 1 shows the information bit per frame and the information data rate for different MCS schemes.

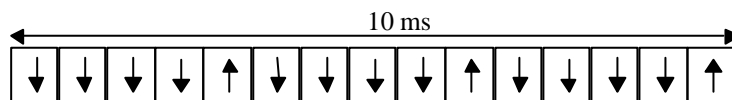


Figure 1. HSDPA frame configuration in TDD mode.

Table 1. Information bit rate for HSDPA frame length of 2.67 msec

Chip Rate=3.84 Mcps, SF=16, Frame length=2.67ms		12 Codes		1 Code	
Modulation	Code Rate	Info Rate (Mbps)	Info bits/frame	Info Rate (kbps)	Info bits/frame
64	3/4	8.9424	29808	745.2	2484
16	3/4	5.9616	19872	496.8	1656
16	1/2	3.9744	13248	331.2	1104
8	3/4	4.4712	14904	372.6	1242
4	3/4	2.9808	9936	248.4	828
4	1/2	1.9872	6624	165.6	552
4	1/4	0.9936	3312	82.8	276

### **3 Conclusion**

We proposed a frame structure of HSDPA in TDD mode. It can be used as a common simulation assumption for easy comparison of link level and system level simulation results from different parties.

### **4 References**

- [1] 3GPP TR V0.5.0 (2000-05), Physical Layer Aspects of UTRA High Speed Downlink Packet Access, 3GPP Release 2000, TSG-RAN Working Group1 meeting#18, TSGR1#18, R1-01-0186, Boston, Massachusetts, USA, 15th-18th Jan. 2001.
- [2] TSG RAN R1-01-0018, Siemens, "Techniques to Support HSDPA for TDD Mode", TSGR1#18, Boston, Massachusetts, USA, 15th-18th Jan. 2001.
- [3] 3GPP TS 25.221 v3.5.0, "Transport channels and physical channels (TDD)", Dec., 2000.
- [4] TSG RAN R1-01-0251, Wiscom Technologies, "Link Level Simulation Results of HSDPA in TDD Mode", TSGR1#19, Las Vegas, U.S.A. February 27- March 2, 2001.