

TSG-RAN Working Group 2 (L2/L3) meeting #6
France, August 15~20th, 1999

Agenda Item:**Source: CWTS WG2****Title: Some Influences on MAC Layer on Account of
Four Key Features of TD-SCDMA****Document for: Consideration****1. Introduction**

The TD-SCDMA RTT, which was developed in China, has four key features (says the lower chip rate, uplink synchronization, smart antenna and baton handover) compared with the UTRA-TDD. Due to the high synergy potential of TD-SCDMA and UTRA-TDD, the harmonization of both RTTs was initiated at the beginning of this year. At the three harmonization meetings in Beijing, the participating companies (ARIB, CATT, DoCoMo, Ericsson, Nokia, Panasonic, RITT and Siemens) agreed on introducing and supporting the main key features of TD-SCDMA into UTRA-TDD, based on contribution of CATT (RP99248).

2. Influence on MAC Layer**2.1 Smart Antenna**

When smart antenna adopted, the signal transmission power on BCH, PCH and PSCH will reduced compared with the omnidirectional transmission or sectorial pattern (without beamforming). Hence, the open loop power control mechanism located in MAC layer should be considered under this situation.

When smart antenna adopted, the signal transmits on DSCH with either beamforming or omnidirectional pattern, because the two kinds of transmission patterns have different transmission power, the two patterns must be distinguished on MAC Layer

Due to adopting smart antenna, it leads to the higher Rx sensitivity and Tx EIRP of Node B, to some degree decreasing value of threshold parameter can also satisfy QoS.

2.2 Uplink Synchronization

It should be noted that the location of TDD switching point may be varied depending on the uplink and downlink transmission data rate, and the information for scheduling time slot

is broadcasted on BCH. In addition, relative location of downlink SCH and BCH/PCH/FACH, and the relative location of uplink SCH and RACH are fixed. As described above, because the uplink synchronization establishment is often associated with UE's access procedure, and the synchronization maintenance is often associated with the dedicated communication procedure between UE and network, the following influence on MAC protocol specification imposed by introducing the uplink synchronization should be considered:

- a. The uplink SCH transport channel may be introduced and mapped onto PSCH physical channel,
- b. In order to enable coordinated scheduling between downlink SCH and BCH/PCH/FACH, as well as between uplink SCH and RACH, the corresponding MAC scheduling functions should be allocated in the same node, i.e. co-location of MAC entities such as MAC-sy, MAC-c, MAC-b and MAC-p,
- c. The use of uplink synchronization within ODMA mode, e.g. between Root ODMA relay node and ODMA relay node, between two DMA relay node, between DMA relay node and Gateway ODMA relay node, should be also capable

2.3 Low Chip Rate

During the WG1#6 meeting held in Korpilampi (Finland, July 13-16, 1999), a low chip rate operation mode in UTRA-TDD (R1-99939) was accepted.

Because of the low chip rate, the length of the L1 PDU might be shorter at the same spreading factor. If the length of the MAC SDU is the same considering the minor modification, the segment and assemblage(S/A), of MAC SDU is a little bit more complex. The corresponding S/A can be realized either in L1 or in MAC. If it realized in L2, some modification should be made to meet the S/A requirement. If the S/A fulfill in L1, the protective mechanism of the integrity of the MAC SDU should be enhanced.

2.4 Baton Handover

In the TD-SCDMA system, by using smart antenna the network can know all the UTs accurate position in the cell (How to get the accurate position is for further description). The baton handover costs very shorter handover time period for both inside TD-SCDMA system and between difference systems than that of UTRA-TDD system; In the TD-SCDMA system the parameters that UTs measure are not only the received signal power level and also their TX time offset and so on. The measure information which is used to handover procedure transmitted from L1 to L3 or network via MAC sublayer or the control information for handover transmitted from upper layer or network to L1 via MAC sublayer maybe influence the MAC sublayer, such as obstructing the transport channels, losing the synchronous information transmitted on the SCH channel (the concrete influence on MAC is FFS).

3. Conclusion

Although the low chip rate will result in some difference between normal operation mode and low chip rate mode of UTRA-TDD in the physical layer, the architecture and functions are similar enough to fuse the two modes into one MAC specification. Due to the above mentioned consideration and the compatibility or interworking requirement, the effect of the physical layer difference should be checked out and the modification of the UTRA MAC layer specification should be left as minor as possible.

Reference

- [1] 3GPP WG1 TSGR1#5(99)622 "Low Chiprate in UTRA-TDD"
- [2] The ETSI UMTS Terrestrial Radio Access (UTRA) ITU-R RTT Candidate Submission
- [3] 3GPP TS 25.221 v1.1.0 "Physical channel and mapping of the transport channels onto physical channel (TDD)"
- [4] TD-SCDMA Radio Transmission Technology For IMT-2000 Candidate Submission
- [5] 3GPP WG1 TSGR1#6(99)939 " Text proposal for low chiprate"