TSG-RAN Working Group 1 Meeting #14 ***TSGR1#14(00)0961***
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Title: LS to WG2, WG3, and WG4: Progress Report of the WI 'Low Chip Rate TDD, physical layer' and request for support

Source: TSG-RAN WG1

To: TSG-RAN WG2, TSG-RAN WG3, TSG-RAN WG4

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TSG RAN WG1 as the leading working group has begun the work for the release 2000 work items 'Low Chip Rate TDD, physical layer' and 'Low chip rate TDD', according to RP-000191 and RP-000311. This LS intends to inform the other groups about the current situation in TSG RAN WG1 which may have impacts to the specifications in other RAN WGs.

TSG RAN WG1 inends to refer to the low chip rate TDD in WG1 specifications as 1.28Mcps TDD and also were separation to the existing UTRA TDD is needed, that will be denoted as 3.84Mcps TDD. The intention is that for release 2000 the term UTRA TDD would cover both TDD chip rates

In order to summarize the overall concept of the physical layer of the Low Chip Rate TDD, TSG RAN WG1 has set up the technical report TR25.928, which was noted in RAN#8 meeting as version 1.0.0. This technical report describes the 1.28 Mcps functionality as it is currently considered in WG1 and it highlights the commonalties and differences between the two TDD options. There is updated version of the TR25.928 to be made available in Tdoc R1-00-0960, which contains additional information regarding GSM measurement. TSG RAN WG1 will proceed now for the drafting of the CRs for the WG1 specifications. TSG RAN WG1 intends to maintain "working CRs" and will inform the other WGs when such a CRs are available (first version of those).

Based on this technical report, TSG RAN WG1 has collected the items, where support is possibly needed by TSG RAN WG2, WG3, and WG4, respectively. These items are given in the attached table.

TSG RAN WG1 encourages other WGs to take the necessary action for timely completion of the feature.

Support of :	**Difference to high chiprate TDD option**	**Further details**	**Please refer to the following section in TR25.928 version 1.0.0**
Support of different radio frame structure	1. Different frame structure to high chiprate TDD option 2. Different basic midamble sequences, maximum channel impulse response is scalable (W=8, 9, 12, 16, 21, 32, 64), depending on number of users and environment, including the association between midambles and channelisation codes 3. Use of only one burst type for physical channels except special bursts in DwPTS/UpPTS 4. Support of different timeslot formats due to different number of bits and L1 control signals and midamble length 5. Support of use of 8PSK for special timeslots/all timeslots per cell 6. Beacon function is provided by DwPTS and P-CCPCH	• Segmentation of the radio frame into 2 subframes • Each subframe consists of 7 traffic slots (864 chips length) and two special timeslots for synchronisation and initial access which are separated by an extra guard period 5. Including TFCI, SS, and TPC coding (8PSK)	7.2.1 Frame structure 8.1.7 Sub-frame segmentation 7.2.2.3Training sequences for spread bursts 7.2.2.2 Burst Types 7.2.2.2.3Timeslot formats 7.2.4 Beacon function of physical channels 9.1.2.2 8PSK modulation 8.2.1 Coding of transport format combination indicator (TFCI) 8.2.2 Coding of SS 8.2.3 Coding of Transmit Power Control (TPC)
Modified Power Control	1. Closed Loop PC in **uplink** and downlink 2. Open loop PC on the SYNC1 Code while initial access 3. P-CCPCH and DwPTS power can be used as a beacon 4. number of TPC symbols can take 3 values	1. TPC bits also in downlink 3. transmit power level reported on BCH 4. none, one symbol, 16/SF TPC symbols per radio frame, number of TPC symbols is always the same like number of SS symbols	10.1 Transmitter Power Control
Modified RACH procedure	1. Random Access carried out in 2 steps	1. Send SYNC1, Receive FPACH 2. Send power controlled, timing advanced PRACH in traffic timeslot (code associated to received FPACH. There is another association between the PRACH and the FACH. These associations are broadcast by the BCH.)	10.6 Random Access Procedure 7.2.3.3 The physical random access channel (PRACH) 7.2.3.3.2 PRACH Burst Types 7.2.3.3.3 PRACH Training sequences

		• Due to the two-step approach a collision most likely happens on the UpPTS. The RACH RUs are virtually collision free. • There are no dedicated RACH time slots, the RACH resources share the time slot with dedicated resources, a two step procedure ensures that the actual RACH.	
Cell search operation	1. One synchronisation channel only (DwPTS) and different frame duration	• **Step 1:** Search for DwPTS • **Step 2:** Scrambling- and basic midamble code identification • **Step 3:** searches for the head of multi-frame indicated • **Step 4:** Read the BCH	9.3 Synchronisation codes 10.3 Synchronisation and Cell Search Procedures 10.3.1 Cell Search
Uplink synchronisation	1. Special Layer1-SS symbols 2. Number of used SS symbols can take 3 values 3. SS-symbols are transmitted once per subframe	1. SS symbols command an incremental change of timing 2. none, one symbol, 16/SF SS symbols per radio frame, number of SS symbols is always the same like number of TPC symbols 3. Frequency and step size are configured by UTRAN (“k” and “M” parameters)	10.2.1 With UL Synchronization 10.2.1.1 The establishment of uplink synchronization 10.2.1.1.1 Preparation of uplink synchronization (downlink synchronization) 10.2.1.1.2 Establishment uplink synchronization
Beamforming	Beamforming applies to the dedicated channels and may also be used for some common channels like FPACH		7.2.2.4 Beamforming and Transmit Diversity
Physical channels	P-CCPCH and S-CCPCH require two channelisation codes; FPACH is a new physical channel which always uses one channelisation code at SF 16.		7.2.3.1 Primary common control physical channel (P-CCPCH) 13 Examples of service mapping B.1 BCH
Mapping of transport channels to physical channels	1. PCH; PICH and FACH can be time multiplexed with the BCH on the P-CCPCH. PCH, PICH and FACH can be time multiplexed on the S-CCPCH. Therefore these transport channels are using two channelisation codes of SF 16.	The PICH carries a different number of PIs than in the high chip rate option, because of the different burst structure.	7.3 Mapping of transport channels to physical channels 7.3.2 Common Transport Channels 7.2.3.7 The Page Indicator Channel (PICH)

Measurements	Ranges and accuracy have to be adapted for the low chip rate option.		11 Physical layer measurements
Service mapping	Due to the different payload size and subframe segmentation the service mapping for the low chip rate differs from that of the high chip rate option.		13 Examples of service mapping

* The references give the respective chapters in the technical report on the physical layer of the low chiprate option (RP-000280).