

Nomor 3GPP Newsletter – October 2007

News in 3GPP RAN standardization

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Introduction

This month's newsletter provides you with some general background information from the latest RAN plenary meeting.

A number of UMTS Release 7 CRs been approved. The Release 7 specification which is under version control should be more stable by now.

3GPP Long Term Evolution progresses quickly and first RAN1 specifications have been approved and are now under version control. Nevertheless specification work already seems to be behind the original schedule. It can be expected that first RAN2/RAN3 specifications will be approved by the end of this year.

There are a large number of work and study items that have been approved for UMTS Release 8. A large portion of the work considers further improvements of the HSPA uplink which was not covered within Release 7.

Work on these new Release 8 items already started in the Working Groups meetings in Shanghai 8th to 12th of October 2007.

UMTS HSPA Release 7

RAN Plenary endorsed the proposal that tests should prioritize the following Release 7 work items:

- *Continuous connectivity for packet data users*

- *Improved L2 support for high data rates*
- *64QAM for HSDPA (FDD)*
- *MIMO for FDD*

Test specifications of these items as defined by RAN5 should be ready around March 2008.

Other items which will be treated with lower priority are the following (possible reasons for lower priority are being given):

- *Enhanced CELL_FACH state in FDD.* Specification on this was, compared to the other work items, completed quite late (still not 100% completed). Furthermore the feature will require a large number of test cases which still have to be defined.
- *16QAM for HSUPA (FDD).* It seems that the gain in performance by 16QAM is limited, since such good SINR values are limited to scenarios with very low intercell interference, e.g. isolated indoor cell.
- *Small Technical Enhancements and Improvements for Rel-7 Conformance Testing* contains only minor enhancements.

Test specifications of these items as defined by RAN5 should be ready within Q2 of 2008. In general the priority on testing was independent of the optional/mandatory Rel-7 discussion.

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RAN1 started working on the combined transmission of MIMO and 64QAM that would provide data rates up to 42 Mbps. In our point of view the transmission will be straight forward and also requires few changes of the actual specification (mainly DL signaling and CQI tables), but feasible receivers seem to be quite difficult to implement (Prof. Kaiser MIMO GmbH commented at the LTE Forum in September that practical implementations for 64QAM MIMO receiver are currently not feasible. They would correspond to a 1024QAM single stream reception.). Of course, for marketing peak data rates are important as we know from HSDPA Release 5 already. The required CRs are already being reviewed within the working groups. Completion date is November 2007 for RAN1/2/3 and March 2008 for RAN WG4.

Discussion on the mandatory or optional support of the Release 7 feature Enhanced Layer 2 took place at RAN plenary. It was decided to add a UE capability in RRC Connection Request for the support of Improved L2. Improved L2 is thus an optional feature for Rel-7 UEs supporting HSDPA. Nevertheless it is mandatory for HSDPA categories 13 to 18 (HOM and MIMO).

New RAN WG chairmen were elected. There are no changes in RAN1, RAN3 and RAN5. RAN2 chairmanship from Denis (Nortel) is overtaken by Gert-Jan (Samsung). RAN4 chairmanship from Howard (Motorola) is overtaken by Nakamura-san (DoCoMo).

There was discussion on the time, when completion of a work item can be reported. RAN4 work on RF and performance requirements are partly considered and partly not. RAN plenary decided that RAN WG4 will report to the next TSG RAN, identifying the splitting point between core requirements and performance requirements. The core specifications must be completed before a work item can be closed.

Other study items

MBSFN Downlink Optimized Broadcast

3.84Mcps TDD is still controversially discussed by the proponents IP Wireless (TDD variant for MBSFN) and Ericsson (FDD variant for MBSFN). Everyone is objecting to the CRs of the other proponent. A vote will take place during the Cancun meeting end of November.

TR 25.906 version 2.0.0 "**Dynamically reconfiguring a FDD UE to reduce power consumption when desired quality of service is met**" was approved and will be put under version control. Generally, it has been shown to be feasible for a UE receiving MTCH to dynamically reconfigure from dual receiver to single receiver, based on a signaled quality target. Nevertheless, HSDPA reception, dedicated channel reception and E-DCH downlink feedback channel reception are less suitable for dynamic receiver reconfiguration, since there would be some system level impacts.

Completed Work and Study Items

Work Items completed

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- MIMO - RF Radio Transmission/Reception, System Performance Requirements and Conformance Testing.
- Conformance Test Aspects – FDD Enhanced Uplink (Testing) (Rel-6).
- Conformance Test Aspects – IMS Call Control Rel-6 enhancements (Rel-6).
- Conformance Test Aspects – MBMS (Rel-6).
- Conformance Test Aspects – Minimum UE performance requirement for downlink physical channels in support of E-DCH operation based on type 1 enhanced receiver (Rx-Diversity).

Study Items completed at this meeting:

- Scope of future FDD HSPA Evolution
- Dynamically reconfiguring a FDD UE receiver to reduce power consumption when desired Quality of Service is met

3GPP Long Term Evolution

The 3GPP Partnership Agreement was modified. The “Standardization Organizations have agreed to work collaboratively for the production of **evolved** Third Generation **and beyond** Mobile System specifications“. Thus 3GPP officially has the mandate to work on beyond 3G.

Updated official LTE completion dates are:

- RAN1: RAN#37 (Sep 2007)
- RAN2, RAN3: RAN#38 (Dec 2007)

- RAN4: RAN#39 (Mar 2008)
- RAN5: RAN#41 (Sep 2008)

Current status and target for the LTE specification are now:

- RAN1: 80%. Target in December should be 95% overall
- RAN2: 50%. Target in December should be 90% overall (80% for RRC)
- RAN3: 51%. Target in December should be 80% for all RAN3 specs
- RAN4: 2%. Target in December should be 80% except BS conformance testing
- RAN5: 2%

The set of PHY specifications (TS 36.201, TS 36.211, TS 36.212, TS 36.213, TS 36.214) have been approved as version 8.0.0 and will be put under version control from now onwards.

The LTE work item has been progressing specification work on two different Physical Layer Frame Structures (FS) for TDD. A large number of companies are suggesting removing Frame Structure type I for TDD to simplify the system. T-Mobile was rejecting this proposal. RAN WG1 is tasked to re-evaluate the need for two frame structures.

In RAN WG4 there has been a lot of discussion on the channel bandwidths below 5MHz. Due to different proposals in different regions, the result was an agreement to have 1.4MHz, 1.6MHz, 3.0MHz and 3.2MHz. RAN WG4 is

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tasked to re-evaluate the need for the 1.6MHz and 3.2MHz channel bandwidth options.

Discussion on the requirements of location based services for LTE. So far only the regulatory requirements must be met e.g. FCC. SA2 will work on location based service architecture. Impact on E-UTRAN is unclear.

Requirements on mobility interworking between 3GPP and Broadband Wireless Access and between 3GPP and WiMAX were included in the SA1 and SA2 specification. That means the Evolved Packet Core (EPC) will support such mobility.

ENodeB measurements are still under discussion. RAN3 decided that the definition shall be use case driven. This basically means that a specific purpose or need of a certain measurement must be found that cannot be provided otherwise. The WGs will communicate with each other using a predefined template. Further progress on this is uncertain; the need of a measurement can always be questioned, particularly since all radio functions are terminated in eNodeB.

Home Node B/eNodeB

There are many open items across different WGs. Completion level is 20%. The TSG RAN chairman will stress in his report to TSG SA that there is a need of timely answers of the questions on architecture assumptions/impacts asked in the LS to the SA Working groups.

Improved network controlled mobility between LTE and 3GPP2/mobile WiMAX radio technologies

High level requirements for mobility between E-UTRAN and WiMAX networks, WiMAX system information transmission in E-UTRAN, Measurements of WiMAX from E-UTRAN, criteria and measurement for cell re-selection as well as WiMAX network architecture and interface were agreed by the groups. Similarly Handover procedure between E-UTRAN and 3GPP2 networks, cdma2000 information on LTE broadcast channel, 3GPP2 1xRTT measurement reports and control and 3GPP2 HRPD measurement reports and control were proposed respectively and agreed.

New work and study items for Release 8

Improved L2 for uplink

The Release 7 Work Item “Improved L2 support for high data rates” achieved the targeted results of having link layer support for high data rates in the downlink, a single DL L2 evolution for all performance enhancements and a smooth transition between old and new DL protocol formats. Flexible RLC PDU sizes and MAC segmentation in downlink were introduced in order to reach high data rates and reduce protocol overhead and padding.

The link layer enhancements in the uplink were not covered by Release 7 enhancements.

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The objective of this work item is to provide a solution for link layer protocols in the uplink for Release 8, which

- introduces support for flexible RLC PDU sizes
- introduces support for MAC segmentation
- allows smooth transition between old and new protocol formats
- supports seamless state transitions between CELL_DCH, CELL_FACH, CELL_PCH and URA_PCH (dependent on potential enhancements to the CELL_FACH UL transmission)

The work item was approved for Rel8. Leading company is Ericsson. Leading WG is RAN2. Completion date is March 2008.

Enhanced UL for CELL_FACH State FDD

Services like active VoIP clients, PoC, Push email and VPN connections are expected to be used via UTRAN, which introduces relatively frequent but small packets to be transmitted between UE and server. Reduced downlink signalling delays and higher downlink bit rate in CELL_FACH, CELL_PCH and CELL_URA states were achieved by introducing downlink optimisations (Enhanced Cell_FACH of Rel.7) of the radio together with Node B based scheduling using HSPA. However the benefits of this enhancement are limited by the poor uplink counterpart.

The main issue is to improve the non Cell_DCH states in the uplink, namely increase the

bandwidth and reduce the delay of the random access channel. The objectives of this work item are to provide necessary modifications to random access in the 3GPP specifications by:

- Reducing the latency of user and control plane in the IDLE mode, CELL_FACH, Cell_PCH and URA_PCH state.
- Increasing the available peak rate for UEs in CELL_FACH state by direct HSUPA access in CELL_FACH state.
- Reducing state transition delay from CELL_FACH, CELL_PCH and URA_PCH state to CELL_DCH state.

The work item was approved for Rel8. Leading company is Nokia. Leading WG is RAN2. Completion date is March 2008.

CS voice service over HSPA

During the Release 7 work, several improvements for running voice service over HSPA were introduced to boost capacity and reduce battery consumption of the devices e.g. CPC, DRX/DTX, HS-SCCH less reception. The use of DCH in a cell could be further minimised and thus more power and code resources would be available for HSDPA use.

All these improvements are not available for CS domain speech running on DCH. Discussion is ongoing if voice calls of the CS domain should be supported by HSPA (incl. handover between DPCH and HS-DSCH/E-DCH). Qualcomm, Huawei and Nokia Siemens Network as well as quite some operators want to have

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this within Rel7. Discussion on the allocation to Release 7 or 8 will go on in SA.

The objective of this work item is to provide a mechanism to map CS services over HSPA channels instead of traditional DCH. The solution should cover the following areas:

- RRC signalling required to map CS service to HSPA
- Multiplexing of RAB sub-flows
- Aim to avoid specification impact to MAC layer
- Ensuring interoperability with protocol layers above the RAN

The work item was approved in principle for Rel8. Leading company is NSN. Leading WG is RAN2. Completion date is March 2008.

Performance requirements for 15 code reception with 16QAM/QPSK (FDD)

Since Release 5 there have been discussions on whether HSDPA demodulation requirements for 15 code reception with 16QAM and QPSK are needed. However, on completing the 64QAM and MIMO work item in Release 7, there is now a gap in demodulation performance requirements between QPSK with 10 codes, 16QAM with 10 codes, and 64QAM with 15 codes. Adding performance requirements for QPSK and 16QAM HSDPA reception with 15 codes will allow operators to guarantee that they can maximise the spectrum efficiency performance in their networks by maximising throughputs particularly in the case when the UE is not in conditions suitable for

64QAM reception. The aim of this work item is to introduce performance requirements for QPSK and 16QAM with 15 codes.

HSDPA UE categories 9, 10 and 13 to 16 based on the same reference receiver assumptions as used to derive the enhanced performance requirements Type 2 and Type 3 in Release 6 and Release 7 (i.e. LMMSE chip level equaliser with one and two antenna ports). No specific UE implementation is mandated by these enhanced HSDPA requirements.

The work item was approved for Rel8. Leading company is Vodafone. Leading WG is RAN4. Completion date is Mai 2008.

LTE Repeater

The current LTE work item does not include development of standards for repeaters. In UTRA, FDD repeaters have proven to be useful for coverage adjustments and interference mitigation. These applications are expected to remain also in E-UTRA. However, E-UTRA may pose new or different requirements on the repeaters. The objective of this work item is to develop a core specification and a conformance specification for LTE FDD repeaters.

The work item was approved for Rel8. Leading company are Powerwave and Andrew Wireless. Leading WG is RAN4. Completion date is September 2008.

Synchronised E-DCH for UTRA FDD

The principle of synchronized E-DCH is to improve the orthogonality of the uplink signals

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by sharing a common scrambling code and assigning different channelisation codes to the UEs similarly to the downlink. In order to achieve the improved orthogonality at the receiving side (Node B), the transmission time on the UE side needs to be adjusted so that the arrival times at the Node B are sufficiently synchronised.

The objective of this study item is to provide inside whether HSUPA uplink resource allocation allows for means of better synchronization in the uplink compared to the study in 25.854, with the focus on

- Resulting performance from BTS based dynamic uplink code allocation
- Resulting L1/MAC signalling needs to enable BTS based code allocation and uplink synchronisation on top of Release 7 specification
- This study is not expected to repeat the basic USTS analysis already existing in 25.854 with respect e.g. to synchronisation sensitivity.

The study item was approved for Rel8. Leading company is Nokia. Leading WG is RAN1. Completion date is March 2008.

Enhanced UE DRX for FDD

The Release 7 Work Item “Continuous Connectivity for Packet Data Users” (or “Continuous Packet Connectivity” in short), achieved the targeted results for enhancing the efficiency of the radio links when not actively transmitting data in either direction. Nevertheless the support for frequent transmission

of small packets due to IP applications keeping their connection alive by periodically sending a message to the network was not addressed.

The objective of this work item is to provide enhanced power saving mechanisms for the UEs and to reduce the state transition related signalling load, by

- introducing support for a discontinuous reception scheme for CELL_FACH state
- introducing support for an efficient state transition from CELL_FACH to CELL/URA_PCH state
- introducing support for an enhanced DRX method to CELL_DCH state in addition to the one provided in Release 7

The work item was approved for Rel8. Leading company is Nokia. Leading WG is RAN2. Completion date is September 2008

SRNS Relocation Enhancement

The “collapsed” architecture that merged RNC functionality with the NodeB will result in more frequent SRNS Relocation than current architecture. Thus there is a need for an improvement of the mobility in the aforementioned architectural variant, especially for reducing delay and signalling and processing load. Some essential functions for this architectural variant were agreed already to be introduced for Release 7 during the study item phase. The objective of this working item is to improve the SRNS Relocation procedure such that delay and signalling and processing load are reduced.

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The work item was approved for Rel8. Leading company is Nokia. Leading WG is RAN3. Completion date is March 2008.

Enhancements for FDD HSPA Evolution

“Scope of future FDD HSPA Evolution” mainly focussed on an architectural variant, which is compliant with the current Rel-7 architecture, and resulted in a “collapsed” architecture that merged RNC functionality with the NodeB. Some further work can be done to achieve even more improvement for the architectural variant. More specifically, the support for MBMS as well as possible further enhancements in the area of RRM should be focused on.

The objective of this working item is to improve solutions for an architectural variant where the RNC functionality is merged with the NodeB. In order to achieve this, work shall be carried out in the following areas:

- Further RRM optimization, preceded by gain- and complexity analysis for those topics, for which this was not already performed during the SI “Scope of future FDD HSPA Evolution”
- Solutions for improved support of MBMS

The work item was approved for Rel8. Leading company is Nokia. Leading WG is RAN3. Completion date is March 2008.

Summary of all New Study and Work Items for Release 8

Work Items:

- Improved L2 for uplink (WID to be reviewed by WG)
- UE conformance test aspect - 1.28 Mcps TDD Enhanced Uplink
- CS voice service over HSPA
- HSDPA demodulation requirements for 16QAM and QPSK with 15-codes
- WI Conformance Test Aspects - Multimedia Telephony Services for IMS (MTSI)
- WI LTE FDD repeaters. WID in RP-070749
- WI Enhanced Uplink for CELL_FACH State in FDD
- WI Enhanced UE DRX
- SRNS Relocation Enhancement
- Enhancement for HSPA Architecture (WID to be reviewed by WG)

Study Items:

- SI Scope of future HSPA Evolution for 1.28Mcps TDD. SID in RP-070748
- SI Synchronised E-DCH. SID in RP-070678

A TSG-RAN workshop on IMT-Advanced immediately prior to RAN #38 is recommended as an informational and educational workshop to inform 3GPP of relevant information related to IMT-Advanced in the ITU-R. In addition workshop should prepare 3GPP, and especially TSG-RAN, to receive ITU-R circular letter. Additional information from ITU-R experts will be presented at the work shop. Attendance is open to all 3GPP members.

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