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Latest Status Update of LTE

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Introduction

This will be the last complete status report of LTE. The Physical Layer work item is already closed and modifications are introduced by separate change requests (CRs) to the specifications. In May it can be assumed that the radio protocol will be officially closed (except RRC). Al the open items and discussions are already on minor details not worth to be reported on regular basis.

Physical Layer

LTE was discussed:

- for 5 days at the RAN1#51bis meeting in Seville in January, and
- for 5 days at the RAN1#52 meeting in Sorrento in February.

Summary of discussions and agreements are described per topic below:

- 488 contributions for RAN1#51bis, and 417 contributions for RAN1#52 were submitted.
- Overall Status: All the speficification are almost finalized. Only minor open issues are still remained.
- Physical Layer CRs to 36.211, 36.212, 36.213, 36.214 were endorsed to be approved
- The details of Reference Symbols and control channel were agreed.
- Details of channel coding were agreed
- Details of power control, DL/UL-SCH procedure were agreed
- Measurement on CDMA2000 were agreed
- Details of UE category, physical UE capability were agreed

Radio Protocol Issues

LTE was discussed:

- for 2 days at the RAN2 RRC ad hoc meeting in Vienna in December,
- for 5 days at the RAN2#60bis meeting in Seville in January, and
- for 5 days at the RAN2#61 meeting in Sorrento in February.

Summary of discussions:

- Stage 2 (TS 36.300)

  Stage 2 was kept up to date with the Stage 3 work;

  Work progressed on RRM information at handover, ANR and eNB measurements;

  A CR for the Stage 2 specification (TS 36.300) is presented to this RAN plenary meeting for approval

- MAC Layer (TS 36.321)

  Work progressed on e.g., MAC headers, HARQ operation, DRX control, UL logical channel prioritization, RACH backoff control, UL scheduling information reporting, and semi-persistent resource allocation;

- RLC (TS 36.322)

  Work progressed on e.g., RLC SDU discard, RLC re-establishment, polling/ status reporting, RLC-UM and AM clean up, and error handling;

- PDCP (TS 36.323)

Mainly small corrections;

- UE capabilities (TS 36.306)

  UE capabilities were kept up to date as per RAN1 agreements;

  It was agreed that UE categories 1-5 shall support 8 DRB's and 9 or 10 RLC AM entities;

  CDMA2000 related capabilities were introduced;

- RRC (TS 36.331)

  Work progressed on e.g., system information transmission procedure, measurement configuration, connection establishment/ release procedures, and handover failure recovery;

  Methodology for RRC PDU/ IE documentation was agreed and initial ASN.1 covering the current specification was created;

- Idle mode procedures (TS 36.304)

  Work progressed on e.g., priority-based inter-frequency/RAT reselection control, CSG reselection, and paging;

- Services provided by the physical layer (TS 36.302)

  No progress was made since RAN Plenary #38.

S1/X2 Interface Issues

LTE was discussed

- for 5 days at the RAN3#59 meeting in Sorrento in February
- with intensive email work after the meeting (22 topics)

Summary of discussions are as follows:

- Clarification from RAN2 that stated the UE behaviour shall be the same during S1 and X2 Handover, resulted to a definition of eNB/MME Status Transfer procedure during S1 Handover to convey PDCP SN and its HFN, both for UL and DL.
- It was agreed to create a 3GPP TR 36.902 to capture the SON use cases and their solutions. The purpose of the CR is to capture and coordinate the SON use cases agreed by RAN WGs. An LS to inform the creation of the TR and its purpose was sent to the related WGs.
- Several new use cases were agreed to be captured in the SON TR are the followings:

  Physical Cell ID automated configuration;

  Mobility Robustness Optimisation;

  Mobility Load Balancing Optimisation;

  Energy Saving and Interference Reduction.

- The work on the already agreed usecases, i.e. ANR (Automatic Neighbor Relation) optimisation for intra RAT, inter RAT/frequency, RACH optimisation, etc. can be carried on in Stage 2 and Stage 3 TS.

  An LS was sent to ask RAN2 and RAN4 opinion on the stage2 Text Proposal for ANR intra RAT, inter RAT/frequency.

- Clarification on the scope and the necessary measurements for RAN performance monitoring was sent to SA5
- On Home eNB discussion, solution options to realise one S1-MME connectivity between Home eNB and MME were discussed. The two solution options, i.e. direct connectivity and indirect connectivity via proxy, are captured in the TR R3.020.
- A discussion to clarify the necessary EPS and E-UTRAN identities was conducted and some clarification questions, that are necessary to define those identities, was sent to SA2 and RAN2.
- A study on architecture for ETWS, comprising of both CBS and E-MBMS, were discussed. An LS to SA2 and RAN2 was sent in order to have a full overall picture of the architecture, in term of necessary functionalities, their impact and overall schedule.
- On MME load balancing, balancing using 'MME relative load' as a weight factor was discussed, but no decision can be achieved.
- S1 CDMA Tunneling procedure was defined to convey necessary message for handover support from E-UTRAN to CDMA2000 RATs.
- A set of CRs to the following RAN3 specifications were agreed during email work.

RAN3 agreed changes for TS36.401(Architectural description)

RAN3 agreed changes for TS36.413(S1AP)

RAN3 agreed changes for TS36.423(X2AP)

- On Signaling Transport specification (TS.36.412), the number of SCTP association that may be established between MME-eNB remains an open issues.
- Other RAN3 specification are quite stable.

  TS36.411/36.421 (S1/X2 Layer 1 specifications) are stable.

  TS36.410/36.420 (S1/X2 general aspect and principle specifications) are stable.

  TS36.414/36.424 (S1/X2 Data Transport specifications) are quite stable with one CR for each TS.
- Little progress on E-MBMS specification work, due to focus on SON and stage 3 TSs.

  Text proposal for E-MBMS M1UP specification (TS36.446) was discussed. It is still open whether SYNC protocol will be conveyed within GTP-U header or GTP-U payload.

Performance Issues

LTE was discussed:

- for 5 days at the RAN4 #46 meeting in Sorrento in February.

Summary of dicussions are described per topic below:

- The latest RAN4 TSs are listed as follows:

  A CR to TS 36.101 was approved (R4-080494)

  A CR to TS 36.104 was approved (R4-080551)

  A CR to TS 36.133 was approved (R4-080478)

  TS 36.141, v 0.2.0 was noted. Level of Completion = 45% (R4-080508)
- UE requirements

  Most of core parts of TS 36.101 were finalized. Open issues on TS 36.101 are listed in the following:

  Final requirement values on some requirements, such as Spectrum flatness, Reference sensitivity power level, Maximum input level and so on;

  Performance parts (Demodulation performance requirements)
- BS requirements

  Most of core parts of TS 36.104 were finalized. Many parts of minimum requirements for PUSCH, PUCCH and PRACH were agreed with square brackets. Open issues on TS 36.104 are listed in the following:

  Transmitted signal quality, such as EVM

  Remaining issues in demodluation performance requirements, such as UL timing adjustment, Tests for ACK/NACK/CQI multiplexed into PUSCH
- RRM requirements

  RRM ad-hoc sessions were held and good progress was observed. Ad-hoc minutes were provided in R4-080479 and R4-080498

  Summary was provided below:

  It was agreed to use RSRQ as an intra-frequency measurement

  It was agreed that channel BW should be signaled for potential UE power saving benefits in RRC_IDLE. Corresponding LS was agreed and sent to RAN2

  Handover and Cell Reselection Execution Requirements were discussed and text proposals for TS 36.133 were agreed.

  Gap length of 6 ms and Gap periodicity of 40 ms and 120 ms were agreed. Other periodicity and gap length could be investigated in the future meetings.

  It was agreed not to develop mobility performance requirements for LTE_RRC_CONNECTED mobility to UTRAN without neigbour cell list.
- BS conformance tests

  Many text proposals were presented and agreed:

TS 36.141 v 0.2.0 was noted (R4-080508): Level of Completion (LoC) = 45%.