3GPP TSG RAN Meeting #93e

RP-212333

Electronic Meeting, 13-17 September 2021

Views on RAN Rel-18 package

Agenda Item: 9.0.1

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General comments

- These slides show our current thinking on a possible overall package of work in RAN for Rel-18
  - Considers the Rel-18 email discussions held in the week beginning 30th August
  - Considers both Intel priorities and wider industry priorities as seen from workshop and email discussion
  - Does not consider RAN4 centric items – these are discussed separately in RP-212222
  - Work in progress – our views will continue to develop throughout the Q4 discussions
- The package is structured as a set proposed WIs/SIs (i.e. there are differences compared to the discussion structure used until now in RAN). For each proposed WI/Ss, we provide:
  - Proposed high level scope
    - In some cases we explicitly identify topics that are not included. Omission may be due to workload considerations or that we consider that an item does not yet have sufficient motivation or justification to be included. We have omitted some items in which we have interest, see value, and may have commented positively in the past.
  - Proposed size of the WI/SI
    - Large (3-4 TUs), Medium (2TUs), Small (1TU)
    - Meaning of Large/Medium/Small taken from RAN chair's RP-211680. RAN2/3/4 rarely have items of more than 2 TU per meeting, so only RAN1 has 'large' items.
  - No lead WGs indicated - in some cases the lead WG is obvious, in other cases it is best decided once scopes are finalised
- We propose that at least the listed items continue to be part of the discussion in Q4 2021.

Topic	WI/SI	WI/SI size	Scope and comments
MIMO enhancements	WI	RAN1: Medium RAN2: Small	• CSI enhancements (Doppler domain CSI compression; CSI for URLLC mTRP) • Multi-TRP enhancements (mTRP deployment with different Rx timing offset greater than CP (+multiple TAs for mTRP); latency reduction for beam acquisition) • CPE specific enhancements (High order modulation 4K QAM, 10K QAM) • Coherent JT in specific scenario Note: CPE enhancements could be split out into a separate WI from MIMO
Uplink enhancements	WI	RAN1: Large RAN2: Small	• >4 Tx operation (CB enhancement for > 4Tx; 8 MIMO layers for SU-MIMO) – mainly CPE target • Enhanced multi-panel/multi-TRP uplink operation (eMBB and URLLC enhancements for PUCCH/PUSCH) • Frequency-selective precoding • Support for TRPs with Rx only capability and low power TRPs • SRS enhancement to support channel prediction • Higher order modulation for UL: 1024 QAM • DMRS AP increase (for UL capacity increase) Note: We consider that further coverage enhancements would need to be further checked as part of Uplink enhancements Note: We consider that it may be preferable to include all DL and UL MIMO enhancements into a single MIMO WI, but acknowledge this could result in a very large item.
Mobility enhancements	WI	RAN2: Medium	• Layer 1/layer 2 based inter cell mobility (intra-DU; inter-DU; support for more than 2 target cells/CGs) • DAPS (Dual Active Protocol Stack)/CHO (Conditional HandOver) related improvements e.g. DAPS+CA/DC, DAPS+CHO, CHO+CPAC" • FR2 (frequency range 2)-specific enhancements (fast cell/cell group change) Note: We propose not to include MBB/RACH-less HO in scope for FR2 enhancements.
NR 52.6 - 71 GHz enhancements	WI	RAN1: Medium	Enhancement to 60GHz • Potential leftover: Rx aided LBT; beam management enhancement with LBT; LBT for multi-panel Tx; PTRS and PN robustness enhancements • Enhancement of multi-TRP (in practical) • Supporting 256QAM / 1k QAM • Faster UE Capability (lower latency) • multi-rank DFT-s-OFDM support • coverage enhancement with multi-PxSCH • coverage enhancement with LBT • power saving with LBT • positioning support for 60GHz • IAB support for 60GHz • V2X support for 60GHz Note: This scope is very dependent on the final state of the Rel-17 WI on 60GHz

Topic	WI/SI	WI/SI size	Scope and comments
XR	WI	RAN1: Medium RAN2: Medium	• Application awareness and differentiation of XR traffic • Capacity enhancements • Power saving C-DRX enhancements Note: Power saving physical layer enhancements and coverage enhancements have not been included. Any mobility enhancements should be addressed by a more general mobility enhancement WI.
IAB enhancements	WI	RAN2: Medium	• Mobile IAB/Vehicle Mounted Relay Note: Unlicensed IAB and Full Duplex IAB have not been included, primarily motivated to keep RAN1 workload reasonable.
Sidelink enhancements	WI	RAN1: Medium RAN2: Medium	• SL enhancements (Multi-carrier operation for sidelink; further power saving for sidelink; unlicensed operation) • IIoT/URLLC enhancements for sidelink (IIoT/TSN over sidelink) • Co-existence of LTE V2X & NR V2X • Sidelink for RedCap UEs • SL UE-UE relay (open for separate WI) Note: UE-UE relay could be a separate WI from other sidelink enhancements, similar to the WI structure in Rel-17
RedCap enhancements	WI	RAN1: Medium RAN2: Small	• RedCap with 5MHz bandwidth • New power saving enhancement techniques (including C-WUR) Note: Power saving enhancements could be a separate WI as enhancement can be applicable to non-RedCap UEs. Note: Energy harvesting to be handled under separate SI passive IoT
NTN enhancements	WI	RAN1: Small RAN2: Small	• Enhancements for smartphone operation with NTN (coverage) Note: We consider that support for UEs without GNSS, and other potential enhancements raised during the workshop are not sufficiently well motivated to be included. Note: There is already certain RAN4 RF work for NTN that is already agreed to be undertaken in the Rel-18 timeframe, but we expect this to be contained in separate WI(s).
MBS enhancements	WI	RAN2: Medium	• Multicast and HARQ for IDLE/INACTIVE UEs • Reliability enhancements (RLC-AM) support for PTM • Power saving and mobility enhancements
Positioning enhancements	WI	RAN1: Large RAN2: Medium	• Sidelink positioning/ranging • NR positioning in unlicensed spectrum • Improved accuracy (PRS/SRS aggregation), integrity, and power efficiency • RedCap positioning
Small Data transmission enhancement	WI	RAN2: Small	• MT-triggered SDT • Recovery mechanism • RRC-less

Topic	WI/SI	WI/SI size	Scope and comments
AI/ML for Physical Layer	SI	RAN1: Medium	• Develop evaluation methodology and decide KPIs • Limited use cases selected for study: CSI reporting; Beam management; RS overhead reduction; Positioning • Consider potential specification impacts Note: No normative work on AI/ML for physical layer is expected in Rel-18
AI/ML for NG-RAN	WI	RAN3: Medium	Note: Follow on WI from Rel-17 “Study on further enhancement for data collection”, with scope depending on the outcome of that study recommending any normative work.. Note: Potential continuation of RAN3 Rel-17 “Study on further enhancement for data collection”, with scope depending on the outcome of that study (study phase within WI)
Network Energy Saving	SI	RAN1: Medium RAN3: Small RAN4: Small	• Develop evaluation methodology and decide KPIs (including gNB power consumption model) Note: Open to some normative work towards end of Rel-18 if the study identifies any significant energy saving opportunities with small spec impact, but we should not plan for a Rel-18 WI from the outset.
Duplex Evolution	SI	RAN1: Small RAN4: Medium	Study to consider: • ‘Full duplex’ at gNB only • ‘Full duplex’ by FDM operation within TDD carrier • Focus on sub6 TDD deployment scenario with massive MIMO • Study interference management Note: RAN4 need to be involved in the work to assess feasibility from the start Note: No normative work on Duplex evolution is expected in Rel-18
NR > 71 GHz waveform study	SI	RAN1: Small	• Waveform study only (possibility also to be used in 60GHz) Note: No normative work on NR > 71 GHz is expected in Rel-18
Smart Repeater	SI with follow-on Rel-18 WI	RAN1: Small RAN4: Medium	Note: Study item required to understand overall architecture before embarking on normative work

Topic	WI/SI	WI/SI size	Scope and comments
UAV	WI	RAN2: Small	• Support same enhancements for UAVs as in LTE, with reuse of LTE solutions as much as possible
IIoT	WI	RAN1: Small RAN2: Small	• Unlicensed band enhancements for both FBE and LBE • Scheduling and HARQ enhancements • Higher layer enhancements (UE based PDCP duplication including PHY level enhancement of Cross-CC repetition for uplink in URLCC) Note: IIoT over sidelink has been included in the sidelink enhancements WI but it could also be located here.
Support for <5MHz BW	WI	RAN1: Small RAN2: Small	• Aim should be to support narrow bandwidth(s) with minimal specification impacts
Inter-gNB coordination	SI	RAN3: Medium	• Inter-gNB/gNB-DU multi-carrier operation • Inter-gNB/gNB-DU multi-TRP operation • Enhancement for resiliency of gNB-CU
SON/NDT	WI	RAN2: Small RAN3: Small	• To address use cases based on new functionality introduced in Rel-16 and Rel-17
Passive IOT	SI	RAN1/2/4: small	• Use case / design target, Key area to enhance Note: No normative work is expected.

Items listed in outcome from workshop (RWS-210659) that have not been included in this Rel-18 package proposal. This may be due to workload considerations or that we consider that an item does not yet has sufficient motivation or justification to be included.

- CA/DC enhancements
- Flexible spectrum integration
- RIS
- HAPS
- Network slicing enhancements
- MUSIM
- UE aggregation

TU estimation/ Workload considerations

WG	Large WI/SIs	Medium WI/SIs	Small WI/SIs	TU/meeting estimation	TU/meeting for Rel-17 in Q3/21
RAN1	2	7	7	29	26.5
RAN2	0	5	10	20	24
RAN3	0	2	2	6	11
RAN4	0	2	2	6	n/a

Notes:

- This is a first order estimation only. To be refined as the objectives become more clear.
- Further RAN 3/4 work from these items may be identified, but most likely with smaller impact
- RAN4 total only reflects work coming from the RAN1/2/3 centric items. RAN4 led items will obviously be in addition. For this reason comparison to Rel-17 TU allocation is not relevant.
- TU/meeting is for when WI is fully up and running – typical that WI/SIs might have a slow start with fewer TUs in early meeting of the release.

Observations:

- RAN1 would be more loaded than Rel-17.
- RAN2 would be at capacity considering the likelihood of some additional work coming from SA/CT
- No headroom for late identification of work
- Additional consolidation will likely be needed during Q4 discussions and in December RAN.

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