

3GPP TSG RAN #102

Edinburgh, UK, December 11 – 15, 2023

RP-233691

Overview of Rel-19 package

Agenda Item:

9.1

Source:

Intel Corporation

Document for:

Discussion



General Aspects of Rel-19

- RAN Chair has proposed a Rel-19 Package for RAN1/2/3 in RP-232745
- In general, we support the package as proposed
- Following slides provide Intel's view on the objectives of the Rel-19 WIs, in particular addressing those aspects that will require further discussion in RAN#102 (yellow highlights in RP-232745)

RAN1-led Topics (1/2)

- WI – AI/ML for Air Interface

- Contribution in RP-233324
- Normative work for one-side model LCM
- Normative work for Beam management & positioning enhancement use case.
- Continue study for two-sided model LCM
- Continue study for CSI compression and CSI prediction

- SI – New spectrum channel model

- Contribution in RP-233328
 - Intel, Samsung, KT, SK Telecom, Nokia, Nokia Shanghai Bell, Ericsson, WILUS, Google, CEWiT, Huawei, HiSilicon, ETRI, Interdigital, Spreadtrum, vivo, Futurewei, NTT Docomo, Fraunhofer IIS, Fraunhofer HHI, Apple, Lenovo
- Validation of model at least for 7-24 GHz
- Adapt/extend (as necessary) model at least for 7-24 GHz for considering near-field propagation, and spatial non-stationarity

- WI – MIMO evo

- Co-sourced contribution RP-232915
 - Samsung, Apple, CATT, Ericsson, ETRI, Fraunhofer IIS, Fraunhofer HHI, Google, Huawei, HiSilicon, Intel Corporation, Lenovo, Motorola Mobility, MediaTek, NEC, New H3C, Nokia, Nokia Shanghai Bell, OPPO, Qualcomm, Sharp, Xiaomi, ZTE, Sanechips, AT&T, CMCC, KT Corporation, KDDI, LG Uplus, NTT DOCOMO, Ruijie Networks, Spark, SK Telecom, Telus, T-Mobile USA, Verizon
- UE-initiated/drive beam management & UE signaling for reporting
- CSI support up to 128 ports
- UE report for CJT deployments with non-ideal backhaul
- Non-coherent UL codebook for 3 Tx
- Asymmetric DL sTRP/mTRP deployments

- WI – NES

- Contribution in RP-233325
- On-demand SSB for Scell,
- On-demand SIB1 for IDLE UEs
- PRACH and paging adaptation for IDLE UEs
- Cell DTX/DRX operation for single cell multi-TRP

RAN1-led Topics (2/2)

- WI – Duplex evo
 - Co-sourced contribution RP-233669
 - Samsung, CMCC, Qualcomm, CATT, NTT DOCOMO, Xiaomi, CeWiT, LG Uplus, KT, InterDigital, Spreadtrum, ZTE, Sharp, Ericsson, Intel
 - Semi-static signaling for SBFDD subband/guard bands
 - Support PUSCH/PUCCH/SRS/SR/PRACH transmission in SBFDD
 - Specify enhancements for gNB-gNB CLI and UE-UE CLI
- SI – Ambient IoT
 - Important to narrow the scope such that the study could be completed in timely manner.
 - Preference to prioritize/focus on:
 - Device Type C
 - Topology 1
 - Both indoor/outdoor deployments
 - Open on WI to be started during Rel-19 depending on SI progress
- SI – ISAC channel model
 - Contribution in RP-233326
 - Prioritize following use cases: (a) UAV tracking and coordination, (b) Assistance to autonomous driving, (c) Vehicle speed measurements
 - Deployment scenarios: outdoor, indoor, mix of outdoor and indoor
 - Link types: Uu and Sidelink,
 - Sensing modes: Mono-static, bi-static, multi-static
 - Modeling of the following aspects:
 - reflection off targets, movement of targets, non-ideal reflectivity of sensing targets via modelling of Radar Cross Section (RCS), environment/clutter patterns /Applicable frequency ranges: FR1, FR2-1, FR2-2
- WI – LP-WUS/WUR
 - Clarify distinction between Waveform option-1 and Option-3. TR38.869 description of OOK-1 and OOK-4 do not exactly describe how modulation is performed. We assume details of the modulation for SC in OOK-1 or OOK-4 is part of normative work.

RAN2-led Topics (1/2)

- WI on further mobility enhancements
 - Tdoc in RP-233652
 - Inter-CU LTM
 - Measurements for LTM
 - Event triggered reporting
 - CSI-RS measurements
 - Conditional LTM mobility
 - Sequential and RACH-less HO for L3 mobility without configuration
- WI on XR enhancements
 - Tdoc in RP-233653
 - Multi-modal enhancements (dependence on SA2/SA4)
 - Synchronisation of streams
 - Multiple C-DRX
 - UE assistance information
 - Measurement gap enhancements to minimize impact on XR traffic
 - Allow PDCP SN gap
 - UL delay aware scheduling
 - Study needed
 - RLC AM enhancements for traffic with small delay budget
 - Study and specify if agreed

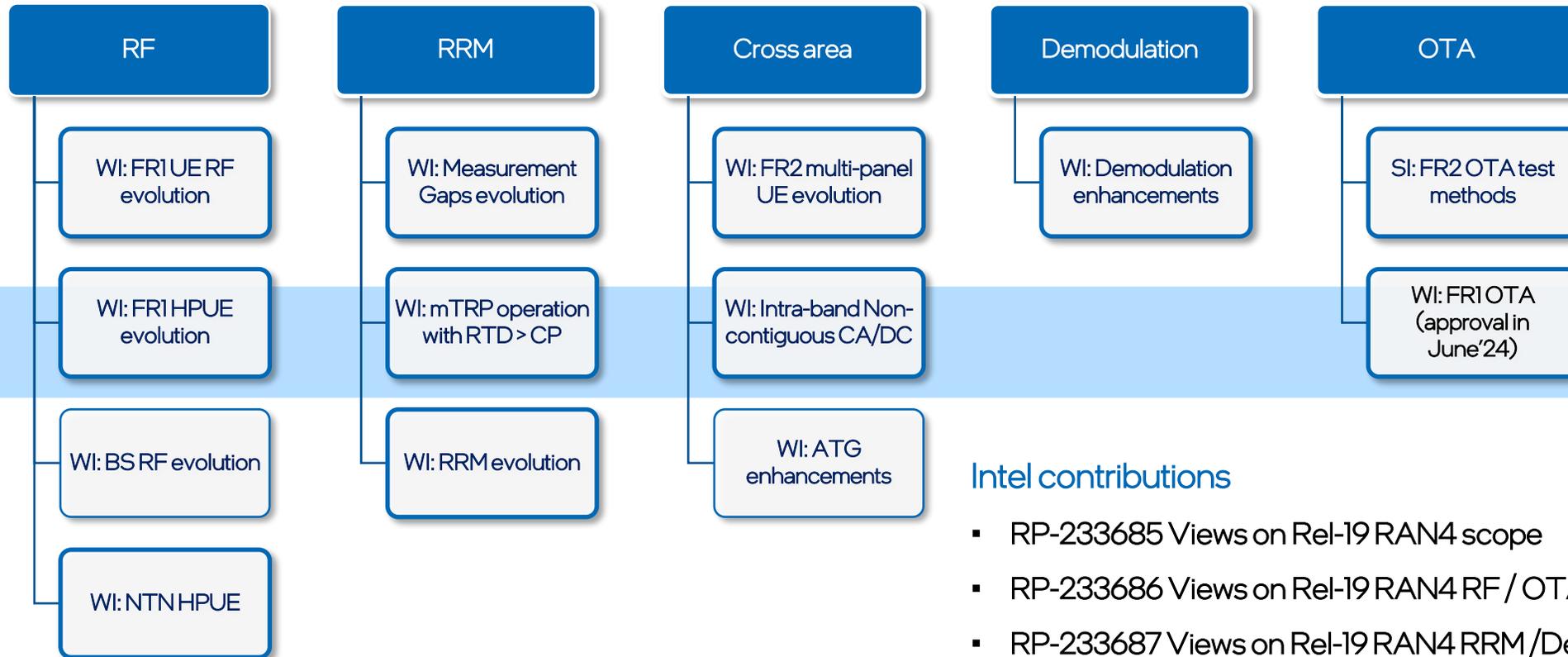
RAN2-led Topics (2/2)

- SI – AI/ML for mobility
 - Tdoc in RP-233654
 - RRM prediction/optimisations
 - UE sided model
 - Event prediction, HOF/RLF prediction
 - HO preparation optimization
 - Network side model
 - Candidate/target cell prediction for L3 HO
 - Candidate/target beams/cells prediction for LTM
 - Evaluate against existing HO/LTM performance
 - Optimisation areas:
 - HO success/failure
 - Ping-pong
 - Measurement/report reduction
 - Duration of stay in target cell
 - Re-use AIML for air interface framework for LCM, data collection, model transfer
 - L3 and L1/2 mobility can be considered, with priority for L3
- Positioning Enhancements (Other Topics)
 - Contribution in RP-233327
 - Broadcast and groupcast for Sidelink positioning [RAN2, RAN3]
 - *Down-scoped from Rel-18 at RAN #101.*
 - AGNSS enhancements to support [RAN2, RAN3]
 - NavIC L1 SPS
 - *For support of second generation of NavIC (Navigation w/ Indian Constellation) satellite systems*
 - B2b signal of A-BDS
 - *For support of B2b signal defined in A-BDS for BDS-3 (BeiDou Navigation Satellite System - 3) constellation*
 - Performance requirements for the above objectives [RAN4]

RAN3-led Topics

- AI/ML for NG-RAN
 - RAN Chair's proposal to have a 6 month SI + 12 month WI is reasonable
 - Address Rel-18 leftovers
 - New use cases/scenarios – preference for coverage and capacity optimization
- SON/MDT
 - Mobility Robustness Optimization – enhancements related to new features from Rel-18 Mobility WI.
 - Lower layer triggered mobility (LTM), CHO with candidate SCGs, subsequent CPAC
 - Enhancements related to new features introduced by other Rel-18 WIs
 - Preference for intra NTN mobility
 - Lower priority: network slicing and energy saving
 - Rel-18 leftovers – lower priority
- Topological Enhancements
 - Start with SI followed by WI with well defined scope
 - Support for WAB to cover various scenarios including backhaul via TN or NTN
 - Support for Femtos
 - Lower priority: access to local service by 5G Femto with co-located UPF. Could be reviewed later in release if co-located UPF is possible with zero/minimal standardization effort based on work on WAB node with co-located UPF
 - IAB enhancements:
 - Lower priority: Multi-hop routing for local IAB mobility. Potential to be considered later in the release

RAN4-led Topics (1/3)



Intel contributions

- RP-233685 Views on Rel-19 RAN4 scope
- RP-233686 Views on Rel-19 RAN4 RF / OTA
- RP-233687 Views on Rel-19 RAN4 RRM / Demodulation
- RP-233688 Views on Rel-19 RAN4 cross-area topics

RAN4-led Topics (2/3)

Topic	Prioritized scope/objectives
FR1 RF	<ul style="list-style-type: none"> • SRS IL compensation and reporting • Device evolution: 6Rx and 3Tx for handheld/CPE/FWA • Irregular Channel Bandwidth
FR1 HPUE RF	<ul style="list-style-type: none"> • HPUE with CA/DC
FR2 RF	<ul style="list-style-type: none"> • Low priority • CA enhancements
NTN HPUE	<ul style="list-style-type: none"> • HPUE for NR NTN • HPUE for IoT NTN
BS RF	<ul style="list-style-type: none"> • Multi-band FR2 BS • BS OTA test time reduction
FR2 OTA test methods	<ul style="list-style-type: none"> • Dynamic OTA test methods • Test methods for STxMP

Topic	Prioritized scope/objectives
Measurement Gaps evolution	<ul style="list-style-type: none"> • Pre-configured NCSG • Enhanced collision handling for concurrent MGs (parallel measurements)
mTRP operation with RTD > CP	<ul style="list-style-type: none"> • RRM requirements to enable mTRP operation with RTD > CP incl. inter-cell beam management, TCI state activation, and others
RRM evolution	<ul style="list-style-type: none"> • Enhanced TCI state switching requirements • Interruption reduction (incl. URLLC) • Improved UE Rx Beam switching • FR2 RRM delay reduction
Demodulation enhancements	<ul style="list-style-type: none"> • BS MMSE-IRC for uplink inter-cell interference • Enhanced MIMO channel models with spatial components for UE and BS requirements • UE Soft IC receivers (study) • UE application layer throughput with OLLA

RAN4-led Topics (3/3)

Topic	Prioritized scope/objectives
Evolved FR2 multi-panel UE	<u>Multi-RX panel enhancements</u> <ul style="list-style-type: none">• CA extension• RRM enhancements (L3 enhancements, inter-cell mTRP TCI state switch and beam management.) <u>Multi-TX panel / STxMP</u> <ul style="list-style-type: none">• RF and RRM requirements
Intra-band non-co-located CA/EN-DC enhancements	<ul style="list-style-type: none">• Non-located scenarios for FR1 intra-band non-contiguous NR CA and inter-band EN-DC (with overlapped DL spectrum) for UE with 6 or 8 total antenna/LNA-s• Support for UE with 4 shared antenna/LNA-s on each and both carriers
ATG enhancements	<ul style="list-style-type: none">• FR2 support (study + normative stage)• FR1 CA support• Rel-18 RRM leftovers and improvements

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