

Overview of RAN Rel-18 content

Agenda Item:	4
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3GPP Release 18 – “5G Advanced”

- “5G Advanced” label for Rel-18+ is already agreed by PCG
- Rel-18 “5G Advanced” is a mid generation update between 5G and the next generation
- The release must include a balanced mix of the following:
 - Kick off study for some larger items of long term technical significance, e.g:
 - Extension up to 114 GHz
 - AI/ML for the air interface
 - New functionality to meet the industry needs
 - Evolutionary enhancements to existing functionality
- The release must include a balance of items addressing industry needs from eMBB and verticals:
 - Industrial, Vehicular, IoT, Public Safety, Satellite, XR, etc,
- Release duration
 - 18 months release preferred for Rel-18 and Rel-19
 - Maintain cadence of delivering new functionality – particularly after long Rel-17 caused by the pandemic
 - Big items should span 2 releases with Rel-18 SI + Rel-19 WI

eMBB Centric Topics

52.6-71GHz enhancement

- Further enhancements beyond Rel-17 baseline
- Latency
- Throughput
- Power consumption/energy efficiency
- Coverage
- Also relevant to vehicular, industrial, etc

NR extension up to 114 GHz

- Start of longer-term technology study
- Exploitation of new spectrum

NR MIMO

- Continued evolution of NR MIMO
- Multi-TRP enhancements targeting practical deployments and URLLC
- Enhancement for new FR2 deployment scenarios
- FR2 uplink enhancements – simultaneous multi-panel transmission

RAN4 requirements evolution

- FR2 UEs with multi-beam simultaneous reception
- UE interference mitigation receiver enhancements (MMSE-IRC for time-selective interference; DL MU-MIMO enhanced receivers)
- BS MMSE-IRC receivers for inter-cell interference
- RRM requirements enhancements (FR1+FR NR-DC, NeedForGaps, IS/OOS BLER, Per-FR gap capability, CMTTC, TCI state switch)

 Intel highest priority items

Non-eMBB Centric Topics

NR Positioning enhancements

- **Sidelink positioning** integrated to NR positioning framework – vehicular and public safety are key drivers
- **Uu positioning enhancements** addressing unlicensed spectrum, integrity for RAT dependent solutions, RedCap UEs, aggregation of DL/UL reference signals

XR

- Scope for capacity, power saving and mobility driven enhancements
- Traffic awareness at RAN

NR Sidelink enhancements

- Vehicular and public safety remain key drivers
- Industrial IoT a new driver for sidelink evolution, augmenting URLLC on Uu interface
- Sidelink for RedCap UEs with potential IoT, Industrial IoT and consumer use cases

URLLC/IoT enhancements

- Unlicensed operation
- Scheduling and HARQ enhancements for service multiplexing
- URLLC for Sidelink

RedCap enhancements

- Lower capability RedCap UEs – target 1-20Mbps and enabling applications utilising LTE Cat1/1bis to migrate to NR
- Unlicensed operation
- Positioning support
- Side link support

MBS enhancements

- Enhancements and leftovers from first release of NR MBS
- RLC-AM for PTM
- Multicast for RRC_INACTIVE
- Mobility, power consumption reliability enhancements

 Intel highest priority items

Cross functionalities

Linear Packet Coding in L2 for RAN performance improvement

- Coding applied “per packet” in L2 (enhancement from Rel-16 packet duplication) not yet exploited in 3GPP systems
- Potential for significant RAN performance improvements from:
 - Reliability gain with less resources
 - Efficient use of route diversity
 - Soft-combining in upper layers
- Little overhead (~1%, per packet decision); Little added complexity (linear operation, quick table look-up over finite field)
- Study and evaluate scenarios where Linear Packet Coding is beneficial, and L2 protocol impacts

AI/ML enabled RAN and air interface

- **AI/ML enabled RAN**
- Standardisation of data collection and network interface support for energy saving, load balancing, traffic steering/mobility uses cases (i.e. follow on from RAN3 led Rel-17 SI)
- Study further use cases (e.g. network slicing, RAN QoE optimization, IAB network, etc)
- Study distributed/federated AI/ML within NG-RAN
- **AI/ML for air interface**
- Start of longer-term technology study
- Study of potential applications to AI/ML at UE or NW to improve air interface performance
- Study approaches where AI/ML operation is in UE/NW only, and where AI/ML is distributed across UE and NW

Mobility enhancements

- Fast cell group switching for cases where DAPs implementation is challenging or not feasible
- DAPs enhancements for reduced data rate interruption, and reliability
- Enhanced mobility in NPNs
- Enhancements for network deployments of mixed release
- Enhancements for UAVs

 Intel highest priority items

More details in the following Intel contributions submitted to the workshop:

- RWS-210366 Rel-18 NR above 52.6 GHz
- RWS-210367 Rel-18 NR Positioning
- RWS-210368 Linear Packet Coding in L2 for RAN performance improvement
- RWS-210369 Further Enhancements of NR Mobility
- RWS-210370 Rel-18 NR MIMO
- RWS-210371 Rel-18 NR Sidelink
- RWS-210372 Rel-18 NR XR
- RWS-210373 AI/ML enabled RAN and NR Air Interface
- RWS-210374 Rel-18 NR MBS enhancements
- RWS-210375 Views on RAN4 Rel-18 scope
- RWS-210377 Rel-18 URLLC/IIOT
- RWS-210378 Rel-18 RedCap Enhancement

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