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General Views on Release 19

Huawei, HiSilicon

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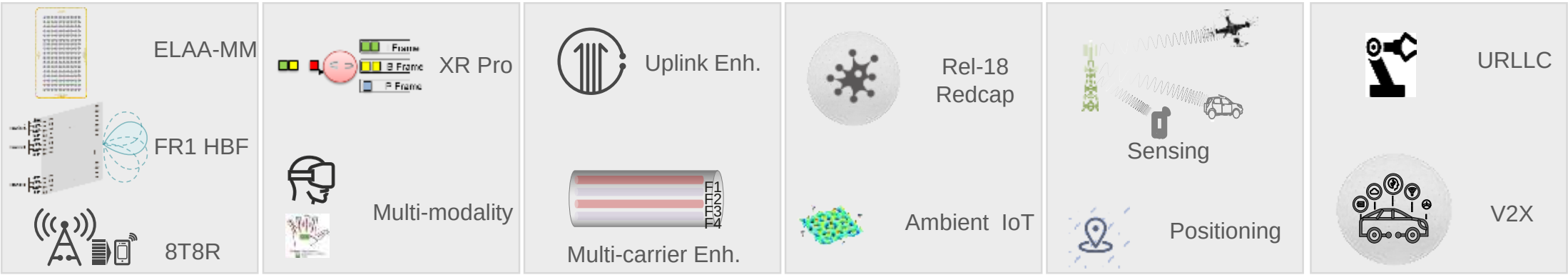
Rel-19 as the second release of 5G-Advanced

- Rel-19 is a core release for 5G-Advanced, critical to ensure healthy global 5G deployments in coming years
- Rel-19 projects should be commercially and deployment driven
- Strive for a good balance between use cases expansion, enhancements of existing use cases/features, and study/work on future-looking features



Rel-19 should be dedicated to 5G-Advanced

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Status of Rel-19 scoping discussions

- 3GPP RAN held a Rel-19 workshop in June 2023. The RAN Chair's Summary was endorsed in RWS-230488.
- Slide 7 of RWS-230488 provides a categorization of topics based on the workshop contributions, which identified a list of (first-tier) topics that have been widely supported in contributions to the workshop, additional (second-tier) candidate topics for RAN1/RAN2/RAN3 which have received mixed support, and other topics which received rather little or isolated support in the workshop contributions.

First tier

- AI/ML Air Interface
- MIMO Evolution
- Duplex Evolution
- Ambient IoT
- Network Energy Saving Enhancements
- Mobility Enhancements
- NTN Evolution
- XR Evolution
- AI/ML for NG-RAN
- SON/MDT
- Channel Modeling (& possibly additional aspects e.g. for ISAC) for further evolution

Second tier

- Additional RAN1-led Candidate Topics
  - LP-WUS/WUR
  - Multi-carrier Enhancements
  - Coverage Enhancements
  - Positioning Enh.
  - SL Evolution
- Additional RAN2-led Candidate Topics
  - NCR
  - SL Relay Enhancements
  - UAV/UAM
  - MU-SIM
  - Broadcast/multicast
  - UE aggregation, collaboration, and backup
- Additional RAN3-led Candidate Topics
  - Topological enhancements
    - IAB/WAB/Femto
    - E.g., for public safety/emergency services
  - QoE

Others

- Lean protocol stack/High speed packetization/Layer 2 UP enhancements
- RAN architectural enhancements/AS Security Enhancements
- Network/Outer coding
- RedCap Enh./High reliability and low complexity IoT
  - Combination w/ SL or NTN can be discussed in the SL/NTN topics, respectively)
- TaaS (Timing as a service)/High Accuracy Timing Service
- SDT enhancements
- LTE enhancements
- Dynamic UE capability update
- Others (e.g.,, Idle/Inactive enhancements, RAN slicing enhancements, etc.)

This contribution provides Huawei's views on a meaningful Rel-19 package, considering the above categorization, and also provides views on the detailed scope of the selected topics.

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Huawei's proposal for the Rel-19 package (RAN1/2/3)

RAN1-led topics

- Ambient IoT (SI+WI)
- AI/ML Air Interface (SI/WI)
- MIMO Evolution (WI)
- Duplex Evolution (WI)
- Network Energy Saving Enhancements (WI)
- LP-WUS/WUR (WI)
- Multi-carrier Enh. (WI)
- Sidelink Evolution (WI)
- Channel Modeling (SI)
  - Sensing, 7-24 GHz

RAN2-led topics

- Mobility Enh. (WI)
- XR Evolution (SI+WI)
- NTN Evolution (SI+WI)
- Positioning Enh. (WI)
- *+ very large TU impact from RAN1-led topics*

Additional Candidate Topics

- Sidelink Relay Enhancements
- UAV/UAM
- Broadcast/multicast
- High accuracy timing services

RAN3-led topics

- AI/ML for NG-RAN (WI)
- SON/MDT (WI)
- ISAC (SI+WI)
- Topological enh. (SI+WI)
- QoE (WI)

Discussion on all other candidate topics not listed on this slide can be dropped from this point onwards.

The next two slides provide our views on the high-level scope of each of the selected topics.

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Rel-19 RAN1/RAN2/RAN3 Contents

RAN1-led topic
RAN2-led topic
RAN3-led topic

Use cases expansion

Ambient IoT (SI+WI)

New IoT segment to support batteryless device and co-deployment with 5G.

Passive/semi-passive tags(indoor) and active tags (outdoor) in licensed FDD spectrum, with direct BS connection.

Topological Enh.: Support for Emergency Service (WI)

Flexible multi-hop and multi-path IAB, and others

Integrated Sensing & Communications (SI+WI)

RAN/CN support to enable wide-area network-based sensing (RAN3)
Channel model Study (RAN1)

XR enhancements (SI+WI)

1. Study on Multi-modal XR, e.g. traffic model, enhancement on resource efficiency, enhancement to support synchronization, etc.
2. RAN-application cooperation to ensure e2e requirements
3. Minor UP enhancement, e.g. RLC AM

Enhancing existing use cases/features

MIMO (WI)

Enhanced Hybrid BeamForming Massive MIMO for FR1

Hybrid BF concurrent multi-beam reporting (~6GHz IMT) with multi-beam reporting

FR2 (mmWave) evolution

1. Enhanced BM/CSI for latency reduction for larger BS array

FR1 Massive MIMO evolution

1. Beyond 32 ports for a single TRP: 64/128 CSI-RS ports Type II codebook
2. Low complexity 6Rx/8Rx UE
3. Uplink enh: UL subband precoding

mTRP evolution

UE-assisted synchronization (DL & UL)

Multi-carrier Further Enhancements (WI)

1. Single PDCCH enhancements, e.g. for co-scheduled cells with different SCS
2. Fast DL carrier switching, e.g. ms-level DL carrier switching (via L1)

Further Sidelink Evo (WI)

1. Sidelink operation on FR2, incl. FR2-2
2. SL CA: unlicensed FR1 CA, unlicensed FR2 CA, cross-carrier operation

Low Power WUS (WI)

Joint OOK+FSK+sequence WUS design
LP-WUR and main radio RRM relaxations
Procedures for idle/inactive, and connected

Network energy saving (WI)

1. SIB1-less non-anchor NES cell for UE in IDLE mode
2. On-demand SSB SCell operation, e.g. for inter-band CA with FR1 and FR2

Further Mobility Enh. (WI)

1. Inter-gNB(CU) LTM for mobility latency reduction in standalone scenario (no SN).
2. High throughput maintenance for PCell switch and SCell switch
3. Support DAPS enhancements

NTN LEO evolution (SI+WI)

1. System-level coverage enh. for multi-beam per satellite
2. Uplink capacity/coverage enhancement
3. NTN-NTN mobility enhancement

NR Positioning enh. (WI)

1. Positioning enhancements targeting FR2
2. CPP enhancement
3. Sidelink positioning (Rel-18 RAN2 leftovers)
4. Unlicensed sidelink positioning

SON/MDT enhancements (WI)

Consider more scenarios (e.g. mobility enhancements, NTN, IAB, SDT, slicing, MBS)

Future-looking features

Duplexing Evo (WI)

1. Subband full duplex (SBFD)
2. BS-BS CLI for flexible TDD and SBFD, including UE uplink muting resources and beam nulling scheme
3. UE-UE CLI (lower priority)

AI/ML for Air-Interface

1. Whether to continue study or to have normative work is dependent on the outcome of Rel-18 SI across all WGs

2. Study more sub use case in Rel-19, e.g. Temporal-spatial-frequency (TFS) domain CSI compression, BM for large antennas array for mmw

AI/ML for NG-RAN (WI)

Support more use cases

Note: additional objectives under these topics can be considered if TU capacity allows

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RAN1-led topic
RAN2-led topic
RAN3-led topic

Rel-19 RAN1/RAN2/RAN3 Contents (additional candidate topics)

Use cases expansion (Cont.)

High Accuracy Timing Service (WI)

Support for 250ns~1us 5GS sync budget to fulfill vertical requirements:

1. Timing accuracy enforcement by considering UE internal accuracy loss and NLOS environment
2. Mobility support across working clock domains

Sidelink relay enhancements (WI)

1. Multi-path support for two paths and more than 2 paths
2. Multi-hop U2N relay for further coverage extension
3. Group handover for the remote UE to reduce the service interruption

Enhancements of existing use cases/features (Cont.)

UAV/UAM enhancements (WI)

1. Mobility enhancements
2. Interference mitigation

Further MBS work (WI)

1. Multicast optimization in RAN sharing scenario to reduce Uu resource consumption
2. Extended CP for better spectrum efficiency
3. Enhancements for higher data rate, e.g. CA/DC
4. Enhancements for power saving for receiving MBS

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References

Tdoc	Title
RP-231927	AI/ML for Air Interface in Rel-19
RP-231928	MIMO evolution in Rel-19
RP-231929	Duplexing evolution in Rel-19
RP-232415	Ambient IoT work in Rel-19
RP-231930	Network energy savings enhancements in Rel-19
RP-232339	Mobility enhancements in Rel-19
RP-231931	NTN enhancements in Rel-19
RP-232340	XR enhancements in Rel-19
RP-232122	AI/ML for NG-RAN in Rel-19
RP-232123	SON/MDT enhancements in Rel-19
RP-232124	Scope of Integrated Sensing and Communications in Rel-19
RP-231932	Multicarrier operation enhancements in Rel-19
RP-232416	Scope of LP-WUS in Rel-19
RP-232417	Sidelink enhancements in Rel-19
RP-231933	Positioning enhancements in Rel-19
RP-232341	MBS enhancements in Rel-19
RP-232115	SL Relay Enhancements in Rel-19
RP-232342	Views on UAV and UAM in Rel-19
RP-232125	Enhanced support for ubiquitous emergency services in Rel-19
RP-232126	QoE enhancements in Rel-19
RP-232116	High Accuracy Timing Services in Rel-19
RP-232383	RAN4-led topics in Rel-19