

Views on RAN4 Rel-18 scope

Agenda Item: 12.2.3

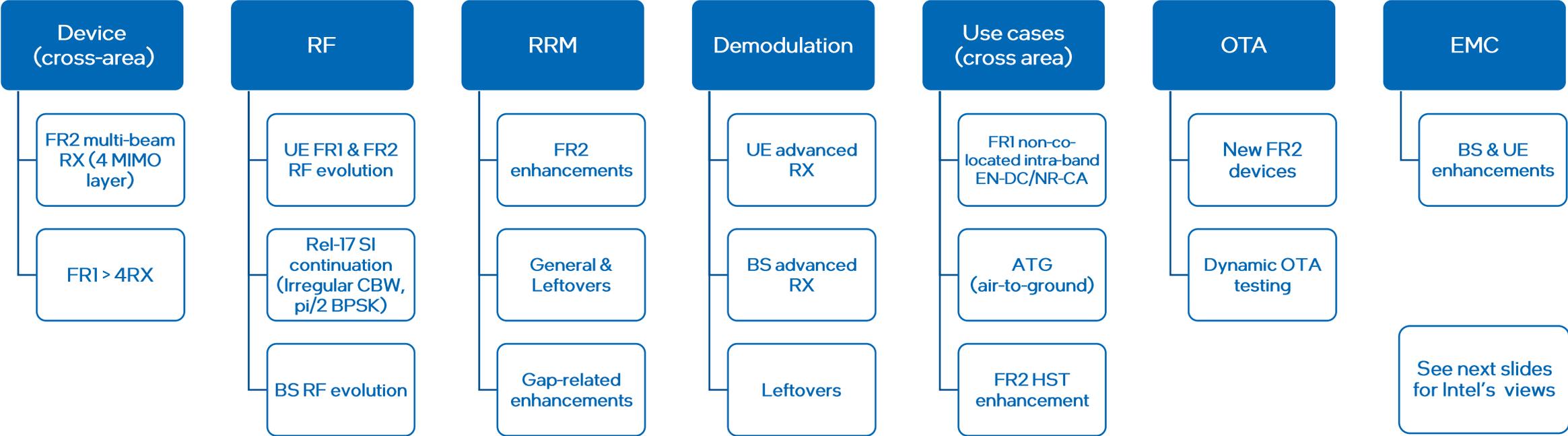
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General views on RAN4 Rel-18 package

Key principles for RAN4 WI package contents

- Balance the needs of the industry and the RAN4 workload constraints
- Balance work among in-field issues, leftover issues from early release(s), and new enhancement
- Meet the commercial demand for practical deployment and open the opportunities for further network evolution

Key areas of evolution identified based on Rel-18 pre-RAN #93 email discussion (non-spectrum)

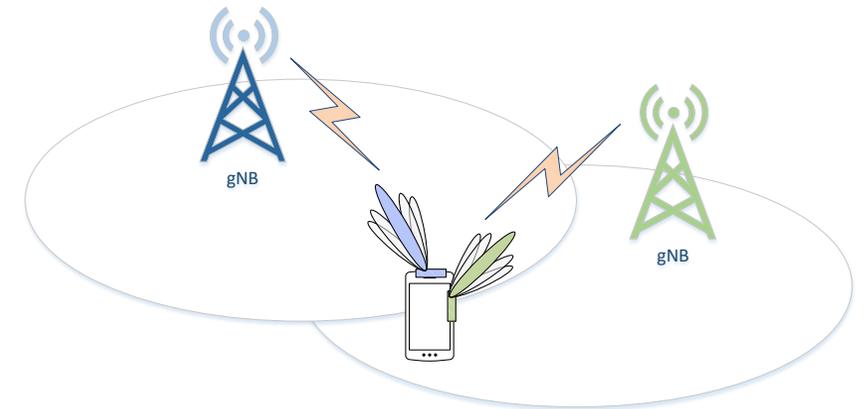


Device Enhancements (cross-area)

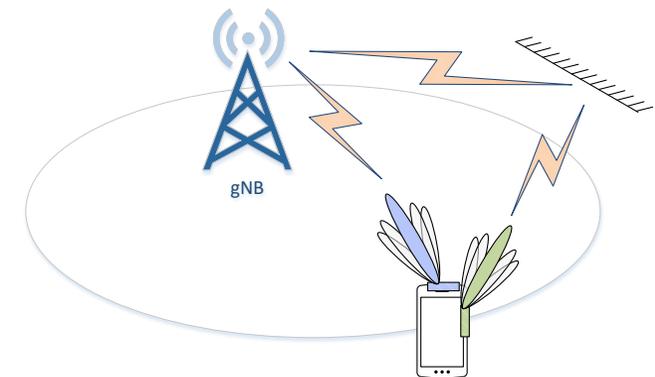
FR2 multi-beam DL reception [see details in R4-2118049]

- Enhanced FR2 UEs with multi-beam simultaneous reception and multiple RX chains can provide a meaningful performance improvement in FR2 improving both demodulation performance (4-layer DL MIMO), RRM performance and improve RF spherical coverage.
- Objectives: Define requirements for UEs capable of simultaneous multi-beam DL reception in FR2
 - Enhanced RRM requirements: measurement delay reduction, FR2-FR2 DAPS HO
 - Enhanced RF requirements: spherical coverage requirements for devices with 2 panels
 - UE demodulation requirements: simultaneous and non-simultaneous RX from different directions, 4 DL MIMO layers.
 - Study OTA test methodology

Multi-TRP TX + Multi-beam RX



Single TRP + Multi-beam RX



Use Case Enhancements (cross-area)

FR1 non-co-located intra-band non-contiguous EN-DC/NR-CA [see details in R4-2118050]

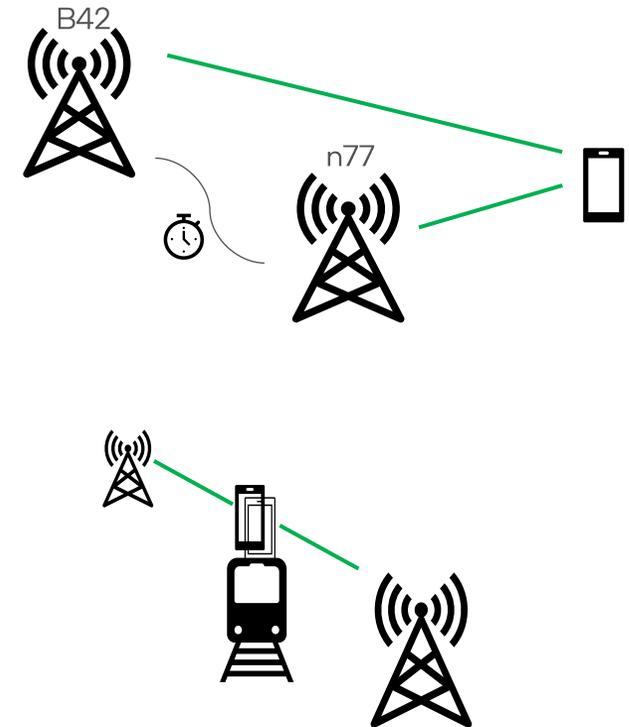
- Important scenario for multiple operators with a clear market need/justification.
- Additional studies are required to balance the needs of operators and UE implementation constraints.
- Candidate objectives: MRTD/MTTD requirements; PDSCH demodulation performance requirement based on the applicable MRTD and power imbalance

FR2 HST enhancements [see details in R4-2118050/51]

- Candidate objectives: HST CA FR2 (RRM/Demod), HST FR2 multi-panel reception CPEs, HST FR2 UE type enhancements

ATG (Air-to-Ground)

- New scenario to extend 5G technology reach.
- Extensive scope discussion in Rel-17 timeframe with stable objectives.



UE RF Enhancements

Further UE RF technology evolution shall be considered with a focus on enabling new use cases and performance improvement

FR2 RF enhancements

- FR2-2 intra-band DL/UL CA based on CBM/IBM and FR2-1/FR2-2 inter-band CA based on IBM
 - CA support for FR2-2 may not be introduced in Rel-17 and can be considered for Rel-18. Comparing to FR2-1 the max frequency separation in FR2-2 band is much larger and IBM can be considered for intra-band CA on top of CBM.
- FR2 ON/ON switching time enhancements
 - ON/ON transient time has a big impact on the overall spectral efficiency of FR2 and FR2-2 specifically. Further tightening of RF requirements can be beneficial to improve the performance and enable operation with high order modulations.
- *Note: Rel-17 WI is ongoing and additional objectives can be considered subject to RAN4 progress*

FR1 RF enhancements

- MSD improvement
 - Improved MSD performance will have a positive impact on the overall network performance and can be considered as one of the key improvements in Rel-18. The work is expected to have relatively large scope and recommended to be performed in Rel-18 (rather than in Rel-17)
- > 2 TX antennas
 - Further enhancement of UE antenna performance is possible including 3TX and/or 4TX

RRM Enhancements

RRM performance improvements are critical to ensure optimized UE in-field performance. Potential RRM enhancements scope of Rel-18 items shall balance between Rel-15/16/17 RRM “leftovers” (i.e., items deprioritized in previous releases due to TU constraints) and new RRM areas

Candidate enhancements (see details in R4-2118050)

FR2 enhancements

- FR2 delay reduction
- Network controlled gaps for UE Rx beam switching
- FR2-FR2 DAPS HO
- FR2-2 enhancements & leftovers (e.g., NR-DC and FR2-1 - FR2-2 NR CA/DC)

General/leftovers

- FR1 + FR1 NR-DC RRM requirements
- CMTC
- RLM enhancements
- TCI state switch enhancements

MG related

- NeedForGap requirements
- Per-FR gap UE capability enhancement
- MG sharing enhancements

FR2 HST

- Multi-panel reception (e.g., reduced number of Rx beams)
- HST CA FR2
- HST FR2 UE type enhancements

Demodulation Enhancements

Demodulation performance improvements are required to optimize UE/BS performance under practical scenarios. Recommend to focus enhancements on UE/BS receiver evolution

Candidate enhancements (see details in R4-2118051)

UE advanced receivers

- MMSE-IRC for time-selective inter-cell interference
- Enhanced DL MU-MIMO receivers based on E-MMSE-IRC or R-ML
- Enhanced DL multi-DCI multi-TRP receivers
- Soft IC receivers for DL SU-MIMO

BS advanced receivers

- MMSE-IRC for inter-cell interference

Rel-16 leftovers

- eMIMO: Two UE rate matching CRS patterns in multi-DCI Tx scheme
- IAB: DU 30% throughput requirements, DL CA requirements, URLLC requirements, R-ML
- *Note: can be treated in Rel-17 as well*

OTA Testing Enhancements

Further OTA testing enhancements can be considered to ensure proper UE device testing.

The following areas can be considered:

- FR2 OTA test methods for new device types
 - Current FR2 OTA test methods are focused on PC3 handheld type of devices and further extension to additional device types is beneficial to ensure proper testing of FR2 devices
- FR2 OTA test methods for UEs with multi-beam simultaneous RX

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