3GPP TSG RAN Meeting #95-e
Electronic Meeting, March 17 - 23, 2022

RP-220773

Views on RAN4 Rel-18 scope

Agenda Item: 9.1.4
Source: Intel Corporation
Document for: Decision

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Pre-RAN#95e discussion candidate SI/WIs

New WI: NR demodulation performance evolution	RP-220050
New WI: Even Further RRM enhancement for NR and MR-DC	RP-220051
New WI: Further enhancements on NR and MR-DC Measurement Gaps and measurements requirements without gaps	RP-220052
New WI: Further RF requirements enhancement for NR FR1	RP-220053
New SI: Study on NR FR2 OTA testing enhancements	RP-220054
New WI: BS/UE EMC enhancements for NR and LTE	RP-220055
New WI: NR RF requirements enhancement for FR2, Phase 3	RP-220056
New WI: Requirement for NR FR2 multi-Rx chain DL reception	RP-220057
New SI: Simplification of band combination specification	RP-220058
New SI: Enhancement for 700/800/900MHz band combinations	RP-220059
New WI: NR BS RF requirement evolution	RP-220060
New WI: Air-to-ground network for NR	RP-220061
New WI: Adjacent channel High Altitude Platform Station (HAPS) for NR	RP-220062
New WI: Support of intra-band non-collocated EN-DC/NR-CA deployment	RP-220063
New WI: Enhanced NR support for high-speed train scenario in FR2	RP-220064

Initial versions of draft SID/WIDs were formulated during pre-RAN #95e email discussion

Further discussion on scope refinement/prioritization of selected work items required to fit the practical RAN4 TU constraints

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

Intel's views on possible RAN4 Rel-18 contents (non-spectrum items)

- NR FR1 UE evolution
- NR FR2 UE evolution
- NR FR2 UE multi-Rx chain DL reception *
- NR BS RF evolution
- NR and MR-DC RRM enhancements *
- NR and MR-DC MG enhancements *
- NR Demodulation evolution *
- NR FR2 HST enhancements
- NR FR2 OTA test methods SI
- NR FR1 non-co-located intra-band EN-DC/CA
- NR ATG (air-to-ground)
- NR/LTE EMC enhancements for BS and UE
- Rel-17 SIs continuation

Note: (*) - more details on topics are provided in separate contributions

Further discussion on objectives prioritization and down-selection is required for each SI/WI in RAN #95e. Views on selected items are provided in the following slides.

NR FR1 UE Evolution

Prioritized objectives (based on RP-220053)

- 4TX UEs for CPE/FWA/vehicle/industrial devices
- 6RX and 8RX for CPE/FWA/vehicle/industrial devices
- Lower MSD

Views on objectives in WID RP-220053

- 6RX/8RX for CPE/FWA/vehicle/industrial devices
  - 6RX: Enabling both 6Rx/8Rx requirements will provide greater flexibility for UE design. 6Rx for smartphone requires studies and Rel-18 work can focus on CPE. Limited amount of work is expected on top of 8RX requirements

    Proposal: Merge objectives on 6RX and 8RX support for CPE/FWA/vehicle/industrial devices.
  - Extension to 6/8 antenna SRS antenna switching should be considered
- 4TX UEs for CPE/FWA/vehicle/industrial devices
  - Objectives are stable in RP-220053, but UE PC details need further clarifications.
  - Prefer to focus on UE power class 1.5 with 29dBm total output power and 23dBm x 4 PA architecture
- Lower MSD
  - Generic MSD improvement approach is desirable and support to "*study whether the generic approach can be applied based on UE indication of capability*"
  - Recommend to clarify that MSD improvements shall be applicable to existing and new band combinations

NR FR2 UE Evolution

Prioritized objectives (based on RP-220056)

- ❖ UL 256QAM
- ❖ Beam Correspondence for RRC_INACTIVE and initial access
- ❖ Enhanced switching time (ON/ON transient time)

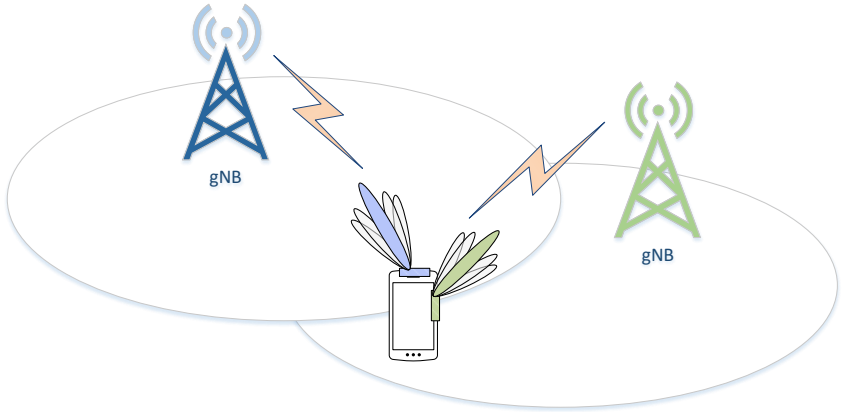
Views on objectives in WID RP-220056

- UL 256QAM
  - Objectives in RP-220056 are stable.
  - There is no need to preclude use of 256QAM for non-FWA devices. PC2/3/6 can be considered as well.
- DL/UL CA/DC RF enhancement in FR2-1
  - RAN4 spent 2 releases improving FR2 CA performance and it is not recommended to consider additional scenarios unless there is a strong operator request
  - Inter-band UL CA was originally a part of Rel-17 and was removed due to lack of interest.
- Beam Correspondence for RRC_INACTIVE and initial access
  - Objectives in RP-220056 are stable.
- Enhanced switching time (ON/ON transient time)
  - Enhanced ON/ON transient time up to 1us would be beneficial from network point of view. ON/ON transient time has a significant impact on UL performance, especially for high SCS (480/960kHz) scenarios in FR2-2 and FR2-1.
  - Objectives in RP-220056 can be used as baseline

NR FR2 Multi-Rx chain

Views on WID objectives in RP-220774

- RF requirements
  - Scope and objectives in are stable RP-220774
- RRM requirements
  - Propose general objective: "*Identify and Specify RRM requirements for enhanced FR2 UEs with simultaneous DL reception with different QCL TypeD RSs on a single component carrier*"
  - At least L1/L3 measurement delay reduction can be considered
  - Other detailed requirements can be left up to RAN4 discussion
  - RRM requirements shall be moved to Core part
- Test methods
  - FR2 OTA test methods shall be considered in a separate SI
  - Scope of SID RP-220054 is stable



WID update is proposed in RP-220774

NR and MR-DC RRM and MG Enhancements

RRM enhancements prioritized objectives

- (1) FR2 RRM delay reduction enhancements
  - Cell identification and measurement delay reduction
  - SCell activation delay reduction
- (2) Extension of requirements for existing features to new scenarios
  - FR1-FR1 NR-DC RRM requirements
- (3) TCI state switching enhancements
  - Reduced TCI switch delay requirements considering UE using temporary RS for fast measurements

See detailed proposals in RP-220775 and RP-220777 (WID)

MG enhancements prioritized objectives

- (1) Enhancements of pre-configured MGs, multiple concurrent MGs and NCSG
  - Pre-configured MGs and multiple concurrent MGs
  - NCSG and multiple concurrent MGs
- (2) RRM requirements for measurement without gaps
  - NeedForGaps related measurements
  - Inter-RAT LTE measurements

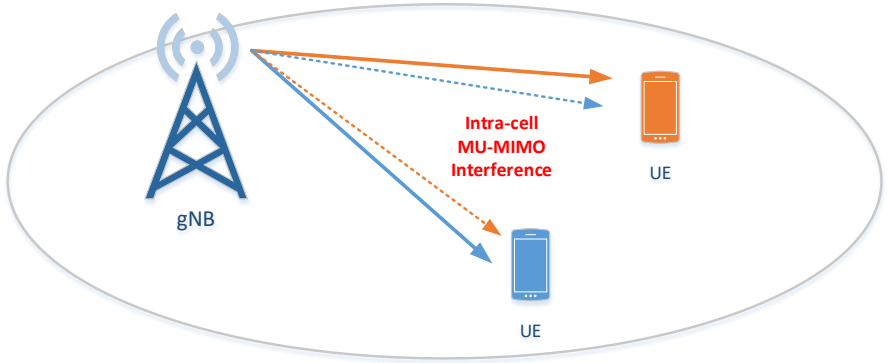
See detailed proposals in RP-220776 and RP-220778 (WID)

NR Demodulation Evolution

Prioritized objectives (based on RP-220050)

- BS advanced receiver (MMSE-IRC)
- UE advanced MU-MIMO receiver
- CRS-IC receiver for LTE/NR overlapping spectrum

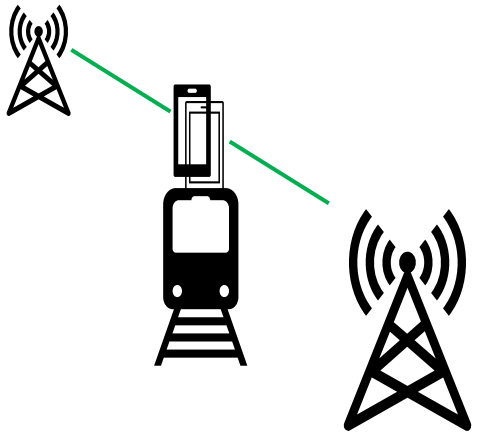
DL MU-MIMO Interference



Views on objectives in WID RP-220050

- BS MMSE-IRC receiver for suppressing inter-cell interference
  - Objectives are stable
  - LTE interference profiles will be considered as starting point. Analysis of NR interference profiles will be required to ensure that requirements are defined under practical NR conditions.
- UE advanced MU-MIMO receiver
  - Objectives are stable
  - Suggest removing "Note: Performance requirements shall be specified under single reference receiver assumption" and further discuss the details of requirements in RAN4.
- CRS-IC processing for scenarios with overlapping spectrum for LTE and NR
  - Objectives are stable
  - The main discussion point will be UE complexity and potential impact on PDSCH processing timelines

NR FR2 HST enhancements



Prioritized objectives (based on RP-220053)

- Requirements for intra-band carrier aggregation (CA)
- Tunnel deployment scenario
- Support of 500km/h
- Multi-panel CPE devices

Views on objectives in WID RP-220053

- Requirements for intra-band CA
  - Both RRM and UE/BS Demodulation requirements shall be considered
  - Do not see need in study stage for RRM requirements
- Tunnel deployment scenario
  - Recommend to study whether existing requirements can be reused
- Mixed near-to-track deployment scenario
  - The scenario was discussed in Rel-17 and do not see a strong motivation for additional studies
- Support of 500km/h
  - Both RRM and UE/BS Demodulation requirements shall be considered, and WI Performance part objectives shall be adjusted accordingly
- Multi-panel CPE devices
  - RF/RRM requirements shall be considered for the Core part and further WID clarifications are needed
- New uplink timing adjustment
  - Details of new UL timing adjustments methods shall be clarified before approving the objectives

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