

3GPP TSG RAN #102

RP-233063

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General Views on Rel-19 RAN4 package

Source: vivo

Document for: Discussion and Decision

Agenda Item: 9.1.4.1

General views on RAN4 Rel-19

- **General thoughts for RAN4 Rel-19 package**

- Keep the similar number of WIs as Rel-18, to ensure the meeting efficiency and quality of specifications.
- The Rel-18 boundary of non-spectrum vs spectrum (agreed in RP-212682) should be respected, otherwise the overall work management in RAN4 may have a risk.
 - Try to avoid the situation of limiting the number of non-spectrum projects in Rel-19, but pushing excessive work into future new WIs as spectrum
 - RAN4 Rel-19 package could consider both non-spectrum scope and potential spectrum scope identified, to have a clear views on RAN4 work
- TU budget for overall Rel-19 RAN4 targets is beneficial to organize the package
 - RAN4 work involves not only RAN4-led items but also the corresponding requirements work from items led by other WGs. The TU capacity should also be considered.
 - Sufficient TU reserved for Rel-19 RAN4 package is needed.
- How to merge the interested topics into umbrella WIs needs further discussions

vivo interests of RAN4 Rel-19 topics

RAN4 Rel-19 Package

Items in **Green** are vivo's high priority items

- **UE RF only**

- FR1 RF enh
 - **Enhancement for Increase UE Power high limit feature**
 - 6Rx (ant feasibility study)
 - NTN HPUE
 - RF UL coverage enhancement
 - Handheld 3Tx CA/DC
- FR2 multi-Tx (STxMP) RF

- **Test**

- **FR1 OTA (TRP/TRS)**
 - **Enhanced test method: new UE type, multi-Tx, CA**
 - **New requirements: 1Tx and 2Tx, new UE type**
- FR2 OTA
- MIMO OTA

- **RRM only**

- RRM Enhancement

- **Demod**

- Demodulation requirements

- **RF+RRM+Demod**

- **FR2 multi-Rx**

- **RRM requirements**
- **RF requirements**
- **Demod requirements**

- **RAN4 RedCap Enhancement**

- **Lower power class RedCap UE**
- **RRM requirements**
- **RF MPR Reduction**

- **Motivations (Details in RP-233064)**

- **Test methods related:**

- *Current test method could not cover XR device and NTN devices, new test method and proper performance metric are needed to quantify the end-to-end radiated performance of these devices with potential new antenna Type/design.*
- *Enhanced TxD and UL-MIMO test method to support 2Tx and 4Tx is needed. New performance metric for UE with 4Tx to quantify beam performance should be studied.*
- *Current CA test method just has limited scope to cover 2DL/1UL band combinations, enhanced test method for large scope with more DL/UL CA combination is required.*
- *Testing-time-reduction solutions for AC and RC test method are important to minimize overall OTA testing time consuming issue.*

- **Requirements part:**

- *Lab alignment activity and performance campaign are based on 1Tx UE configuration. Lab alignment performance under UE 2Tx configurations is required, before developing corresponding 2Tx requirements.*
- *Industry is expecting RAN4 to output more requirements for NR bandwidth UE 1Tx and 2Tx configurations*
 - *Different power classes should be considered based on operators and certification bodies request*
 - *RedCap UE requirements are also considered if commercially available at that time*
 - *Based on RAN guidance, RAN4 should address non-RedCap 2Rx XR OTA requirements impacts*

- **Objectives (Details in RP-233064)**
 - **Test methods related:**
 - UE type: XR device, NTN devices (IoT NTN and NR NTN) should be added for consideration
 - Study and specify test method and potential new performance metric. No requirements defined in Rel-19
 - Enhanced TxM and UL-MIMO test method to support 2Tx and 4Tx, proper performance metric for UE with multi-Tx antenna should also be defined
 - Enhanced CA test method to support CA combination with more DL/UL, e.g., at least 2DL/2UL
 - 3Tx CA combination can be considered
 - Study and specify testing time reduction solutions for AC and RC test method
 - Develop the preliminary Measurement Uncertainty (MU) assessment of the above newly defined test methodologies and test configurations.
 - **Requirements part:**
 - Lab alignment activity and performance campaign based on UE with NR 2Tx configurations. FFS new UE type for lab alignment.
 - Specify TRP TRS requirements and recommended tolerance for UE with NR 1Tx and 2Tx for UE based on enhanced reference test method and defined performance part framework
 - Consider different power classes, e.g. PC3, PC2, PC1.5, based on operators and certification bodies request
 - RedCap UE requirements are also considered
 - Address non-RedCap XR OTA requirements impacts

NR FR2 Multi-Rx DL reception

RF+RRM+Demod



• Motivation (Details in RP-233066)

- In Rel-18, Multi-Rx chain DL reception is supported for some basic scenarios and functions.
 - The feature is supported for single carrier case only
 - Only focused on intra-cell multi-TRP operation scenario
 - TCI state switch requirements are specified based on Rel-15/Rel-16 TCI framework
- CA is supported for multi-TRP operation in Rel-18
 - TCIs can be updated involving multiple CCs

• RRM Requirements enhancement scope

- 4-layer MIMO
 - Specify enhanced requirements for TCI state switch with unified TCI state framework.
 - TCI state switch involving multiple CCs, if CA is supported
- FR2 Measurement delay reduction
 - Specify enhanced requirements for HO, PSCell addition, PSCell change for delay reduction
 - Specify enhanced requirements on Inter-cell beam management
- CA/DC support
 - Enable multi-Rx reception for FR2 CA
 - Enable multi-Rx reception on one carrier when CA/DC is configured.
- Scheduling restriction/measurement restriction relaxation
 - Study and specify enhanced requirements, if feasible, for SSB-based measurements

NR FR2 Multi-Rx DL reception

RF+RRM+Demod

- **RF requirements (Details in RP-233066)**
 - Multi-Rx for FR2 CA
 - intra-band CA
 - Inter-band CA
 - Leftover of FR2 multi-Rx in R18
 - Requirement for other power class, e.g., PC1, PC2, etc.

- **Demodulation requirements**
 - Requirements for demodulation under FR2 CA

RAN4 RedCap Enhancement

RF+RRM



- **Motivation (Details in RP-233066)**

- RLM/BFD measurement relaxation
 - RLM/BFD measurement relaxation is a key feature for UE power saving enhancement in Rel-17.
 - In Rel-17 RedCap WI, RAN4 discussed whether and how to specify RLM/BFD relaxations for Redcap UEs. However, the relaxed RLM/BFD requirements are not yet specified for Redcap.
 - RLM/BFD relaxation can also bring quite power saving gain for RedCap UE, which is more important.
- Low power class
 - Low power class, which will have relative lower radiated power and reference sensitivity requirement, could further reduce device complexity and improve power efficiency.
- Redcap MPR Reduction
 - Achieve less MPR in certain scenarios.

- **Objectives**

- RLM/BFD measurement relaxation
 - Specify the RLM/BFD relaxation requirements for RedCap in Rel-19
- Low UE power class- UE RF impacts
 - Specify lower power class (14dBm and/or 20dBm) and corresponding RF requirements for RedCap in Rel-19
- Redcap MPR Reduction

UE FR1 RF enh

UE RF

- **FR1 RF objectives**

- **Generic enhancement for Increase UE Power high limit feature**

- Single Carrier: increase UE power high limit enh for TxD/UL-MIMO
 - PC2 with 2Tx: PC3 1Tx + PC2 1Tx
 - others
- CA/DC: increase UE power high limit enh for PC2 and PC1.5 for 2Tx and 3Tx CA/DC [may cover the following combinations]
 - PC2 2Tx related: FDD PC2+TDD PC3
 - PC2 3Tx Related: e.g. PC3 1Tx + PC2 2Tx
 - PC 1.5 3Tx related: PC3 1Tx + PC1.5 2Tx

- Study on 6Rx for handheld UE, focus on high band

- Up to 4 layer
- Antenna feasibility study is needed

- PC2 NTN UE for all NTN bands (IoT NTN and NR NTN)

- RF UL coverage enhancement

- MPR reduction/improvement and/or power boosting for PC2 and PC3

- Handheld FR1 3Tx inter-band CA/DC for 2 bands

FR2 OTA testing

Test

- **Objectives**
 - Testability issue for multi-panel RF/RRM/Demod
 - Including FR2 multi-Rx CA and FR2 multi-Tx (STxMP)
 - Testability issue of FR1+FR2 DC/CA RRM test cases

NR MIMO OTA

Test

- **Objectives**

- FR1 MIMO OTA requirements for new bands
- FR2 MIMO OTA requirements for new bands, if needed
 - Operators' request are required
- Study on dynamic MIMO OTA channel model
 - Need operators feedback on scenarios
 - The test system configuration of defined MPAC system is not changed

FR2 multi-Tx RF (STxMP)

UE RF

- **Objectives (STxMP)**

- Definition of “beam peak” for STxMP
- Further study min peak EIRP, spherical coverage requirements for testability related issues
 - Requirements in R18 may need to exhaust all AoA pairs which is impossible from verification perspective
 - The testability should be considered, e.g., Whether the TE can distinguish the power of different beams
- Further study MPR requirement
 - The MPR requirements may not always occur in beam peak due to the interference between beams
- Beam correspondence for multi-Tx
- MPE for multi-Tx, e.g., P-MPR reporting, UL duty-cycle enh

RRM Enhancement phase4

RRM



- **Motivation (details in RP-233065)**

- Rel-17 leftover
 - In RAN#95-e meeting, TCI state switch delay enhancement and HO with PSCell new scenarios were prioritized for Rel-18 in moderator summary RP-220021.
 - It was not considered in Rel-18 due to RAN4 workload issue
- RACH-less handover
 - In Rel-18, RAN4 agreed to define delay requirements and timing requirements on RACH-less handover for NTN scenario.
 - However, there is no requirement for NR RACH-less handover procedure
- Gap combination of different features
 - RAN2 signaling in general supports joint configuration for all gap features, including concurrent gap, Pre-MG, NCSG, ePOS, MUSIM and NTN.
 - It is high likely a UE would support MUSIM and NTN. There is benefit to define corresponding requirements for the joint configuration of the two features in terms of gap handling. MSIM and NCSG may be another example.

- **Objectives**

- TCI state switch delay enhancement
 - Specify requirements for TCI state switch delay based on periodical TRS / A-TRS, for both Rel-15/16 TCI framework and unified TCI framework
- Specify requirements for HO from NR SA to NR-DC
 - HO with Pcell from NR SA to NR-DC
 - CHO with PSCell addition
 - CHO with conditional PSCell additoin
- Specify requirements for NR RACH-less handover
- Gap combination of different features
 - Specify RRM requirements for joint configuration of or MUSIM gaps and NTN gaps
 - Note: Other feature combinations may also be considered depending on interest from industry, e.g., joint configuration of MUSIM gaps and NCSG, etc.

THANK YOU.

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