

vivo

3GPP TSG RAN Rel-19 workshop

RWS-230069

Taipei, June 15 - 16, 2023

# Views on Rel-19 RAN4 package

Source: vivo

Document for: Information

Agenda Item: 6

# 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

# Overview of RAN4 Rel-19 topics

## RAN4 Rel-19 Package

- **UE RF**

- FR1 RF enh
- FR2 RF enh
- FR2 multi-Rx RF
- FR2 multi-Tx (STxMP) RF

- **Spectrum**

- FR1 3Tx spectrum continuation
- FR1 2Tx HPUE spectrum

- **RRM**

- FR2 multi-Rx RRM
- RAN4 RedCap Enhancement
- Measurement gap enhancement
- RRM Enhancement

- **Demod**

- Demodulation requirements

- **Test**

- FR1 TRP/TRS
- FR2 OTA
- MIMO OTA

- **Note:** How to organize the above aspects into umbrella-WI, e.g., FR1 UE RF in R19, can be further discussed from project management perspective

# 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
    - 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, PC2 Tx + PC1.5 2Tx
- Study on 6Rx for handheld UE (up to 4 layer)
- PC2 NTN UE for all NTN bands
- General PC2 RedCap UE for all FR1 band
  - only for sensor and camera form factor
- Enhanced TxD with 3Tx
- 8Tx for FWA

- **Others have RAN1 impacts**

- MPR enhancement-potential leftover from Release-18
- Achieving better FR1 coverage and/or performance- leftovers
  - General SAR scheme related reporting, mostly Duty cycle/P-MPR reporting related
- Extend the Tx Switching feature to FWA with 3Tx simultaneous case

# UE FR2 RF enh

## UE RF

- **Limiting similar scope size as Rel-18, clear interests from operators are needed.**
- **Objectives may be considered**
  - FR2-1 CA enhancement (clear requests needed from operators)
    - FR2-1 intra-band + inter- band CA
    - Enable simultaneous Rx/Tx
  - FR2 MPE mitigation enhancement
    - per panel/per beam P-MPR reporting

# FR2 multi-Rx RF

## UE RF

- **Objectives**
  - FR2 multi-Rx for FR2 contiguous CA
  - Leftovers of Multi-Rx RF from Rel-18:
    - Requirement for the bands other than 28GHz
    - Requirement for the power class other than PC3

# FR2 multi-Tx RF (STxMP)

## UE RF

- **Objectives (STxMP)**
  - MOP design for multi-Tx including min peak EIRP, spherical coverage
  - Beam correspondence for multi-Tx
  - MPE for multi-Tx, e.g., P-MPR reporting, UL duty-cycle enh
  - Leftovers of Multi-Tx from Release-18:
    - Requirements other than in P<sub>cm</sub>ax section would not be considered in Rel-18 ([R4-2310268](#))
      - Supporting Panels are restricted to 2 in Rel-18;

# FR1 3Tx spectrum continuation

## Spectrum

- **Spectrum WI Objectives**

- 3Tx for inter-band UL CA/DC + UL-MIMO/TxD handheld UE normative work
  - Without increase UE power high limit. The generic enhancement of UE power high limit feature should be considered in FR1 UE RF
  - Need clear band combinations from operators
    - WI focus on band combination specific requirements
- 3 bands CA/CA+DC (High complexity)

- **Basket WI Objectives**

- New bands for 3Tx for inter-band UL CA/DC
  - FWA form factor based on Rel-18 outcome

# FR1 2Tx HPUE spectrum

## Spectrum

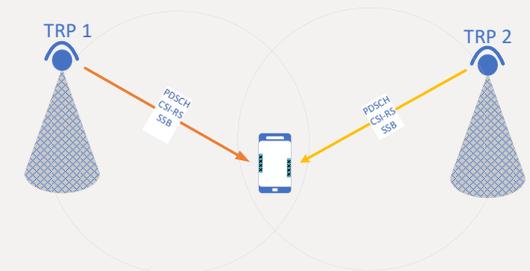
- **Spectrum WI objectives**
  - PC1.5 2Tx Related
    - 2Tx CA, Including: inter-band CA / inter-band EN-DC / intra-band CA
    - Tx and Rx RF requirements
    - Clear band combinations should be added based on operators interests
      - WI focus on band combination specific requirements

# FR2 Multi-Rx RRM motivation

## RRM

- **Motivation**

- FR2 Multi-Rx chain DL reception is an very attractive feature
  - Enable support of 4-layer DL MIMO in FR2
  - Scheduling availability enhancement and/or measurement restriction relaxation taking advantage of simultaneous DL reception capability of multi-Rx chain.
- 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
  - Rel-15/Rel-16 TCI framework is the baseline to define TCI state switch requirements
  - Focused on L1 measurement delay reduction
- Beam pair information is acquired based on Rel-17 group-based beam reporting
  - The procedure needs improvement taking UE implementation aspects into account



# FR2 Multi-Rx RRM objectives

## RRM

- **New scenario (depending on RAN4 progress)**
  - Enable multi-Rx reception for FR2 contiguous CA
  - Enable multi-Rx reception on one carrier when CA/DC is configured.
- **Procedure enhancement**
  - Enhancement on group-based beam reporting, if necessary
  - Note: RAN1 involvement may be expected.
- **RRM Requirements enhancement for supporting 4-layer MIMO in FR2**
  - To support unified TCI state framework
  - Requirements for enhanced beam pair reporting, if necessary
- **RRM Requirements enhancement for multi-Rx chain UE capability**
  - Enhanced requirements for L3 procedures
    - HO, PSCell addition, PSCell change
  - Enhanced requirements for L3 measurement related
    - Measurement delay reduction, scheduling availability enhancement
  - Enhanced requirements on Inter-cell beam management
    - Support of multi-Rx chain DL reception for R17 ICBM

# RAN4 RedCap Enhancement

RRM



## • Motivation

- RLM/BFD measurement relaxation
  - RLM/BFD 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.
- L1-SINR measurements for Redcap
  - L1-SINR measurement was introduced in Rel-16. These feature was not specified for Redcap UE at Rel-17/18.
  - From beam management point of view, it is beneficial to have L1-SINR measurement for Redcap UE.
- 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.

## • Objectives

- RLM/BFD measurement relaxation
  - Specify the RLM/BFD relaxation requirements for RedCap in Rel-19
- L1-SINR measurements for Redcap
  - Specify L1-SINR requirements for RedCap in Rel-19
- Low UE power class- UE RF impacts
  - Specify lower power class and corresponding RF requirements for RedCap in Rel-19

# Measurement gap enhancement phase3

RRM



- **Motivation**

- Gap overhead
  - RAN2 signaling in general supports joint configuration for all gap features, including concurrent gap, Pre-MG, NCSG, ePOS, MUSIM and NTN. However, RAN4 did not define any requirements for restriction on joint configuration of different gap features in Rel-17.
  - The overhead could have notable negative impact on throughput performance if multiple gap related features are jointly configured.
  - No requirements are defined on maximum number of gaps to be supported when gap related features are jointly configured
- Gap combination
  - Requirements are only specified for particular jointly configuration of gap related features in Rel-18. Other cases are also beneficial.
- Other potential Rel-18 gap relevant leftover
- Other potential new gap enhancement

- **Objectives**

- Specify requirements on overhead and the maximum number of gaps to be supported for combination of multiple or all gap related features.
- Specify requirements for particular joint configuration case of NCSG + Pre-MG scenario.
- Specify requirements for other necessary gap related features

# RRM Enhancement phase4

## RRM



- **Motivation**

- 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.
  - However, 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
- Other potential Rel-18 RRM leftover
- Other potential new RRM enhancement

- **Objectives**

- Specify requirements for TCI state switch delay based on A-TRS.
- Specify requirements for HO from NR SA to NR-DC
  - Could be done in Rel-18 TEI
- Specify requirements for NR RACH-less handover
  - Could be done in Rel-18 TEI
- Specify requirements for other necessary Rel-18 RRM leftovers

# FR2 OTA testing

## Test

- **Objectives**

- Corresponding test methods enhancement for multi-panel RF/RRM/Demod, including multi-Tx (STxMP)
- Leftovers
  - Leftover issues of multi-Rx in Rel-18

# FR1 TRP TRS enh

## Test

- **Objectives**

- Test methods for new UE type (XR, NTN UE..), new phantoms if needed
- Optimized test methods for TxD or single-layer UL-MIMO
- CA test methods for 3Tx configurations (2bands and/or 3 bands)
- PC3 TRP/TRS requirements for FR1 RedCap UE
- PC1.5 TRP/TRS requirements
- Potential Leftovers from Release-18
  - CA test method for 2 band with 2Tx
  - PC2 TRP/TRS requirement for 2Tx handheld UE (TxD and single-layer UL-MIMO)
  - Unfinished bands for 1Tx requirements (n77/n5/n8..)

# NR MIMO OTA

## Test

- **Objectives**

- FR1 MIMO OTA requirements for new bands
- FR2 MIMO OTA requirements for new bands
- Study on dynamic channel model
  - Need operators feedback on scenarios
- Leftovers from Release-18
  - Phantom-based MIMO OTA test method
  - New FR1 MIMO OTA system to support larger QZ size
  - FR1 and FR2 MIMO OTA requirements for a few unfinished bands

THANK YOU.

谢谢。