3GPP TSG RAN #101
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# Views on RAN4 Rel-19

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# Outline

- General views
- Demod topics
- RF topics
- RRM topics
- OTA topics

# General views on RAN4 work

- Proposals for RAN4 timeline
  - » The non-spectrum items package shall be approved in March 2024 according to the endorsed RAN time guidance (RP-230050).
  - » The spectrum work items to be continued in Rel-19 shall be approved in the type of package in/after March 2024 of which the time may depend on their completion of Rel-18.
  - » The specific spectrum work items which are not in the Rel-18 continued basket WIs package would be independent of the timeline due to operators' requests.

# General views on RAN4 work

## Focused RAN4 topics

### Demod topics

- UE Soft-IC receiver under SU-MIMO
- BS advanced receiver (MMSE-IRC) for suppressing inter-cell interference
- UE ATP requirements to 4 CSI-RS ports and maximum 4 layers

### RF topics

- 3Tx/6Rx for handheld UE
- High power UE basket WIs
- Power enhancement for dutycycle/high limit
- Rel-19 downlink interruption basket WI for 4 bands combinations at dynamic Tx Switching in uplink

### RRM topics

- FR2 RRM measurement delay enhancements
- Measurement gap enhancements

### OTA topics

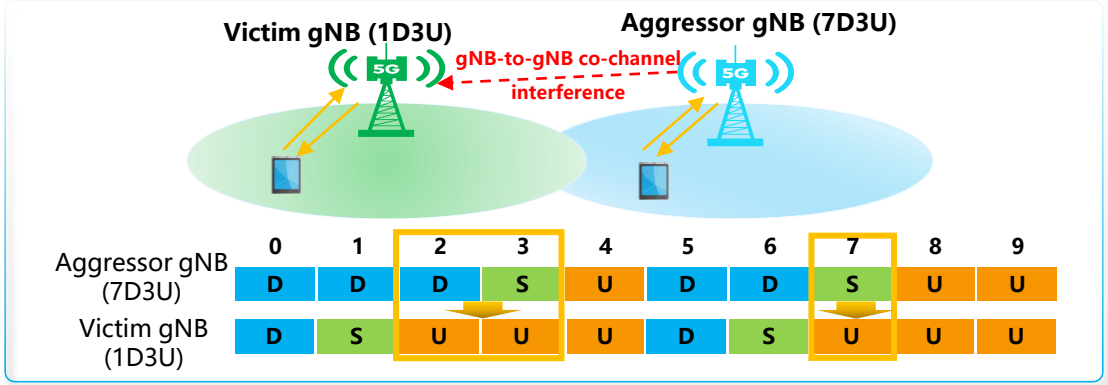
- FR2 OTA enhancement for simultaneous transmission with multi-panel(STxMP)
- MIMO OTA enhancement to support dynamic test methods and requirements for FR1/FR2 new bands
- FR1 TRP TRS enhancement

# Demodulation topics

- In Rel-18 demodulation requirements evolution WI, companies have focused on the following topics:
  - » UE advanced receivers for suppressing intra-cell inter-user interference under MU-MIMO scenario
  - » UE application layer throughput requirements with link adaptation
    - The requirements is limited to maximum rank 2 with 2 CSI-RS ports
- Considering the Rel-18 RAN4 workload, there were leftover topics which have also received wide interests:
  - » UE Soft-IC receiver under SU-MIMO
  - » BS advanced receiver (MMSE-IRC) for suppressing inter-cell interference

# Demodulation topics

- From the operator point of view, there are benefits for UE supporting Soft-IC receivers to achieve better DL performance under SU-MIMO scenarios. Therefore, in Rel-19, it is proposed to investigate the performance of Soft-IC and specify corresponding UE demodulation requirements if performance gain could be observed.
- The UE MMSE-IRC requirements have been defined in Rel-17. Thus, there is necessity to introduce the corresponding BS MMSE-IRC requirements for FDD and TDD, also considering the larger ICI for the UL due to UE high power class transmission in 5G NR.
  - » In addition, in field test with different TDD UL/DL configurations between neighboring cells, heavy gNB-to-gNB co-channel CLI is observed, which can also be mitigated by BS MMSE-IRC.




- At the same time, it is also proposed in Rel-19:
  - » To extend the UE application layer throughput requirements to 4 CSI-RS ports and maximum 4 layers

# RF topics

- More Tx/Rx for handheld UE
  - » 3Tx handheld UE: single band 3Tx, 2 bands UL CA with UL-MIMO in one hand
    - NOTE: With Rel-16/17 Tx switching, inter-band UL CA with UL-MIMO on one or two band have already been supported for UE capable for 2Tx, where the UL CA and MIMO are not scheduled at the same time
  - » 6Rx for handheld UE, which was dropped from Rel-18 RAN4 scope
- High power UE basket WIs
  - » Continued basket WIs for high power UE
  - » PC1.5 supporting for inter-band CA (PC2+PC2)
  - » PC1.5 supporting for intra-band CA (contiguous or non-contiguous)
    - **If new PC1.5 basket WI is approved, it is suggested to refine the WI title and objectives with other high power UE basket WIs. The intention is to better categorize and trace them**

# RF topics

- Enhancement for power domain
  - » Continue optimize the dutycycle SAR solution by
    - enabling UE report on the $\Delta P_{PowerClass}$, if no conclusion in Rel-18
    - introducing ‘duration’ information (e.g., a UE can sustain UL at a previously or concurrently reported PCmax) report for FR1
  - » Discuss whether to introduce P-MPR report in FR1 that has been stopped in Rel-18
- Enhancement for increasing UE power high limit
  - » Extend the capability for increasing power high limit to more power class use cases including
    - PC2 + PC3 for 3Tx architecture
    - PC1.5 + PC2/PC3 for 3Tx architecture
- Rel-19 downlink interruption basket WI for 4 bands combinations at dynamic Tx Switching in uplink

# RRM topics

- FR2 RRM measurement delay enhancements
  - » Joint delay reduction mechanisms for FR2 RRM measurement including
    - Rx beam sweeping number reduction
    - Potential signaling enhancement to support FR2 measurement delay reduction
- Measurement gap enhancements
  - » Continue leftover issues for pre-configured MG and NCSG including
    - Pre-configured NCSG related mechanism, activation/deactivation procedure, etc.
    - Parallel measurements upon NCSGs collision

# Thanks!