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RP-240313

R19 UE RRM enhancement

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RRM enhancement candidates

- RAN4 Rel-19 package has been discussed in RAN#102 and summary can be found in RP-233918. In the latest guidance from RAN chair (RP-240019), it is targeted to down scope to only two topics, i.e. FR2 L3/L1 measurement delay reduction, and fast Scell activation with EMR.
- For the detailed contents our view are shown in the following pages.

RRM enhancements (**2 topics**) • FR2 L3/L1 measurement delay reduction • Fast Scell activation with EMR	WI

References: RP-233951

Potential objectives:

- FR2 L3/L1 measurement delay reduction with reduced Rx beam sweeping and enhanced CSSF for connected mode
  - FFS on applied scenarios, justification and feasibility on reduced number of Rx beam sweeping
    - For single Rx, focus on the case of CA/DC where it is currently specified that the delay is scaled with the number of CCs
    - For multi-Rx, focus on the single carrier case
    - Other scenarios (if so, clearly defined)?
- ~~Parallel measurement with NCSG~~
- ~~Pre-configured NCSG~~
- ~~HO with PScell for scenarios for NR SA to NR DC~~
- ~~Extend the R17 RLM/BFD relaxation requirements to RedCap UEs~~
- ~~Enhancements to maintain the UE reception and transmission during the period (or part of period) of DL, UL and joint DL/UL active TCI state switching~~
- ~~Specify the requirements for inter-frequency and intra-frequency L1 measurement based on NCSG~~
  - ~~Further study on RAN1/2 impact~~
- ~~A-TRS based TCI switch delay and Scell activation~~
- ~~Scell with UL only transmission with study on RAN1/2 impact~~
- ~~Dynamic RTD/TTD status update~~
  - ~~FFS on the applied scenario and also the performance gain for network and UE~~
  - ~~FFS on RAN2 impact on designing the report, e.g. event triggered report~~
  - Further check with RAN1 MIMO item if the reporting has been already included
- Fast Scell activation with EMR with both delay requirements for Scell activation and enhanced measurement accuracy requirements.
  - To start from Q3'2024 and aim for completion in Dec'2024
    - Workplan for this bullet can be discussed in May'2024
- ~~Combination of different gap types, e.g., Pre-MG and NCSG and combination of gap enhancement and other features, e.g., NTN, POS, MUSIM~~

Slide 22

FR2 L1/L3 measurement delay reduction

General view:

- FR2 measurement delay for L1 and L3 measurements are much longer than those in FR1 due to UE RX beam sweeping. It is beneficial of this enhancement.
- The work for FR2 delay reduction has already started in R18 eFeRRM WI (FR2 SCell activation) and Multi-Rx WI (FR2 L1 measurement) which can be leveraged in Rel-19.
- It is possible to reduce FR2 L1/L3 measurement delay with some assumptions, e.g., utilizing multi-Rx chain/multi-panel to perform fast beam sweeping or supporting more searchers to processing multi-carrier measurement.
- Only RRC connected mode should be considered in this enhancement, considering power consumption impacts in idle/inactive if make UE activates more panels and operates fast beam sweeping.

Fast Scell activation with EMR

General view:

- It is more like the continuation of R18 leftover for fast CA/DC setup.
- Scell activation in RRC connected mode can leverage the valid results from both Idle/inactive and connected mode for the purpose of fast CA/DC setup
- The measurement results and report before the activation complete can be considered, including before, during and after RRC CONNECTED mode
- Both Scell and PScell can be considered in the candidate carrier or cell list for EMR

R19 RRM enh objectives proposal

FR2 L1/L3 measurement delay reduction

- The measurement delay reduction includes reduced Rx beam sweeping and enhanced CSSF **for connected mode only**
- Study the feasibility of measurement delay reduction for single Rx and multi-Rx.
- **Existing measurement accuracy requirements should be used as baseline** to improve measurement delay.
- Specify if needed, signaling enhancement for the UE to meet the reduced FR2 delay requirements

Fast Scell/PScell activation with EMR

- Identify the scenarios, and specify the corresponding RRM requirements for fast Scell/PScell activation with EMR including before, during and after UE enters RRC CONNECTED mode
- Specify if needed, signaling enhancement for the UE to meet the reduced FR2 delay requirements

Thank you

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