

3GPP TSG RAN#102

Edinburgh, Scotland, December 11-15, 2023

RP-233671



Agenda Item: 9.1.4.3
Source: Xiaomi
Document for: Discussion

Xiaomi's views on RAN4 RRM topics for Rel-19

Xiaomi



Candidate Rel-19 RAN4 RRM Topics

■ RRM requirement Evolution

- L1 measurement with Type-2 MG/NCSG/NeedforGap in LTM
- Reduced L3 delay requirements in FR2
- TCI state switching enhancement

■ Measurement Gap Evolution

- Parallel measurement upon gap occasions collision
- Pre-configured NCSG
- Interworks among NTN/MUSIM/PreMG/Concurrent gaps

■ Multi-RX Evolution in FR2

- Dual unified TCI state activation
- Enhancement on L1 measurement
- Enhancement on L3 measurement
- Extended RRM requirement when $RTP > CP$

RRM Requirement Evolution - L1 measurement with Type-2 MG/NCSG/NeedforGap in LTM



■ Motivation

- In Rel-18 LTM, legacy MG is assumed to define inter-frequency L1 measurement. However, there are some limitations to network and UE implementation due to restriction conditions based on legacy MG.
- Extended delay for legacy inter-frequency L3 measurement due to sharing between L1 and L3 measurement.
- In order to optimize the efficiency and flexibility on both network and UE sides, it's quite desirable to introduce other types of MG for L1 inter-frequency measurement in LTM, e.g. Type-2 MG/NCSG/NeedforGap.

■ Objective

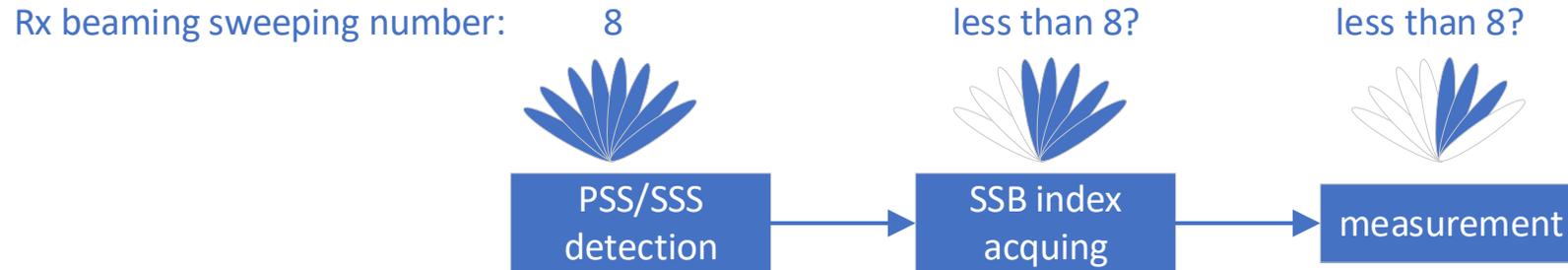
- Specify UE capability
- Specify measurement period requirement

RRM Requirement Evolution - Reduced L3 delay in FR2



■ Motivation

- FR2 L3 measurement delay reduction is important to improve the FR2 utilization experience in real.
 - In FR2 intra-band scenario, co-located deployment is assumed. The current CSSF takes all configured MOs into account, which leads to large delay. There is no necessity to perform measurement on all configured MOs in the same band.
 - For a newly detected cell, the expected UE behavior is to perform PSS/SSS detection, SSB time index acquiring and measurement with RX beam sweeping sequentially. However, UE can acquire some beam information via the previous process. Therefore, reduced delay requirement due to less RX beam sweeping in the later steps may be achieved.



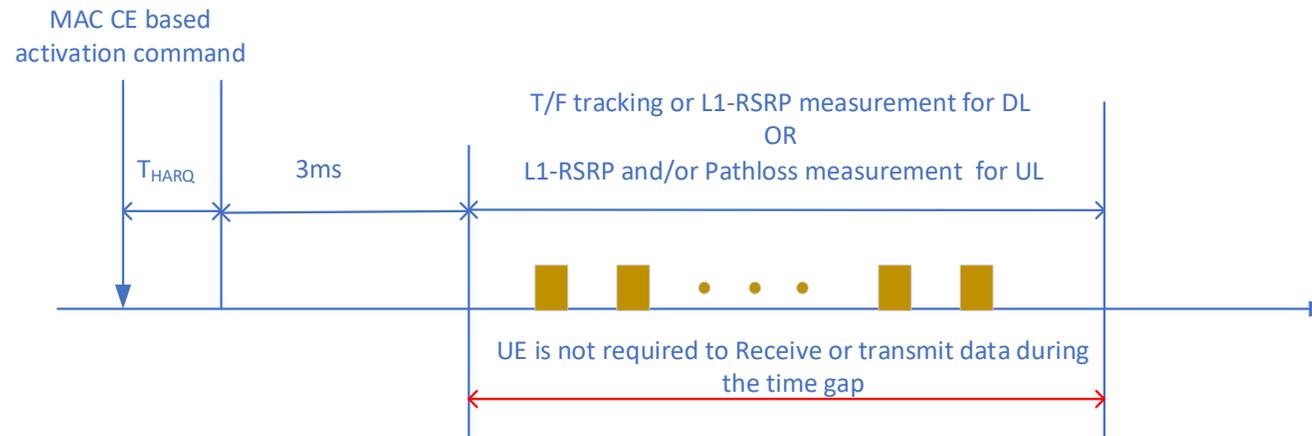
■ Objective

- Specify enhanced CSSF in intra-band FR2 L3 measurement
- Specify reduced delay requirement for newly detected cell in FR2
 - RX beam sweeping number in different step
 - Condition for reduced RX beam sweeping
 - UE capability

RRM Requirement Evolution - TCI state switching

Motivation

- In legacy Rel-16 TCI state or Rel-17 unified TCI state activation, UE can receive or transmit old data until $n+T_{\text{HARQ}}+3\text{ms}$. After that, there will be a time gap that UE is not required to receive or transmit data until UE has finished the DL/UL TCI activation, which will have impact on the throughput. The time gap may be long depends on different scenarios:
 - For Downlink, time gap due to T/F tracking or L1-RSRP measurement
 - For Uplink, time gap due to L1-RSRP and/or pathloss measurement



Objectives

- Specify enhancement RRM requirement for UE to receive or transmit data during the time gap
- Identify and specify if any other reference signal could be used to speed up the switching delay

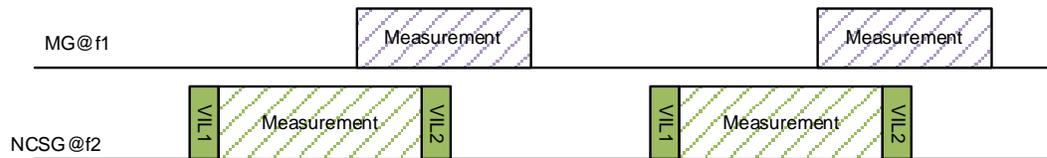
Measurement Gap Evolution



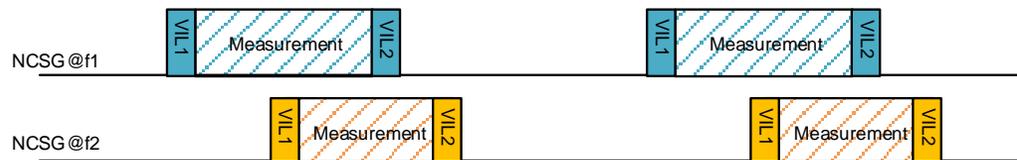
■ Parallel measurements with NCSG

- Motivation: In case of concurrent MGs in which one of NCSG was configured, the parallel measurements on the multiple collided concurrent gaps are feasible if UE has vacant RF chain(s). This can improve both NW and UE's efficiency significantly.
- Proposal: Parallel measurements with NCSG can be introduced in Rel19 with the objectives below
 - The necessary requirements for the parallel measurements with NCSG and other
 - UE capability to support this aspect

Example scenario:



Case 1: MG + NCSG



Case 2: NCSG + NCSG

■ Pre-configured NCSG

- Motivation: If Rel18 WI, the joint discussion among pre-configured MG and NCSG was precluded. But some scenarios below in which the disadvantages of non pre-configured NCSG was identified.
 - When SCell measured was being deactivated, UE receiving DL scheduled data could be outraged because of the processing on RRCReconfiguration to release associated NCSG.
 - Additionally, when SCell measured was being switched from deactivated to activated, UE may not perform the measurements on the SSBs on the deactivated SCell before UE complete RRCReconfiguration for the new NCSG or MG.
- Proposal: Pre-configure NCSG can be introduced in Rel19 with the objectives below
 - The mechanism to configure the pre-configured NCSG
 - The activation/deactivation procedure
 - UE capability to support this aspect

■ Interworks among NTN/MUSIM/PreMG/Concurrent gaps

- Motivation: In Rel19, the joint operations with the multiple advanced gap aspects after Rel17 (ed.g. Pre-configured, concurrent gaps, and NTN) are desired. But in Rel18, ue to lack of time, these issues were postponed.
- Proposal: The requirements for inter-works among NTN/MUSIM/Pre-MG/Concurrent gap can be defined.



Multi-RX Evolution in FR2

■ Motivation

- Rel-15/16/17 leftover, basic requirement and limited enhancement is defined for intra-cell mTRP with $RTD < CP$, e.g.
 - Fast beam sweeping for Non-GBBR based L1-RSRP measurement
 - Scheduling/measurement restriction relaxation in limited scenarios, e.g. Data+RS or RS+RS in L1 measurement with dual TCI states reported in GBBR
 - Rel-15/16 based dual TCI activation requirement
- Data+RS, RS+RS based on Multi-RX can be extend to more scenarios in Rel-19, e.g. L1/L3 delay reduction, scheduling/measurement relaxation, $RTD > CP$.
- Beam management performance in Multi-RX can be further enhanced as interference is not mainly considered in GBBR and TRP specific CBD is not aimed for Multi-RX reception.

■ Objectives

- Dual TCI activation
 - Rel-17 Unified TCI state based dual TCI state switch
- Enhancement on L1 measurement
 - TRP specific CBD enhancement
 - Interference measurement
 - Delay reduction for GBBR
 - Scheduling/measurement restriction relaxation
- Enhancement on L3 measurement
 - Measurement delay reduction
 - Scheduling/measurement restriction relaxation
- Extended RRM requirement when $RTP > CP$



Thanks!