Qualcomm

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# Views on Rel-18 Mobility enhancements

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Document for: Discussion

# Outline

- Discussion on conclusions from NWM
- Topics we like to discuss further
- Recommendation for the WI

# Moderator Conclusions from NWM

## L1/L2 Mobility

- RAN2 is the leading WG for mobility enhancements in Rel-18, while RAN1, RAN3 and RAN4 are impacted WGs.
- For L1/L2 mobility, the following scenarios will be considered:
  - prioritized scenarios: (1) Standalone, CA (2) Intra-DU case and intra-CU inter-DU case (3) Both intra-frequency and inter-frequency (4) Both FR1 and FR2
  - second-priority scenarios only if time is allowed (can be revisited once the scenarios are clearly described): MR-DC
- L1/L2 inter-cell mobility got very wide support and should be specified in Rel-18 with the following high-level objectives:
  - To specify mechanism and procedures of L1/L2 based inter-cell mobility :
  - Configuration and maintenance for multiple candidate cells [RAN2, RAN3];
  - Dynamic switch mechanism among candidate serving cells for the potential applicable scenarios [RAN2,RAN1];
  - L1 enhancements, including inter-cell/mTRP beam management, L1 measurement and reporting, beam indication and timing management (if needed, as a second priority) [RAN1, RAN2, RAN4];
  - NOTE: FR2 specific enhancements are not precluded, if any.

# Moderator Conclusions from NWM

## DAPS Enhancements

- DAPS for FR2-FR2 is assumed to be specified in Rel-18, and the major impact is in RAN4. So the final decision is left to RAN4.
- As the baseline, CHO+MRDC and DAPS+CA/DC will be considered in Rel-18. Other items (i.e., DAPS+CHO/CPAC ,CHO + CPC) will be further discussed online.
- The following description can be used as the baseline for further discussion on the scoping of objective on DAPS/CHO enhancements:
  - To specify mechanism and procedures for CHO enhancements in MR-DC scenario
    - Procedure and configuration of CHO in MR-DC scenario [RAN2, RAN3];
  - To specify mechanism and procedures for DAPS operation for CA/DC
    - Support simultaneous configuration and procedures of DAPS and CA/DC [RAN2, RAN4]

# Comments on Moderator Conclusions

## L1/L2 Mobility

- We support the suggested objectives from the moderator on L1/L2 mobility.
- For the prioritization of the scenarios, we would suggest the following modifications:
  - Inter-DU should be lower priority than intra-DU. This will require either a new inter-DU interface or major changes to F1 interface.
  - MR-DC should be high priority. The procedures for SA/CA can mostly be re-used for MR-DC:
    - L1/L2 mobility is important for FR2, and it is expected that FR2 will be an SN in NR-DC deployments.
  - At least the case of intra-SN L1/L2 mobility without MN impact should be specified which can re-use SA/CA procedures:
    - This will be similar to how CPC intra-SN was specified in Rel-16 by re-using MN CHO framework while inter-SN CPC was done in Rel-17.

# Comments on Moderator Conclusions

## DAPS/CHO Enhancements

- We support the conclusion on DAPS for intra-FR2.
- We do not think DAPS + MR-DC and DAPS + CA should be high priority:
  - DAPS is already a complicated feature for the implementation, mainly due to the need for simultaneous reception/transmission.
  - MR-DC and CA will require more than two active legs. This is very high complexity for the UE and can only be supported for high-end UEs. This objective will also require significant new RAN4 work.
  - Rel-16 DAPS can already achieve 0ms latency. Further increasing throughput by CA/DC during the short HO interruption provides only minor gains and is not critical for most use cases.
- CHO enhancements are very important:
  - CHO/CPC is getting more traction in the field and much easier to implement, compared to DAPS.
  - CHO/CPC is very beneficial to improve mobility robustness, i.e., to reduce HO failure, which is a critical KPI.
  - CHO + MR-DC and CHO + CPC should be high priority.
  - CHO/CPC enhancements for FR2 (some discussed even in Rel-16) should also be high priority since FR2 mobility is more challenging and ping-pong and reliability issues are more likely than FR1.

# Topics we like to discuss further

## FR2 enhancements

- In current specifications, including Rel-17, mobility mechanism is mostly same for FR1 and FR2.
- For Connected mode, there are procedures to handle beam failures and recovery for FR2 operation. However, no optimizations were introduced for FR2 mobility.
- It is very well known that FR2 mobility has unique challenges due to dynamic nature of beam changes and beam failures.
- Handover failures and ping-pongs can happen more often in FR2.
- A general objective should be included in the WI for enhancements to FR2 mobility:
  - At least for CHO and CPC as discussed in the previous slide but preferably for also legacy HO.
  - Enhancements to reporting of beam measurements during mobility to reduce failures should be considered.
  - Better incorporation of individual beam qualities in handover decisions can improve early and wrong handover problems.

# Recommendation for the WI

## Scope and objectives

- Support the moderator conclusion for the WI to be RAN2-led
  - RAN2 is the leading WG for mobility enhancement in Rel-18, while RAN1, RAN3 and RAN4 are impacted WGs.
- Most of the topics are well known from previous releases:
  - L1/L2 mobility
  - DAPS for intra-FR2
  - CHO/CPC enhancements
- Other FR2 enhancements can be discussed based on contributions:
  - Some have been discussed in Rel-16 but not pursued due to lack of time.
- We do not see a need for a Study Item phase.
- RAN4 load for the objectives should be considered in the general setting of WG load and not specific to this WI.

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