RP-213374

3GPP TSG RAN #94e
Electronic Meeting, December 6 - 17, 2021

AI: 8A.2

Views on R18 Mobility Enhancement

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Background

- The *[RAN94e-R18Prep-10] Mobility Enhancements* discussion and the objectives of the draft WID (RP-212710) focus on the following areas
  - L1/L2 mobility enhancements
  - DAPS/CHO related enhancements
  - CA/DC related mobility enhancements

- The UE diversification has been supported on the market and standards
  - The High/Medium/Low-end UE devices can support the different UE capabilities and complexities.
  - The support in standards: e.g. XR/IIOT for High-end device, RedCap for Low-end device

- The listed areas/objectives require the higher NW and UE complexity, but mobility enhancements are also useful (and practical) for the low-end UE devices which cannot rely on the support of multiple beams and/or DC configurations.

R18Pre Discussion Structure

- Introduction
- Initial Phase
  - General
  - Area 1: L1/L2 mobility enhancements
  - Area 2: DAPS/CHO related enhancements
  - Area 3: CA/DC related mobility (previously from CA/DC discussions)
  - Summary of initial phase
- Intermediate Phase
- Final Phase
- Conclusions
- References

Draft WID scope

4.1 Objective of Core part WI

The detailed objective of this work item are:

1. To specify mechanism and procedures of L1/L2 based inter-cell mobility for mobility latency reduction:
   - Configuration and maintenance for multiple candidate cells to allow fast application of configurations for candidate cells [RAN2, RAN3]
   - Dynamic switch mechanism among candidate serving cells (including SpCell and SCell) for the potential applicable scenarios based on L1/L2 signalling [RAN2, RAN1]
   - L1 enhancements, including inter-cell beam management, L1 measurement and reporting, beam indication, and for non-synchronized scenario to handle TA management [RAN1, RAN2]
   - CU-DU interface signaling to support L1/L2 mobility, if needed [RAN3]

   Note 1: FR2 specific enhancements are not precluded, if any.
   Note 2: The procedure of L1/L2 based inter-cell mobility are applicable to the following scenarios:
   - Standalone, CA and NR-DC case with serving cell change within one CG
   - Intra-CU case and intra-CU inter-DU case (applicable for Standalone and CA)
   - Both intra-frequency and inter-frequency
   - Both FR1 and FR2

2. To specify mechanism and procedures of MR-DC with selective activation of the cell groups via L3 enhancements:
   - To allow subsequent CPC/CPAC after changing SCG without reconfiguration and re-initiation of CPC/CPAC [RAN2, RAN3, RAN4]
   - TBD: whether Rel-17 CPC/CPAC mechanism is used as the baseline
   - TBD: whether to limit MR-DC to EN-DC and NR-DC

3. To specify CHO including target MCG and target SCG if it cannot be completed in Rel-17 [RAN3, RAN2]

4. To specify CHO including target MCG and candidate SCG for CPC/CPAC [RAN3, RAN2]

   - CHO including target MCG and target SCG is used as the baseline

Limitation of the current draft WID scope

- Current WID scope focuses the-enhancements to some specific UE types:
  - The enhancement for the UE who supports CA/DC
  - The enhancement for the UE who supports DAPS
  - The enhancement for the UE who supports the MIMO enhancement

- Current WID scope does not consider the solutions that do not require additional capabilities on both the UE and the NW (and which can be easily implemented).
  - CHO and DAPS HO are specified as the two main solutions in R16 mobility enhancements.
  - But in the real deployment, while the CHO is widely supported by UE vendors and NW vendors due to the low complexity, but this is not the case with DAPS.
  - LTE already supports mobility enhancements which do not depend on the complex MIMO/DC requirements while this is lacking in NR.

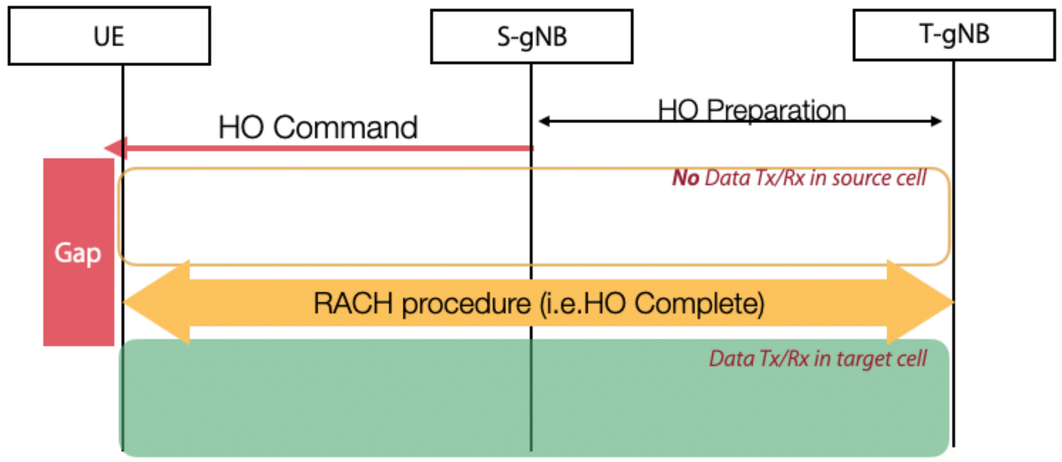
- **Observations**
  - Current draft WID scope cannot improve the mobility performance for the UEs who donot support the CA/DC or the UEs who donot support the strong MIMO capability.
  - **R18 mobility enhancement should consider the enhancement for the different UE Types.**
    - All the listed objectives/areas are not suitable for at least the low-end UE devices.
  - **The mobility enhancement based on simple UE operation should be included in the R18 scope.**

Current draft WID scope	UE requirements
L1/L2 mobility enhancement	• The enhancement requires UE to support the strong MIMO capability.
DAPS/CHO enhancement	• R16 DAPS HO is much more complex to UE due to the new DAPS PDCP mode and the simultaneous Rx UE requirement. • Further R18 enhancements requires UE to support simultaneous Rx at least, to support CA/DC+DAPS, or CHO+CA/DC, or CHO +CPC/CPAC.
CA/DC related mobility enhancement	• The enhancement requires the UE to support CA/DC first.

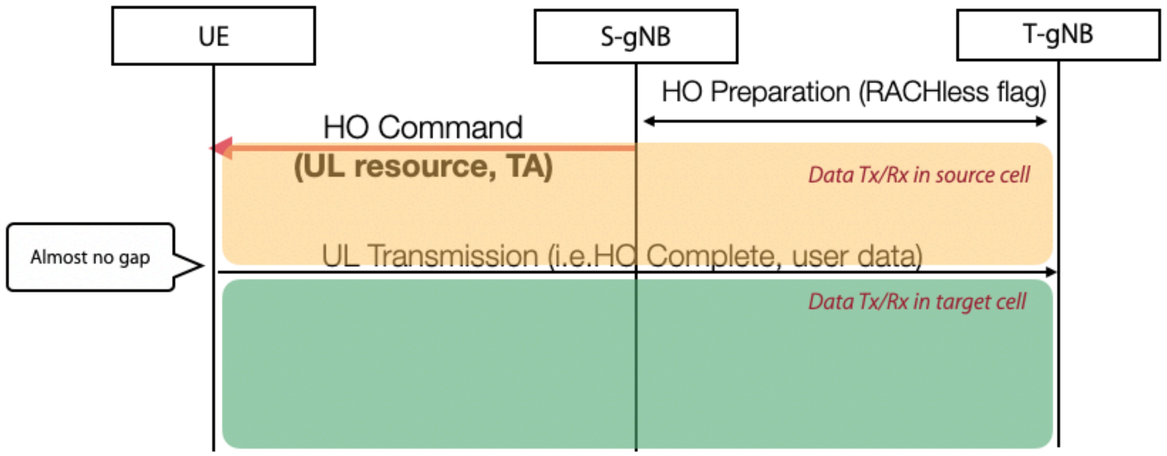
The simple solutions for the mobility enhancements

- LTE like RACH-less HO and MBB HO can be considered for the HO interruption time reduction purpose.
  - Benefit
    - Both solutions do not require high UE complexity, and UE is not required to support the simultaneous reception/transmission.
  - Potential drawback
    - The HO interruption time may be not exact 0ms but can be reduced compared to the legacy HO.
    - But if UE can support the DL sync in target cell before HO, or if the UE can support the DL sync acquisition and the transmission via source link simultaneously, the HO interruption time can achieve 0ms.

- **Observation**
  - The LTE like MBB and RACH-less HO scheme can reduce the HO interruption time with low complexity.



Legacy HO



RACH-less + MBB HO

Conclusions and WID proposal

- R18 mobility enhancement should consider the enhancement for the different UE types (for e.g., which do not require the support of complex MIMO/DC operations)
  - R18 mobility enhancement should include the LTE like MBB HO and RACH-less HO.

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4. To specify CHO including target MCG and candidate SCG for CPC/CPAC [RAN3, RAN2]
   - CHO including target MCG and target SCG is used as the baseline
5. To specify mechanism and procedures for mobility latency reduction which does not require the support of MIMO or DC:
   - Configuration and operation of LTE-like MBB and RACH-less HO [RAN2, RAN1]

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