



3GPP TSG RAN Rel-19 workshop  
Taipei, June 15 - 16, 2023

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Source: Apple  
Agenda Item: 5

# Views on Rel-19 Mobility Enhancements

Apple

# R19 Mobility | Further Mobility Enhancements and Extensions

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- **Motivation:**

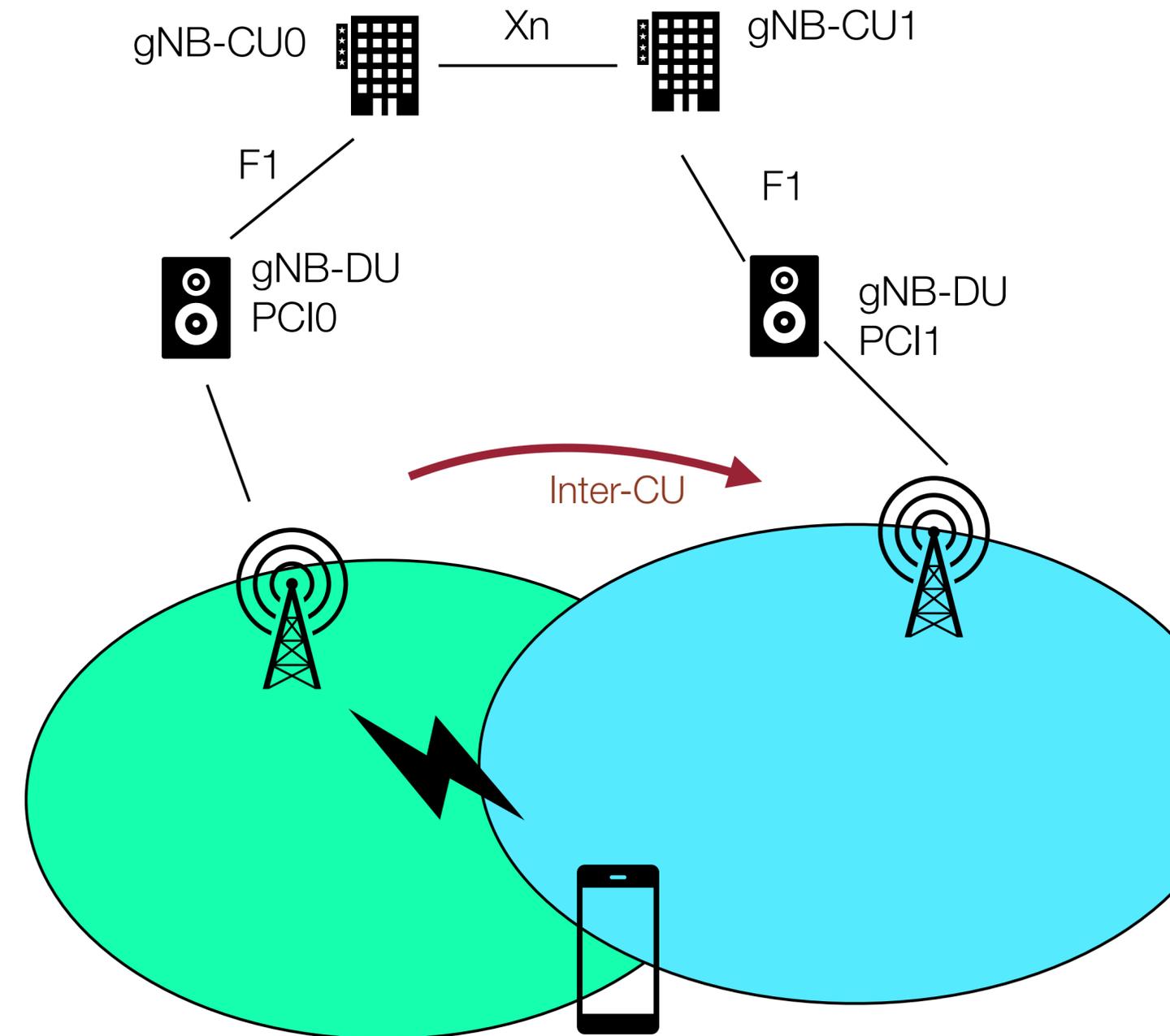
- Extending/enhancing the R18 L2 mobility
- Further reduction in mobility latency:
  - A few scenarios lend to achieving this, and these were not fully considered in NR.
  - Consideration of low-cost devices
- Towards enhancing the mobility robustness:
  - Using the R18/R17/R16 mobility enhancements, link recovery can be enhanced/eliminated
- Signaling optimizations : Handover signaling overhead reduction in the scenarios where a large number of UEs handover to the same cell simultaneously.



# R19 Mobility | Further Enhancements to LTM

## ■ LTM Areas for improvement and enhancements:

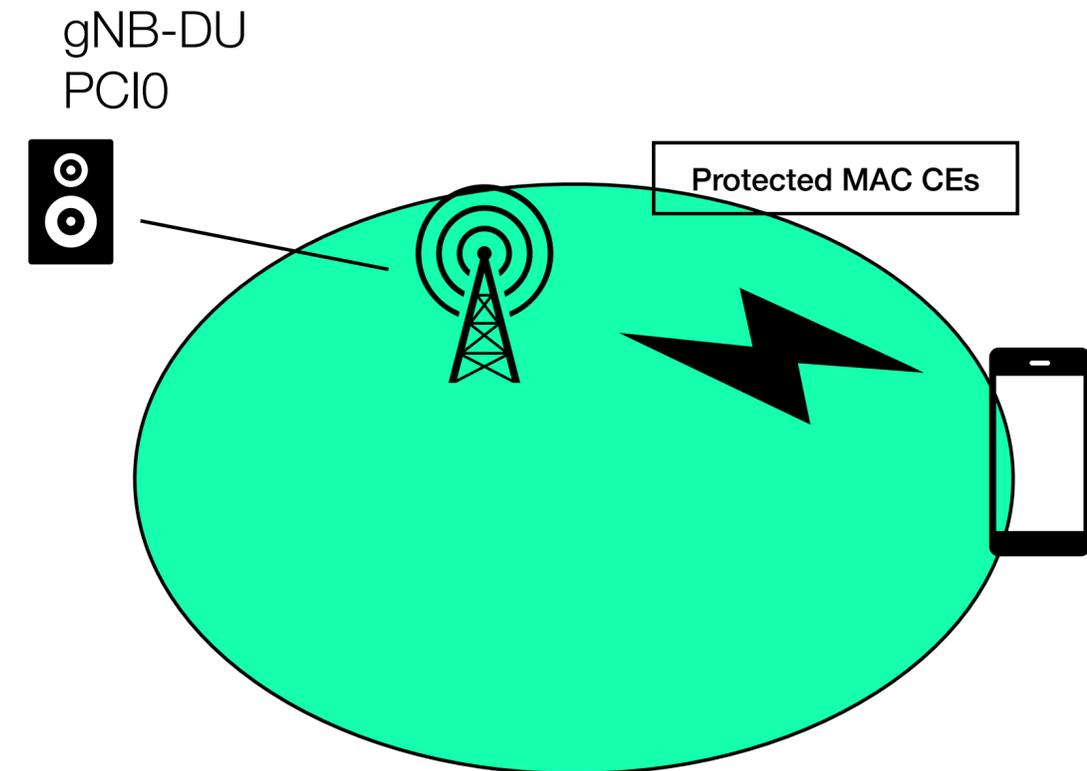
- Rel-18 LTM brings in features and procedures to reduce the interruption and handover latency.
- Also reduces the L3 signaling overhead to a large extent.
- However there are shortcomings with Rel-18 in terms of practicality and feature operation:
  - Rel-18 LTM is limited to a single gNB-CU. Advantages of LTM UE mobility is constrained by this. Cannot span across larger geographical deployments or in case of dense NWs where multiple gNB-CUs are operating
  - Operation driven by L2 signaling inherently has security risks (compared to L3 based legacy Mobility)
  - Rel-18 LTM does not support UE/event triggered report for L1 measurement report, which results in a larger overhead and increased handover latency.
  - Due to lack of availability of TUs, likely the RAN4 requirements for Rel-18 LTM would be more intra-frequency focused and so optimizations related to inter-frequency would likely need to be deferred, e.g. L1 measurement with dedicated gap, NCSG or NeedForGaps may not be supported in R18. All of the above further narrows the deployment and usage of Rel-18 LTM.
  - LTM related FR2 specific enhancements could also be left out
  - Conditional Handover (conditional LTM switch) is very useful for mobility robustness, and is likely not specified in Rel-18



# R19 Mobility | Further Enhancements to LTM - Proposals

## - Proposals for Further enhancements to L2 mobility

- Handling of L2 triggered mobility for inter-CU case and inter-CU + inter-DU case
  - Handling of multi-beams with different security config
- Protection of L2 signaling
  - Aim is to not repeat the L3 security, but ensure that L2 signaling is protected from tampering, so that the UE can validate the sender before applying the L2 signaling.
- Specify UE/event-triggered beam measurement reporting for LTM operation.
- Specify the overhead reduction of CSI measurement report for LTM operation.
- Enhancements towards operation and reduction of latency in inter-band and inter-frequency LTM.
- A common Conditional LTM framework for both intra and inter-CU LTM
- Study FR2 specific enhancements to further reduce the beam latency in LTM operation



# R19 Mobility | Further Reduction in Latency

- **Areas of enhancements for reduction in latency:**

- Make-before-break HO, RACH-less HO
  - Applicability to LTM
  - Applicability to L3
    - Simple UE implementations/Low cost devices that are not required to implement LTM

- **Areas of enhancements for mobility robustness:**

- Fast failure/RLF recovery enhancements
  - CHO like recovery mechanism upon RLF detection
  - PCell failure recovery via SCell
  - Target cell configuration provision via the Reestablishment procedure
- Misc enhances towards further robustness from UE perspective
  - UE triggered primary path switching for split DRB
  - UE triggered duplication activation/deactivation
  - UE triggered SCG/SCell activation/deactivation
- Inter-RAT mobility enhancement
  - CHO for inter-RAT PCell change or PSCell change
  - LTE and NR interworking in INACTIVE state

- **Signalling optimization:**

- Group handover (based on the progress from R18)
  - Study and specify a “common” signaling framework for the group handover mechanism
  - Including the group handover trigger, target cell configuration provision in group manner, HO failure handling, security, etc.
  - Applicable to both L3 and L2 mobility.



# R19 Mobility | Further Reduction in Latency - Proposals

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- **Proposals for further enhancements to mobility latency reduction and robustness**
  - Specify NR specific Make-before-break HO, RACH-less HO features for L3 mobility and LTM starting the LTE feature as the baseline
  - Study and specify link failure recovery enhancements starting with focus on
    - CHO like recovery mechanism upon RLF detection
    - PCell failure recovery via SCell
    - Target cell configuration provision via the Reestablishment procedure
  - Study UE assisted mobility signaling for further robustness starting with
    - UE triggered primary path switching for split DRB
    - UE triggered duplication activation/deactivation
    - UE triggered SCG/SCell activation/deactivation
  - Study the feasibility and usefulness of Inter-RAT mobility enhancements for the below
    - CHO for inter-RAT PCell change or PSCell change
    - LTE and NR interworking in INACTIVE state



