3GPP TSG RAN Meeting #102
Edinburgh, GB, December 11 – 15, 2023
Agenda Item: 9.1.2.1

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Discussion of R19 work on mobility enhancements

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Background for R19 mobility enhancement

With the completion of R18 mobility enhancement, many companies think the mobility enhancement work should be continued into R19

- The mobility architecture for R18 is a simplified one: intra-CU only
  - In RAN #101, 26 companies were interested in inter-CU mobility for R19 work
- In R18, solutions for UL sync delay reduction can be improved to further support fast cell switching
  - UE based TA measurement currently is only allowed for source/target CCs collocated scenarios (precisely synchronized with TAE <260ns), and it can be enhanced to be practical in most mobility scenarios with source/target cells non-collocated
  - During R18 discussion, many companies proposed network assisting UE TAE compensation to enable UE TA measurement in most common non-collocated/imprecisely synchronized scenarios
- In R18, L1 measurement and beam selection for LTM was not fully discussed
  - During R18 discussion and R19 workshop, many companies proposed to support CSI-RS L1 measurement for LTM
  - Reduction of the delay due to measurement and target beam selection should be further studied
- Harmonized conditional and network triggered LTM is not discussed in Rel-18
  - In RAN #101, 19 companies showed their interest on this topic

Motivations and benefits of further mobility enhancement

- Motivation and goals for further mobility enhancement
  - Further reduce/eliminate latency and service interruption
    - Ensure high throughput in both DL and UL at the coverage border area during mobility
    - Support real-time and interactive services
  - Further improve mobility robustness/reliability
    - Industrial communication system
  - Signaling overhead reduction
- Major expanded functions for further mobility enhancement
  - Develop a scheme for inter CU/gNB mobility
  - Specify UE based RACH-less for non-collocated source/target, i.e., imprecisely synchronized (TAE<260 ns) scenarios. It is critical for fast cell switching in inter CU/gNB mobility
  - Further enhancement for high frequency scenarios, e.g., CSI-RS L1 measurement for LTM
  - Delay reduction for not only control plane but also user plane
    - E.g. MAC reset causing HARQ data loss, and how to conduct early data forwarding

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Objectives of R19 mobility enhancement (1/2)

- Extend R18 LTM framework of intra-CU to Inter-CU/gNB scenarios
  - Generic architecture for inter-CU mobility could be further discussed in R19
    - Support both cases that target CU is MN and target CU is SN
  - RACH-less and expansion of UE based TA measurement to source/target non-collocated scenarios
    - Support the normal mobility scenarios where source and target cells are non-collocated and imprecisely synchronized (TAE>260 ns)
  - Inter-CU subsequent mobility issues with inter-CU at the upper layer such as security
  - User plane enhancement for data loss and latency reduction
    - Support early data forwarding before sequential cell/cell group switch over Uu interface
  - There will be additional network interface impact to Xn – additional work for RAN3

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Objectives of R19 mobility enhancement (2/2)

- Measurement related enhancement
  - Improve measurement efficiency for latency reduction and UE power saving
    - Priority/selective measurement, including L1/L3 measurement and RRM
    - Dynamic update candidates for L1 measurement, event triggered measurement report
  - L1 CSI-RS measurement and reporting of candidate/target cell(s)
  - For UE TA measurement, the UE starts measuring the RSTD at the early DL synchronization and continues tracking DL synchronization/RSTD-measurement periodically
- Combining/Harmonizing network triggered LTM with conditional mobility for more robustness and low-interruption
  - Configuration of network triggered and/or UE triggered cell change including CHO, CPAC
    - Both configured for the same candidate cell or one configuration per candidate cell
  - CPAC, CHO using UE based TA measurement and RACH-less.

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