3GPP TSG RAN meeting #101
Bangalore, India, September 11 - 15, 2023
Agenda item: 8A.2.8 XR Evolution

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Further XR enhancements

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Motivation for further XR enhancements

- The new work item on XR for NR is under discussion in Rel-18, which provides enhancements on various aspects, such as XR awareness, power saving, and capacity enhancement.
- However, in Rel-18, the following aspects are not fully discussed and further enhancements may be needed.
  - **XR awareness:** more characteristics of XR traffic may be identified to better support more complicated XR services (e.g., multi-modality flows).
  - **Power saving:** Rel-18 WID mainly focuses on DRX enhancement for the issue of non-integer XR traffic periodicities. In Rel-19, more power-saving techniques, which may be based on the study of TR 38.838 in Rel-17, can be further discussed to reduce UE power consumption.
  - **Capacity enhancement:** Rel-18 mainly focuses on licensed bands and non-CA/DC scenarios. To further improve the capacity of XR traffic, XR operations in unlicensed bands and potential enhancements on CA/DC can be further studied.
  - **Reliability:** As specified in Rel-18, different PDU Sets may have different PSI (PDU Set importance), and hence have different reliability requirements. To improve the reliability of PDU Sets with higher importance, the potential enhancement on reliability can be studied.
- It is proposed to continue the work on XR in Rel-19 to further enhance XR-awareness, power saving, and capacity of XR traffic. Furthermore, enhancements on reliability can also be considered.

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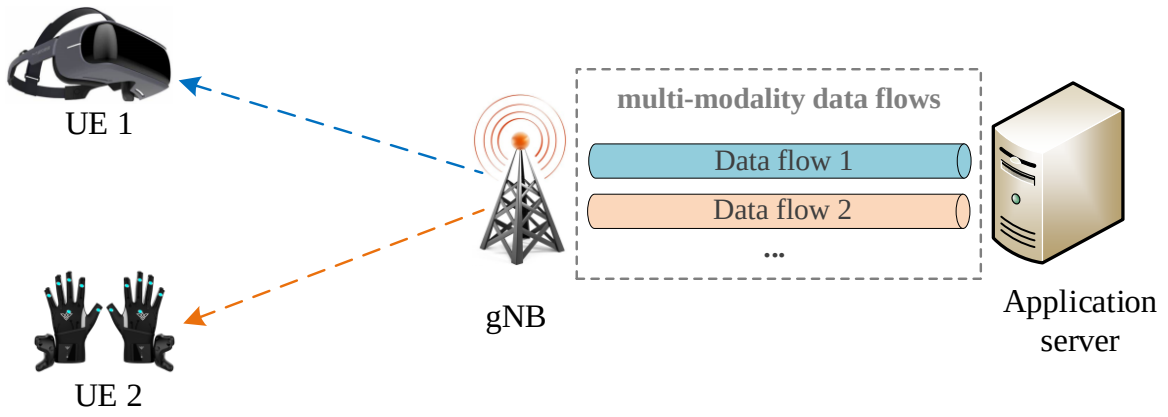
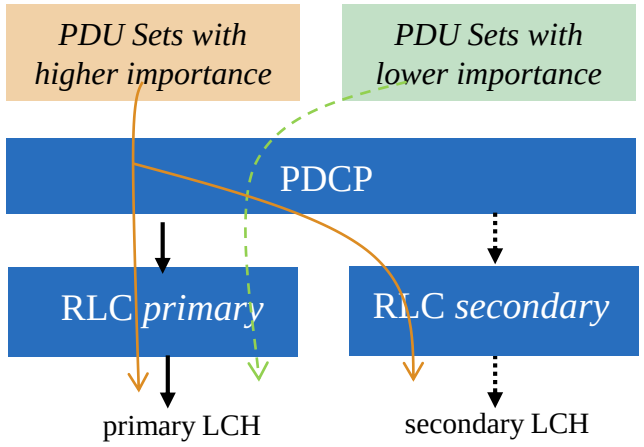
Overview of further XR enhancements

- Immersive multi-modal application for single/multiple UEs requires synchronization and coordination of multiple data flows/streams that are closely related. Then, Potential enhancements to support multi-modality flows can be considered.
- Enhancements on reliability can be considered based on PSI, e.g., PDU Sets with higher importance are duplicated.
- Further enhancements on power saving and capacity shall improve the user experience.



Immersive multi-modal application with multiple UEs



PDCP duplication based on PSI

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Objectives for further XR enhancements

- In Rel-19, we propose the following objectives:
  - Specify the aspects of reliability enhancements. e.g., based on PDU Set importance.
    - DRB/LCH mapping based on the PSI (PDU Set importance).
    - PDCP duplication based on PSI to improve the reliability of PDU Set with higher importance.
  - Specify the enhancements related to power saving.
    - Enhance PDCCH monitoring (e.g., SSSG switching or PDCCH monitoring skipping) to better align with jitter and skip unnecessary monitoring.
    - C-DRX enhancement: Including but not limited to adaptive DRX and multiple DRX configurations.
  - Specify the enhancements related to capacity.
    - Scheduling enhancements, e.g., SPS/CG/dynamic scheduling enhancements.
    - Potential enhancements on CA/DC/unlicensed spectrum to improve capacity, e.g., uplink CA/DC enhancement based on PSI.
  - XR-awareness: Cooperate with SA2/SA4 if new input is provided.
    - Potential enhancements on PDU Set importance across different QoS flows or different importance within a PDU Set.
    - Potential enhancements to support multi-modality flows, e.g., synchronization and coordination between flows or UEs.

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Summary

- It's worth continuing the work on further XR enhancements in Rel-19 to further enhance the aspects of XR-awareness, power saving, and capacity for XR traffic.
- Additionally, enhancements on the reliability of XR traffic can be beneficial in Rel-19.

- **Proposal:** New WI of further XR enhancement is approved for Rel-19 with the following scope (details as in previous slide):
  - Further enhancement of XR-awareness, power saving, and capacity for XR traffic.
  - Additional enhancement for XR traffic reliability.

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