

3GPP TSG RAN Meeting #102
Edinburgh, Scotland, December 11-15, 2023

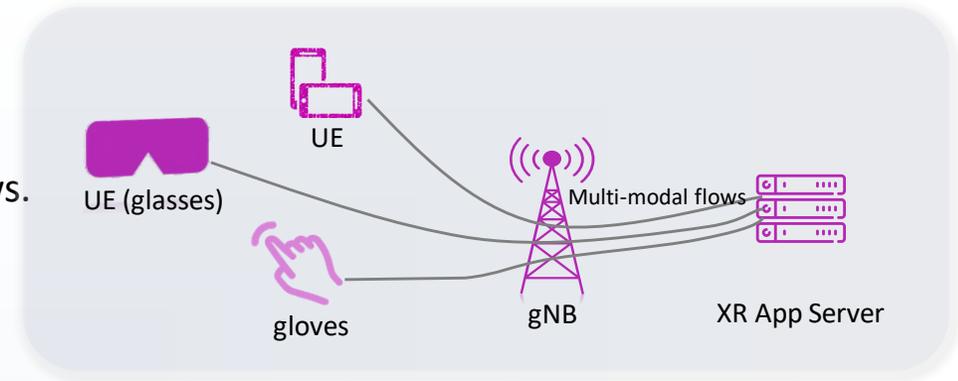
RP-232982

Agenda Item: 9.1.2.2
Source: Spreadtrum Communications
Title: XR enhancements for Rel-19
Document for: Discussion and decision

Issue1: Supporting of Multi-modal flows

Motivation

- Multi-modal flow service is introduced in SA for single or multiple UEs.
- SA2 has introduced the common id and QoS monitoring for multi-modal flows.
- Synchronization among multi-modal flows is identified as a critical issue.



Consideration

- RAN study of multi-modal flows is needed to facilitate synchronized transmission.
 - Scheduling/LCP enhancement for multiple QoS flows.
 - Specify assistance information including synchronization requirement, e.g. assistance information from UE or CN.
- To guarantee synchronized transmission for multiple UEs, considering the following restrictions.
 - keep these UEs stay in the same cell.
 - Coordinated access control and mobility management.

Proposal 1: Enhance the support of multi-modal flows in R19.

Issue2: Measurement gap enhancements

Motivation

- Any data transmission or reception is not allowed in GAP duration, which may:
 - impact the capacity heavily.
 - introduce extra delay due to blocked scheduling within Gap.
- However, Measurement Gap is needed for intra/inter frequency measurement.

Consideration

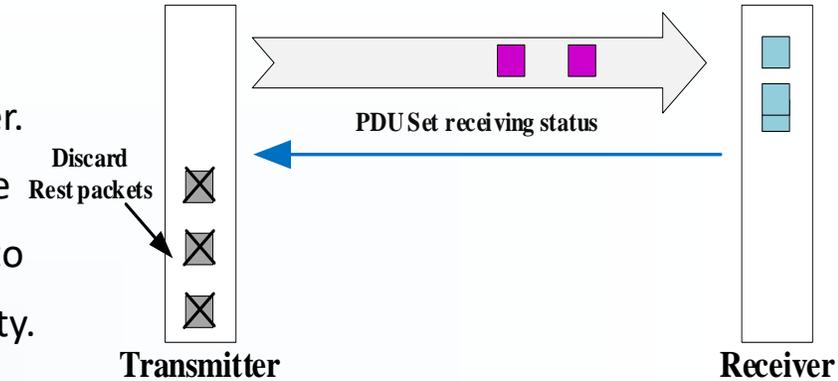
- In order to improve capacity and prioritize XR transmission, enhancements to MG should be introduced in R19 XR WI, including:
- ✓ More flexible Gap configuration to ensure Gap can be deactivated when some conditions are met.
 - The network can indicate UE to deactivate/activate one Gap.
 - UE can deactivate/activate one Gap under the network control, e.g. based on preconfigured condition.
- ✓ However, one principle should be obeyed, i.e., no significant impact introduced on measurement performance.

Proposal 2: Introduce Measurement gap enhancement for XR in R19.

Issue3: Further capacity improvement

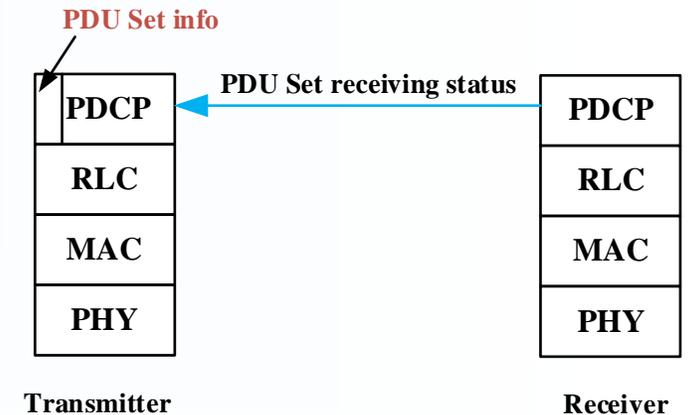
Motivation

- PSIRH is introduced to indicate whether all PDUs of one PDU set are needed in receiver.
- For the case where not all PDUs are needed, the transmitter can stop transmitting the rest packets of the same PDU set if the successfully transmitted packets can be used to decode the whole payload carried in the PDU Set, which can improve network capacity.



Consideration

- To make transmitter avoid unnecessary transmission of rest PDUs of the PDU Set, the following can be considered:
 - Introduce PDU Set receiving status report in receiver, which is used to indicate transmitter that enough PDUs of the PDU Set are received successfully.
 - The transmitter discard the rest PDUs upon the PDU Set receiving status report.
 - The PDU set info like PDU Set Sequence Number should be transmitted to receiver for generating PDU Set receiving status, e.g., via PDCP header.



Proposal 3: Discard mechanism based on PDU Set receiving status is introduced for capacity improvement.

Issue3: Further capacity improvement

Motivation

- UTO-UCI can indicate unused CG PUSCH TO(s) on multiple CG configurations configured to serve XR UL traffic, e.g. video, audio, pose.
- UTO-UCI indication by a single UTO-UCI for multiple CG configurations can save the UL resource allocation and achieve less power consumption.
- Possible earlier indication for another CG PUSCH configuration can be achieved.

Consideration

- Extend the UTO_UCI indication by CG PUSCH(s) of a CG configuration to CG PUSCH(s) of other CG configuration(s) .

Proposal 4:

- **Support extending the UTO_UCI indication by CG PUSCH(s) of a CG configuration to CG PUSCH(s) of other CG configuration(s). [RAN1]**

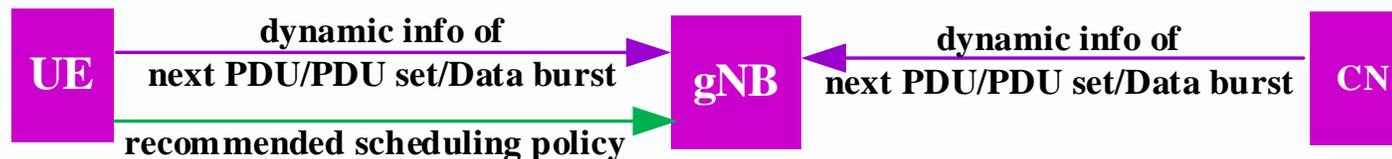
Issue4: Further XR awareness

Motivation

- The application-layer can predict the dynamic information of XR traffic (e.g. inter-burst time, arrival time, PDU Set Importance) which will be beneficial for the UE power saving (e.g. PDCCH monitoring optimization) and capacity enhancement (e.g. PDCP discarding optimization) in RAN.
- For DL traffic, the application-layer in UE can indicate the transmission of the subsequent PDU/PDU set/data burst(s) is not needed to AS layer based on its processing result/policy, which is beneficial for capacity enhancement in RAN.

Consideration

- UE/CN can provide the predicted dynamic info of next PDU/PDU set/data burst to gNB.
- UE can indicate a recommended scheduling policy for the subsequent DL PDU/PDU set/data burst(s) to gNB.



Proposal 5: Study further XR awareness including predicted dynamic info of next PDU/PDU set/data burst and recommended scheduling policy for subsequent DL PDU/PDU set/data burst(s).

Objectives for Rel-19 XR

The following XR objectives can be considered in Rel-19:

- Enhance the support of multi-modal flows [RAN2,RAN3].
 - Study synchronized transmission of multi-modal flows including enhanced scheduling/LCP.
 - Study enhanced RAN awareness of multi-modal flows including the synchronization requirement.
 - Study coordinated access control and coordinated mobility for UEs with the same multi-modal application.
- Measurement gap enhancements [RAN2,RAN4,RAN1].
 - Specify network controlled dynamic gap activation/deactivation.
 - Specify UE-centric gap activation/deactivation based on network configuration.
- Further capacity improvement.
 - Specify PDU Set receiving status reporting mechanism for case that not all PDUs of the PDU set are needed. [RAN2,RAN3]
 - Specify the delivery of PDU Set info (e.g. PDU set SN) over Uu.[RAN2]
 - Specify extending the UTO_UCI indication by CG PUSCH(s) of a CG configuration to CG PUSCH(s) of other CG configuration(s).[RAN1]
- Further XR awareness [RAN2,RAN3].
 - Specify procedure for UE/CN to provide predicted dynamic info of next PDU/PDU set/data burst (e.g. inter-burst time, arrival time, PDU Set Importance).
 - Specify procedure for UE to indicate gNB the recommended scheduling policy for subsequent DL PDU/PDU set/data burst(s).

Thanks

