

3GPP TSG RAN Meeting #98-e

12th-16th December 2022

RP-222981

Discussion on Rel-18 WI scope for XR Enhancements

Agenda Item: 9.1.2

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Document for: Discussion



Conclusion of XR study in RAN1 and RAN2

SI Objectives	Completion Status		Status/Conclusion to Highlight from Rel-18 SI
	RAN2	RAN1	
XR Awareness in RAN	✗	✓	<ul style="list-style-type: none"> - XR specific information provided by CN to RAN - UE and RAN can identify PDU set and data burst dynamically - Discard operation is enhanced based on XR specific characteristics - LS sent to SA2/SA4 about reliability, re-ordering and Pose requirements
Power Saving Techniques	✓	✓	<ul style="list-style-type: none"> - Alignment of C-DRX periodicity with XR traffic - Pre-configuration of C-DRX is allowed
Capacity Improvement Techniques	✓	✓	<ul style="list-style-type: none"> - Enhancements to support indication of unused CG PUSCH occasions by UCI and to support multiple CG PUSCH occasions in a period - BSR enhancements considering XR specific characteristics

Potential Next Steps for Rel-18 XR work

- Options on how to continue Rel-18 XR work in RAN:
 - Option 1) Extend SI to conclude on XR Awareness in RAN for one quarter.
 - The work on other topics is postponed until SI is fully concluded.
 - Option 2) WI and SI run in parallel.
 - SI is extended to conclude the open topics of the XR Awareness in RAN for one quarter.
 - WI can start on objectives completed in SI.
 - Option 3) WI includes a study phase.
 - WI includes a study phase for one quarter to conclude the open topics of the XR Awareness in RAN and work on the objectives completed in SI also starts in parallel.

Proposal 1. To discuss whether to run a SI and WI in parallel (options 2) or a WI with completed objectives including a study phase (option 3) to continue Rel-18 XR work in RAN

XR Awareness in RAN (1/3)

- The SI objectives (RP-220285) on XR-awareness in RAN and current status:
 - Study and identify the XR traffic (both UL and DL) characteristics, QoS metrics, and application layer attributes beneficial for the gNB to be aware of. [RAN2 SI status: completed]
 - Study how the above information aids XR-specific traffic handling. [RAN2 SI status: further discussion is required]
- Open issues
 - Which requirements does RAN need to meet for XR traffic (as RAN2 asked in LSs to SA2/SA4) considering
 - Different reliability handling over Uu interface for different type of PDU sets
 - In-sequence delivery to upper layers
 - Pose related requirements
 - How to handle different reliability over Uu including re-ordering, if required?
 - What AS specification changes are required based on the DRB modeling chosen and the required PDU set mapping/handling.

XR Awareness in RAN (2/3)

- Possible options for the objective:
 - Option a) Continue with similar objective as in current SID (RP-220285).
 - [Objective 1 (option a)] Study how the PDU set/data burst info. aids RAN on XR traffic handling [RAN2] (until RAN#99).
 - Option b) Clarify the remaining areas of study considering RAN2 open topics identified.
 - [Objective 1 (option b)] Study required AS changes (if any) to meet the XR applicable requirements including [RAN2] (until RAN#99)
 - different reliability handling over the air interface for different type of PDU sets
 - in-sequence delivery to upper layers
 - pose related requirements.
 - NOTE: RAN2 considers SA2/SA4 responses to latest questions and SA2 conclusions from Rel-18 XR SI

Proposal 2. On XR awareness in RAN, to discuss whether to keep similar Objective 1 as in Rel-18 XR SID RP-220285 (option a) or clarify the topics to conclude the study (option b)

XR Awareness in RAN (3/3)

- XR information associated for PDU set and data burst is provided by CN to RAN (including semi-static one for DL and UL and dynamic one for DL) to assist the handling of QoS flows and PDUs.
 - [Objective 2] Enable the means to expose XR information (as captured in clause 5.1.1 of TR 38.835) from CN to RAN [RAN3]
- When certain PDU(s) of a given PDU set are lost, application may not need remaining PDUs of that PDU set and discard operation could be performed.
 - [Objective 3] PDCP discard enhancements of PDU/SDUs of a given PDU set considering timer-based event and when related PDUs of a PDU set are lost [RAN2].

Power Saving Techniques

- C-DRX operation is enhanced considering XR traffic characteristics to improve UE's power consumption:
 - [Objective 4] Specify semi-static mechanism to align C-DRX with XR traffic periodicity [RAN2].
 - NOTE: Considering common XR frame rates (e.g., 15, 30, 45, 60, 72, 90 and 120fps) to be confirmed with SA4.
 - [Objective 5] Specify a mechanism for RAN to pre-configure multiple C-DRX configurations via RRC and enable switching between the C-DRX configurations [RAN2, RAN1].

Capacity Improvement Techniques

- BSR and CG operation are enhanced considering XR traffic characteristics to improve capacity:
 - [Objective 6] Specify mechanisms to support dynamic indication of the unused CG PUSCH occasion(s) based on UCI (e.g., CG-UCI or a new UCI) by the UE [RAN1]
 - [Objective 7] Specify mechanisms to support multiple CG PUSCH transmission occasions in a period of a single CG PUSCH configuration [RAN1, RAN2]
 - [Objective 8] BSR enhancements to reduce quantisation errors of the reporting, to consider the delay knowledge of the buffered data (e.g. remaining time) and to define corresponding new trigger conditions considering PDU discard and/or PDU set/data burst information available in UE [RAN2].

Proposal 3. To agree on the objectives 2 to 8 for Rel-18 XR WI. The handling of objective 1 depends on the outcome of proposal 1 & 2.

Summary of Proposals

- The proposals on Rel-18 work scope for XR Enhancements in RAN:
 - [Proposal 1](#). To discuss whether to run a SI and WI in parallel (options 2) or a WI with completed objectives including a study phase (option 3) to continue Rel-18 XR work in RAN
 - [Proposal 2](#). On XR awareness in RAN, to discuss whether to keep similar Objective 1 as in Rel-18 XR SID RP-220285 (option a) or clarify the topics to conclude the study (option b)
 - [Proposal 3](#). To agree on the objectives 2 to 8 for Rel-18 XR WI. The handling of objective 1 depends on the outcome of proposal 1 & 2.

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