



3GPP TSG Rel-19 Workshop

RWS-230068

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Views on further XR enhancements in Rel-19

Source: vivo

Document for: Discussion & Decision

Agenda Item: 5

Contents

- XR awareness
- Relaxed scheduling restriction
- UL scheduling enhancement
- PDU set handling

XR awareness

Scenario identification and modeling

Scenarios for multiple streams/flows:

1. Different PDU sets within a single RTP steam may have different QoS requirements, e.g. I frame and P/B frame may have different reliability requirement
 - The corresponding study happened in Rel-18 study item, but was not included in WI
2. An XR gaming service may serve multiple users and it requires approximately synchronous arrival of background data to all the Game Terminals.
3. SA1 Metaverse has studied the use cases about the immersive multi-modal VR application as right (e.g. Video, Vision, Haptic) and defined the related new requirement, as captured in TR 22.847;
 - R18 XR in RAN only focus on single-modal/stream communication, coordinated transmission for multiple streams/flows within a single UE or multiple UEs may bring better immersive user experience for the above scenarios.
 - Current user plane protocol dose not support coordinated handling for multiple streams/QoS flows, which may not guarantee the sync or depedency between stream/QoS flows. This will lead bad UE experience for above scenarios

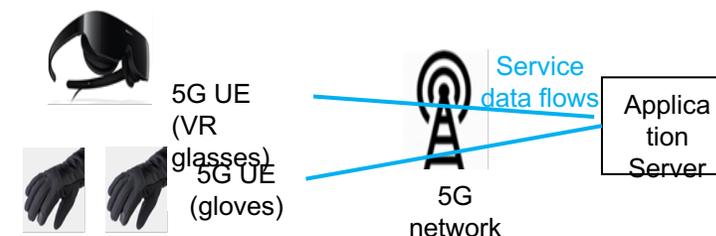


Figure 1. Immersive multi-modal VR application with multiple 5G UEs directly connected to 5G network

Proposal 1: Study and support the modeling and corresponding handling for multi-streams/QoS flows XR traffic (Coordination with SA2/SA4) [RAN2, RAN3]

1. Identify the scenarios on coordinated transmission for multiple streams/QoS flows, e.g.

- One UE with multiple streams/QoS flows (Partial Rel-18 leftover)
- Multiple UEs with multiple streams/QoS flows
- One stream to multiple QoS flows (Rel-18 Leftover)

2. Modelling and corresponding handling, e.g.

- Capacity enhancement on scheduling and discarding based on different protocol mapping on e.g. DRB(s), LCH(s)
- Coordination between QoS flows/UEs/DRBs/LCHs
- Synchronization, e.g. scheduling strategy enhancement for transmitting multiple-streams/ flows in a synchronization way

Rel-18 SI leftover

Relaxed scheduling restriction

- Use case: XR devices are usually operating in low mobility scenario, e.g., VR for game/video in indoor, AR in shopping mall, café, library, super market...
 - Motivation
 - In current specification, UE needs to perform RRM measurement in the configured SMTCs or MGs
 - However, for XR UE, such scheduling restrictions would degrade the system capacity and user experience
 - XR UE, usually in low speed, is not necessary to do measurement in each MG
- Proposal 2: Study and Specify relaxation of scheduling restrictions for intra-frequency RRM without MGs and for inter-frequency RRM with MGs [RAN4, RAN1]

Rel-18 SI leftover

UL scheduling enhancement

- Motivation
 - AR UL video stream has variable frame size across different video frames, as well as stringent PDB requirement.
 - Relying on BSR triggering and reporting in MAC layer to request additional transmission resources besides configured CG PUSCH occasions very likely leads to large delay, since triggering and transmission of BSR MAC CE will be involved, where HARQ procedure is adopted per Rel-15/16/17.
 - It can be beneficial to request additional transmission resources based on UCI for latency reduction, by simply extending the framework of dynamically indicating unused CG PUSCH occasion(s) based on UCI.
- Proposal 3: Support requesting additional transmission resources based on UCI, by simply extending the framework of dynamically indicating unused CG PUSCH occasion(s) based on UCI. [RAN1, RAN2]

Rel-18 SI/WI leftover

PDU set handling

- The following aspects were discussed in Rel-18 SA2 or RAN SI, but was not included in R18 WI due to lack of TU or motivation.
- Regarding discarding enhancements
 - There may be dependency between PDU sets in GoP, which is more motivated for multiple-modality flows
 - Coordination between flows is more popular

Proposal 4: Specify the below PDU set handling [RAN2]:

- the PDU set handling on discard, considering e.g. [inter-PDU set dependency](#), [inter-flow coordination](#)
- the PDU set handling on scheduling enhancements, considering e.g.
 - [LCP enhancements](#), e.g. [latency](#), [importance](#), [PDU set](#)
 - [Periodicity mismatch of UCI/CG](#)
 - [Dependence](#)

Conclusions

Potential Rel-19 further XR enhancements

XR awareness

- Study and support the modeling and corresponding handling for multi-streams/QoS flows XR traffic (Coordination with SA2/SA4) [RAN2, RAN3]
 - Identify the scenarios on coordinated transmission for multiple streams/QoS flows
 - Modelling and corresponding handling

Rel-18 SI/WI leftovers

- Study and Specify relaxation of scheduling restrictions for intra-frequency RRM without MGs and for inter-frequency RRM with MGs [RAN4, RAN1]
- Support requesting additional transmission resources based on UCI, by simply extending the framework of dynamically indicating unused CG PUSCH occasion(s) based on UCI. [RAN1, RAN2]
- Specify the below PDU set handling [RAN2]:
 - the PDU set handling on discard, considering e.g. inter-PDU set dependency, inter-flow coordination
 - the PDU set handling on scheduling enhancements

THANK YOU.

谢谢。