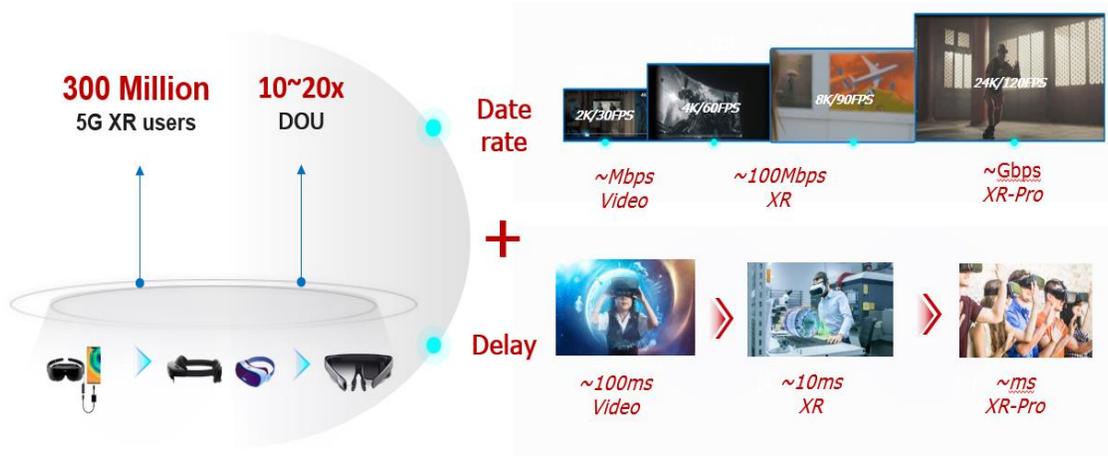


Quality Metric for XR in R18

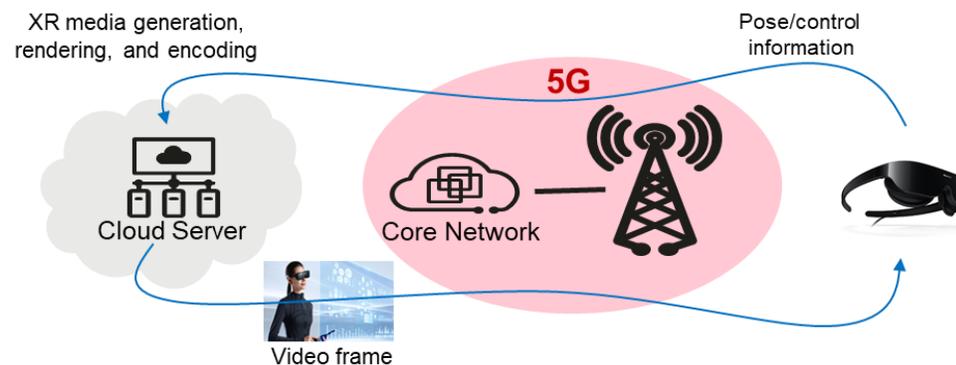


Introduction

- XR is a key driver for 5G to provide immersive user experience^[1].
- High requirements for XR service to guarantee user experience.
- XR is an E2E application: 5G plays a key role in enhancing Quality of user Experience.



Trends of XR towards 2025 and beyond [1]



E2E architecture for XR application

[1] Tong Wen, "Continuous 5G Evolution for Building an Engine of All-Industry Digitalization," MWC Shanghai 5G Advanced Summit, Shanghai, China, Feb., 2021

Background

- **E2E QoE in SA4**

- **Definition of QoE**

- ◆ Overall acceptability of an application or service, as perceived subjectively by the end-user

- **QoE study overview in SA4**

- ◆ Prior to Rel-13 QoE feature enabled for MBMS, MTSI and Streaming services :

- **Define QoE metrics** to reflect how users are experiencing their service quality

- ◆ Rel-14 work item IQoE:

- **Improve QoE configuration and reporting concept**, including the possible use of ITU-T P.1203 to estimate user experience of video streaming quality.
- **Offer 3GPP operator better possibilities for controlling the QoE reporting.**

- ◆ Rel-15 work item EQoE_MTSI:

- Introduce the enhancements also to the MTSI specification TS 26.114 similar to Rel-14

- ◆ Rel-16 work item VR QoE:

- **Define VR metrics** describing characteristics of VR
- **QoE configuration and reporting enhancement** to support new metrics

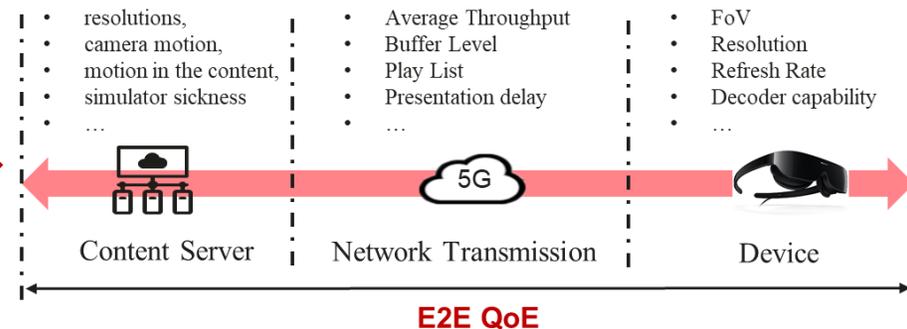


Motivation

● E2E Quality Metric for XR

➤ E2E QoE for VR

- ◆ Identifying factors impacting user experience is helpful for operators make assessment of VR QoE
- ◆ QoE metrics relevant with VR user experience can be divided into three parts: **Content, Network Transmission, Device**



➤ E2E QoE for XR

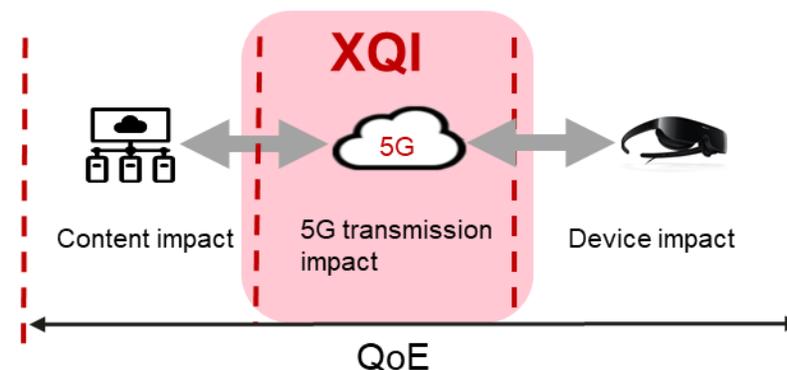
- ◆ Similar to VR QoE, XR QoE can be defined which is affected by three parts
- **A quality metric defined from E2E perspective** is difficult to pinpoint the problem in case of the bad experience (e.g., QoE)
 - ◆ **Problem of content, network or device?**

Motivation

- **Network Transmission Quality Metric for XR**

- From the 5GS perspective, it is meaningful to **pinpoint the impact from 5G transmission on user experience** to offer better management for XR service for MNOs.

- There is no quality metric directly reflecting 5G transmission impact on XR user experience yet.



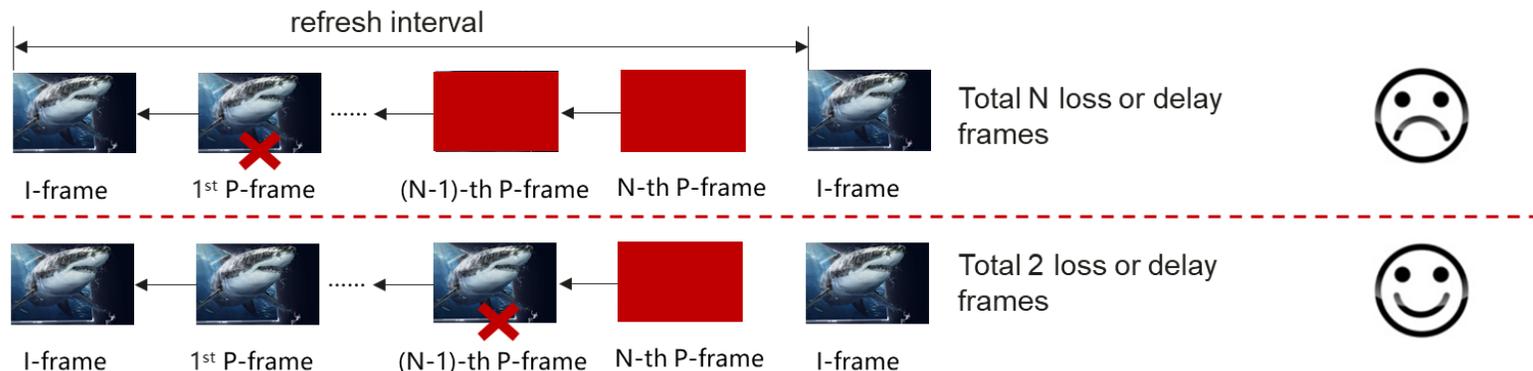
- Introduce a new quality metric (**XR Quality Index: XQI**) at network side directly reflecting network transmission impact on XR user experience

- ◆ Facilitate evaluation, optimization, and management of network transmission for XR service

XQI

● Possible Parameters related with XQI

- Different positions of the first loss/delay frame within **refresh interval** result in **different** user experience due to error propagation



- How network to identify/measure the impact of the loss/delay frames
 - ◆ Packet loss information, Packet delay information
 - ◆ XR-specific information (Refresh Interval of I-frame, frame rate, correlation between packets and frames, etc.)
- Possible Standardization in SA4 for XQI
 - ◆ Enhance QoE metrics for evaluating XQI in SA4 (e.g., Refresh Interval of I frame, frame rate, etc.)
 - ◆ QoE configuration and reporting enhancement to support new metrics for XQI

Conclusion

- Identify the new metrics for evaluating the network transmission quality for XR service in collaboration with RAN
- Possible QoE configuration and reporting enhancement to support the new metrics for network transmission quality

Thank you.

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