**3GPP TSG-WG SA4 Meeting #123e *S4-230502***

**E-meeting, April 17 – 21, 2023**

**Source: Huawei, HiSilicon**

**Title: Discussion on the use case for AR/MR QoE metric identification**

**Document for: Approval**

**Agenda Item: 9.8**

**Work Item / Release: FS\_ARMRQoE / Rel-18**

# 1. Introduction

In last Athens SA4#122 meeting, it’s agreed to focus on the AR/MR QoE metric identification on the content, delivery and device parts based on the AR/MR QoE reference model. This paper intends to focus on the typical procedures for the network/cloud assisted AR/MR scenario, and provide potential AR/MR QoE metrics.

# 2. Typical procedure for network assisted AR/MR experience

In this clause, we mainly focus on the network/cloud assisted AR/MR scenario. The typical procedures can be shown below [1].

1. Application Started: The AR/MR application is started and the application client obtains the entry point from the AR/MR Application service provider.

2. Initial AR/MR object retrieval:

2a. The scene manager obtains the scene description from the scene provider (e.g., located in the Edge/Cloud server) based on the entry point information.

2b. The Scene Manager parses the entry point and creates the immersive scene.

2d. The Scene Manager requests XR Runtime to render and display the target scene.

2e. In case of new scenes or scene updates, return to step 2a.

3. XR Spatial Mapping:

3a. The XR runtime obtains the sensor data and sends them to the XR spatial computing server (e.g. located in the Edge/Cloud server).

3b. The XR runtime receive the XR spatial description from the spatial computing server to reconstruct the 3D map for the surroundings and assist the localization of the AR objects.

NOTE: The steps 2 and 3 can run in parallel and independently.

4. The AR/MR objects are rendered and displayed at the right place based on the reconstructed 3D map.

Based on the above typical procedures, the following QoE metrics can be introduced and measured.

1. Initial mapping latency for reconstructing the surrounding environment:

This metric belongs to the delivery part with the main impact from the network transmission.

This metrics indicates the time from the application is started until the 3D reconstructed map is obtained by the XR runtime and it can be observed in the OP-1. The whole 3D map reconstruction includes following aspects:



Figure 1 Functional diagram for XR Spatial computing with network/cloud support [1]

1) Surrounding sensing latency;

2) Sensor information delivery from the MAF to the XR Spatial Computing Server;

3) 3D Map reconstruction and Spatial Description generation;

4) Spatial Description delivery from the XR Spatial Computing Server to the MAF;

5) Spatial Description parsing and the local/remote AR object displaying;

2. Initial/new AR object loading latency:

This metric belongs to the delivery part with the main impact from the network transmission.

This metric indicates the time from the AR object is requested until the remote AR object is displayed in the right place of the reconstructed 3D space and this can be observed in the OP-1. For instance, once the AR application is started, an initial AR object is requested by the client and further sent back to the AR runtime. This can include following aspects: 

Figure 2 Functional structure for AR UE

1) optionally, AR scene request sent from the MAF to the remote scene server;

2) AR scene generation and rendering the remote scene server;

3) AR scene delivery from the scene server to the MAF;

4) AR scene rendering and display.

3. [Tracking consistency

This metric belongs to the device part, which depends on the pose detection and rendering capability.

Tracking consistency mainly refers to the correct relative position after the change of the angle of view can be continuously obtained at any time after the device starts moving. It can be measured as the relative position error which indicates the deviation of the relative positions in the real world before and after the device movement.]

Editor’s Note: How to observe the tracking consistency is FFS.

# 3. Proposal

Based on the above-mentioned discussion, it is proposed to agree and capture section 2 into the TR 26.812.

# References

1. 3GPP TR 26.998, “Support of 5G Glass-type Augmented Reality / Mixed Reality (AR/MR) devices”