Source: Samsung Electronics, Qualcomm Inc.

**Title: [FS\_5GSTAR] on Clause 8.5 and Media Capabilities for Augmented Reality Glasses WID**

**Agenda Item: 10.9**

**Document for: Discussion and Agreement**

# **Introduction**

The TR 26.998 [1] is approaching its finalization and the potential normative works in clause 8 of [1] brought several Rel-18 work item proposals:

(List from SA#116 and Rel18\_WS#3)

* “5G generic architecture for AR/MR experience (5G\_AREA)” [2]
* “IMS-Based AR Conversational Services (IBACS)” [3]
* “Immersive Real-time Communication for WebRTC (iRTCW)” [4]
* “Media Capabilities for Augmented Reality (MeCAR)”[5]
* “Split Rendering Media Service Enabler (MSE\_SR)”[6]

We see dependencies among potential normative works and their relevant WIDs that require clarifications on the scope. To let contributors of each work to estimate timeline and to avoid duplicated works or missing links, it would be beneficial to clarify several objectives for better structuring of new Rel-18 work items. Proposed clarifications and revisions on objectives in this contribution are done by improving clause 8.5 of TR 26.998 and proposed MeCAR WID.

# **Clarifications on dependency of WIDs to MeCAR**

# **Sensor and Pose information**

A clarification on a cross-work dependency is required whether some media types will be defined as the output of MeCAR, as iRTCW is considering support of sensor information and metadata about user and environment.

Clause 8.4 5G Real-time Communication of TR 26.998:

2) Uplink streaming of camera and sensor information for cognitive/spatial computing experiences, in case the environment tracking data and sensor data is used in creating and rendering the scene.

iRTCW objectives:

Specify sensor information required / recommended for media handling that,

* Identifies information to be consumed locally or transmitted with media
* Leverages sensor information currently provided by mobile operating systems when appropriate

Support relevant metadata about user and environment (e.g., user/object position and direction).

[Proposal #1] We propose to improve one of objectives of MeCAR by specifying aforementioned media/information types:

MeCAR objectives:

* Define media types and formats produced and consumed by the AR device, including basic scene descriptions, audio, graphics and video, as well as sensor information and metadata about user and environment.

# **Capability exchange**

There are proposed work items having capability exchange in their objectives such as 5G\_AREA (capability exchange mechanism), IBACS (session capability negotiation), and MSE\_SR (select and profile the media formats, define edge requirements). It would be beneficial to specify defining media format and capability as the scope of MeCAR, to let the exchange of capabilities as the scope of other work items which consider various devices and transport architectures. It also would be beneficial to relate with existing 3GPP works, for example DASH on how to create appropriate MPD entries and media lines for capability exchange.

Clause 6.5.8 Standardization areas of TR 26.998:

* Capability exchange mechanism and relevant signalling (e.g., SDP)

5G\_AREA objectives:

* Call flows and procedures for AR/MR experience based on the context of clause 6 in TR 26.998, including capability exchange mechanism and establishment of 5G edge instance

IBACS objectives:

* Specify session setup, control and capability negotiation procedures for traditional and AR media

MSE\_SR objectives:

* select and profile the media formats and the corresponding media transport protocols for split rendering
* define edge requirements, such as the EAS profiles, as well as edge discovery and relocation configurations appropriate for split rendering

MeCAR objectives:

* Define media types and formats produced and consumed by the AR device, including basic scene descriptions, audio, graphics and video as well as sensor data.
* Define decoding capabilities, including support for multiple parallel decoders
* Define encoding capabilities
* Enable AR media in 5G Media Streaming by defining suitable 5GMS profiles based on AR media capabilities

[Proposal #2] We propose to add new objective:

MeCAR objectives:

* Enabling signalling (e.g., SDP and MPD) of AR media for generic capability exchange mechanism

# **AR media capability**

AR media capability can be understood as the processing complexity of the AR media. In case of legacy media such as 2D video, describing the complexity in terms of codec profile has been utilized not only for coded media, but also for media processing entities such as encoder and decoder. Similar ways of describing the amounts of required resources to process (such as rendering and coding) various AR media types, for example, the number of vertex and polygons as the clue to estimate GPU workload for primitives, are required for concrete instantiations of processing blocks in both device and edge. Relevant work in MSE\_SR (define edge requirements, such as the EAS profiles) should be considered for consistency in the exchange of capabilities that are available by device, are required for AR media and should be allocated in edge/cloud:

Clause 6.2 of TR 26.998:

9b. The AR/MR Lightweight Scene Manager derives the EAS KPIs from the scene description and device capabilities, requests the AF to provide the list of suitable EAS. Then the AR/MR Lightweight Scene Manager selects the AS/EAS and requests to start the edge processes in the EAS.

MSE\_SR objectives:

* define edge requirements, such as the EAS profiles, as well as edge discovery and relocation configurations appropriate for split rendering

[Proposal #3] We propose to add new objective:

MeCAR objectives:

* Define AR media metadata about complexity of scene to aid Scene Managers to derive EAS KPIs for provisioning of edge/cloud resources
	+ Note: Identify a suitable existing capability framework, or if it does not exist, we need to work with the broader industry (e.g., IETF, KHRONOS, W3C, etc.) to get this done.

# **Proposal**

This contribution proposes to adopt the proposal #1 to #3 for improved structuring of Rel-18 work items. The recommended changes to TR 26.998 are proposed in S4-220135 [7] and to MeCAR WID objectives as follows:

* Define a reference terminal architecture for AR devices
* Define at least one AR device category that addresses the constraints of an EDGAR-type AR glass
	+ Note: Additional device categories may be defined, but with lower priority
* For each AR device category
	+ Define media types and formats produced and consumed by the AR device, including basic scene descriptions, audio, graphics and video, as well as sensor information and metadata about user and environment.
	+ Define decoding capabilities, including support for multiple parallel decoders
	+ Define encoding capabilities Define security aspects related to the media capabilities
* Enabling signalling (e.g., SDP and MPD) of AR media for generic capability exchange mechanism
* Define AR media metadata about complexity of scene to aid Scene Manager to derive EAS KPIs for provisioning of edge/cloud resources
	+ Note: Identify a suitable existing capability framework, or if it does not exist, we need to work with the broader industry (e.g., IETF, KHRONOS, W3C, etc.) to get this done.
* Define relevant KPIs and QoE Metrics for AR media
* Define encapsulation into RTP and ISOBMFF as well as CMAF
* Enable AR media in 5G Media Streaming by defining suitable 5GMS profiles based on AR media capabilities
* Define typical traffic characteristics for AR media

# **References**

1. TR 26.998 v1.1.2, (FS\_5GSTAR)
2. S4-211676r1, “5G generic architecture for AR/MR experience (5G\_AREA)”
3. S4WS-22008 fix, “IMS-Based AR Conversational Services (IBACS)”
4. S4WS-22017, “Immersive Real-time Communication for WebRTC (iRTCW)”
5. S4WS-22015, “Media Capabilities for Augmented Reality (MeCAR)”
6. S4WS-22005, “Split Rendering Media Service Enabler (MSE\_SR)”
7. S4-220135, “[FS\_5GSTAR] pCR on clause 8 of TR 26.998”