**Agenda item:** 10.6

**Source:** ZTE Corporation

**Title: Rendering for AR communication**

**Document for** Discussion andAgreement

# Introduction

In AR communication services over IMS, for different types and statuses of AR-capable UEs, IMS network and UE may use different media processing procedures(e.g. AR rendering) for rendering AR specific data. The solution #8 and #9 in TR 23.700-87[1] have described two types of AR content rendering: one is UE perform the media rendering without network support, the other is UE perform the media rendering with network support.

In [1], AR rendering processing in AR communication call flows can be summarized as follows:

*1. Terminal rendering process: When the media processing capability of AR device meets the requirements of AR communication (such as AR mark and simple AR effect) according to its status such as power status, signal status, computing power status,* *internal**storage* *status, etc, the AR device can independently implement AR media rendering by itself. The either side of IMS provides AR application to the calling and the called users at the same time. The terminal performs local rendering based on the media obtained locally or sent by the peer.*

*2. Network rendering process: When the media processing capability of AR device cannot meet AR communication requirements (such as complex scene or virtual human rendering requirements) according to its status, the AR device can decide to request IMS for AR media rendering. The either side of IMS provides AR application to the calling and the called users at the same time, IMS then performs AR media rendering based on AR media received from the calling or the called users, finally IMS sends rendered AR media using normal audio/video streams through RTP channel to the calling or called user.*

In this contribution, we propose AR communication services is require to support UE rendering or split rendering based on UE’s capacity, status and complexity of AR media, as well as AR rendering for AR communication services is based on exiting SA2 work. This contribution can be a basis of further rendering work for IBACS.

# AR rendering over IMS

[The following text refer to TR23.700-87 need to be further elaborated form IMS-based AR communicate service perspective.]

## 2.1 AR rendering types

Considering UE’s capacity, status and complexity of AR media, there are optional media rendering methods for IMS-based AR communication services as follow.

**UE rendering**, UE independently render AR content based on AR specific data, when the media processing capability of UE meets the requirements of AR communication. The UE performs local media rendering based on the media obtained locally or sent by the peer.

**Split rendering**, UE and IMS network collaborate to implement media rendering for AR content, When the media processing capability of UE cannot meet AR communication requirements. IMS performs media rendering based on AR media received from the calling or the called users.

NOTE 1: UE can decide whether to use the network rendering method and change the split ratio of the rendering tasks based on its status.

## 2.2 Network function for AR rendering

AR IMS communication architecture is enhanced for supporting split rendering within IMS network, including the following network functions show in Figure 3.1.1 of section 3.1[2]:

- **AR Application Server**, performs AR service control related to AR communication, including AR session media controlling, AR media rendering negotiation and AR service handling.

- **ARMF**, performs for AR communication media transmission and media rendering function, including the following functions:

- **AR Rendering Logic:** controls the application-based rendering logic of AR communication.

- **AR Media Processing Function:** including 3D Rendering Engine for rendering the scenes, virtual human models and 3D object models according to the field of view, posture, position, etc. which are transmitted from UE using data channel.

NOTE 2: ARMF is a logic network function element, it can be deployed together with other media functions such as DCMF, it can also be collocated in other functional entities, e.g. UMF (Unified Media Function).

Enhanced media interfaces (show in Figure 3.1.1 of section 3.1[2]) for AR rendering are as follow:

- **DC4:** Service based reference point between the AR Application Server and the DCSF for AR service handling and AR session media control.

- **DC6**: Service based reference point between the MMTEL AS and the ARMF for AR resource management.

DC4 and DC6 are used to request media resource allocation for AR rendering in IMS network.

- **MDC2:** Reference point of data channel media between the AR Application Server and DCMF for AR media rendering negotiation.

- **Mb:** The media interface for audio/video media stream transmission and/or data media stream transmission, including rendered AR media.

## 2.3 UE rendering process for AR content

The procedure for the UE rendering is described in the following call flow:



Figure x: Call flow for UE rendering

1. The UE1 initiates an AR communication session and establishes audio and video session connections with the UE2, and establishes bootstrap and application data channel connections for the UE1 and UE2 according to AR application requirements.
2. The UE1 gets AR media and related metadata (such as 3D model) from AR application locally and performs AR media rendering itself.
3. The UE1 sends the rendered AR media to the peer through application DC.

Note3: The rendered audio/video (such as 2D video) data may be sent over RTP channel.

1. The UE2 directly displays the UE1 rendered media on its screen.

Note4: The UE2 may render local AR media and/or combine with UE1 rendered media according display requirement .

1. The UE2 sends AR media and related metadata (without rendering) gets from local AR application through application DC to UE1.
2. The UE1 performs AR media rendering itself based on the AR media received, and displays the rendered media on its screen.

# Proposal

We propose to agree the AR rendering over IMS in section 2 into the IBACS PD.

# 4 References

[1] 3GPP TR23.700-87: “Study on system architecture enhancement for next generation real time communication; Phase 2";

[2] S4-230298, “IBACS Permanent Document “, v0.2.0, SA4#122, Feb 2023.