**Agenda item:** 10.7

**Source:** Qualcomm Inc., Nokia

**Title: [AvCall-MED] Avatar Communication Call Flows**

**Document for** Discussion andAgreement

# Introduction

In this contribution, we propose content for the base CR on Avatar Communication that introduces the main call flow on Avatar communication as described in TR 26.813 [1].

# Proposed Changes

## A.1.6 Avatar Call Flows

A.1.6.1 General Avatar Call Flow

LD

Figure 24: IMS Avatar Delivery and Animation Flow

**Z. Base Avatar Generation Before Call Setup**

The base avatar is generated before step A. Call Setup and Capability Negotiation. It may be uploaded to the BAR by using the Avatar management interface defined in annex B.

The list of Avatar ID(s) and/or Avatar Representations is downloaded to the UE by following options:

* Pre-configured in the UE: The Avatar ID List and/or Avatar Representations is provisioned or downloaded to the UE before a data channel for avatar call is setup.,
* Through bootstrap data channel: The Avatar ID List is fetched by the DC AS from the BAR when the associated Avatar communication application is downloaded and transferred from the DC AS to the DCSF and downloaded to UE through bootstrap data channel (see details in Annex AC 11.3.1 in TS 23.228[2].
* Through application data channel: The Avatar ID List is fetched by the DC AS from the BAR and downloaded to the UE through application data channel (see details in step A.2).

**A. Call Setup and Capability Negotiation**

A.1 An audio/video session is established between UE1 and UE2 and parameters of the session are negotiated.

A.2 Bootstrap and Application DC session establishment between UE1, the MF and the DC AS. If UE1 does not have any downloaded and pre-configured avatar ID, it may request to obtain Avatar ID List through the established application data channel via capability negotiation request. The DC AS loads the Avatar ID from the BAR and downloaded to the UE through application data channel.

**B. Scene Description Retrieval**

The MF and the participating UEs retrieve the scene description. The scene description may be shared by the MF with the UEs, in case of a shared experience, or the UEs may have their own scene descriptions.

**C. Scene Description Update**

A scene update trigger occurs, e.g., if an object is added to or removed from a scene or if spatial information is updated. The update trigger may originate from the MF itself or the UEs. The UEs may update their scene descriptions independently or the MF may generate an updated scene description and share it with the UEs.

NOTE1: The step B and C are not needed for 2D avatar.

**D.1. Avatar Acquisition**D.1.1: The MF loads the base avatar for UE1 from BAR.

**D.2. Avatar Delivery**

Alternative #1: UE1 centric

D.2a.1: The MF delivers the base avatar of UE 2 to UE1 through data channel.

Alternative #2: UE2 centric

D.2b.1: The MF delivers the base avatar of UE1 to UE2 through data channel.

**D.3. Animation Data Generation**

Based on the capability negotiation result in step A, the UE or network may generate animation data.

Alternative #1: UE centric animation data generation

D.3a.1: The UE1 generates the animation data based on the source data (e.g., audio, video, text) or using an XR runtime. The animation data may be transformed from the source data (e.g., from audio to text), or the same as the source data.

D.3a.2: UE1 delivers the animation data to the entity actuating avatar animation through data channel. The animating entity may be the MF or UE2.

Alternative #2: Network centric animation data generation

D.3b.1: UE1 sends source data for animation data generation to the MF over RTP (audio, video, text) or data channel (text).

D.3b.2: The MF processes the received source data to generate animation data during the session. The animation data may be transformed from the source data (e.g., from audio to text, video to motion data), or the same as the source data.

D.3b.3: The MF delivers animation data over data channel to the UE2 animating the base avatar. If network centric avatar animation is used, this step will be skipped. The animation data may be delivered to UE1 as well.

**D.4. Avatar Animation**

Based on the capability negotiation result in step A, the UE or network may animate the avatar.

Alternative #1: UE centric avatar animation

Alternative #1a: UE1 does avatar animation

D.4a.1: UE1 animates and renders the base avatar using animation data. The animation data is generated by UE1 in step D.3a.1.1.

D.4a.2: UE1 delivers the animated and rendered avatar to UE2. The animated and rendered avatar may be delivered as a 2D video through RTP.

Alternative #1b: UE2 does avatar animation

D.4b.1: UE2 animates and renders the base avatar using animation data. The animation data may be generated by the MF, following steps D.3b.1 to D.3b.2 and received by UE2 in step D.3b.3 or it may be generated by UE1 in step D.3a.1 and received by UE2 in step D.3a.2.

Alternative #2: Network centric avatar animation

D.4c.1: The MF animates and renders the UE1’s base avatar using animation data. The animation data may be generated by the MF, following step D.3b.1 and D.3b.2 or it may be received from UE1 following steps D.3a.1 and D.3a.2.

D.4c.2: The MF delivers the animated and rendered avatar to the UEs. In the figure, delivery to UE2 is shown as example. The animated and rendered avatar may be delivered as a 2D video through RTP.

NOTE2: Rendering is not needed for 2D avatar.

A.1.6.2 Avatar Management Call Flow

TBD.

A.1.6.3 Avatar Selection and Negotiation Call Flow

TBD.



Figure 22: Avatar Selection and Negotiation Call Flow

The capability negotiation procedure is based on the avatar type (2D or 3D) and the capability information of UE and MF. The capability information includes the animation data type(s) (e.g., text, expression data and motion signals for joints) supported by UE or MF. ~~After capability negotiation, the IMS AS instructs MF to download UE1’s base avatar from BAR, generate animation data from the source data received from UE1, and animate UE1’s base avatar using the animation data received from UE1 or generated by MF itself.~~

 0. (optional) An Avatar ID List is downloaded through the Bootstrap Data Channel (see details in AC 11.3.1 in TS 23.228 [23]) or an Avatar ID is pre-configured in UE1.

NOTE: The step 0 is optional. The Avatar ID List is provisioned or downloaded to the UE before a data channel for avatar call is setup. The UE and the BAR may interact by means out of the scope of 3GPP.

1: An audio/video session is established between UE1 and UE2.

2: The bootstrap and application data channels are established between UE1, the MF, and the DC AS.

2.5: UE1-UE1: UE1 selects its base avatar configuration for the AR Call. This may be done by using the downloaded DC application.

3: UE1 sends a capability negotiation request using the application data channel through the MF to the DC AS. The message carries parameters which may include an avatar ID chosen by UE1 (if the avatar ID is downloaded or pre-configured in UE1) and animation data types (e.g., text, expression data, or motion signals for joints) supported by UE1.

 If UE1 does not have any downloaded Avatar ID List or pre-configured avatar ID, it may request to obtain Avatar ID List through the established application data channel via a capability negotiation request. This has to go to UE2.

4. (optional): If the message in step 3 carries parameters including, e.g., an avatar ID downloaded or pre-configured in step 0, then the avatar ID needs to be further verified by the BAR through a verification request from the DC AS to the BAR. If UE1 requests to obtain an Avatar ID List via a capability negotiation request, the DC AS sends the request to the BAR.

5. (optional) According to the request received in step 4, the BAR verifies the avatar ID and sends response to the DC AS. If the avatar ID does not pass the verification by the BAR, an error message is sent to the UE1. If the BAR receives an Avatar ID List request, the BAR (generates and) sends the Avatar ID List to the DC AS.

NOTE: Steps 4 and 5 are optional. Whether and which user identity(ies) should be used by the user of the sending UE (UE1) and/or the receiving UE (UE2) for the download of the Avatar Representations in the case of a receiving UE rendering mode will be decided by SA WG3 and the procedure will be aligned with SA WG3 decision.

6: The DC AS sends an avatar capability request to the MF.

7: The MF sends a response with its avatar capability information to the DC AS.

NOTE1: Step 6 and 7 are optional. The need for DC AS interacting with the MF (e.g. querying) for the MF’s avatar capability is related to SA2’s decision on a possible interface between DC AS and MF.

NOTE2: The service of avatar capability provided by MF will be further defined in CT1/CT4 if needed.

8: The DC AS gets the avatar type (2D or 3D, from base avatar retrieved from BAR or to be generated by the MF) associated with the avatar ID and confirms the capability negotiation result based on the avatar type and the capability supported by UE1 and MF. The capability negotiation result includes the animation method (e.g., by audio, text or expression data and motion signals for joints).

9: The DC AS sends the capability negotiation response to UE1 through MF. The message carries the capability negotiation result.

10: The subsequent procedure continues.

# References

[1] 3GPP TR 26.813, Avatar Representation and Communication (Release 19)

[2] 3GPP TS 23.228, IP Multimedia Subsystem (IMS); Stage 2 (Release 19)