Source: KPN N.V.

**Title: Presentation Overlay in ITT4RT**

**Agenda Item:** **12.5 - ITT4RT**

**Document for: Discussion & Agreement**

**Introduction**

In this contribution we like to propose a solution for the following requirement specified in the permanent document of ITT4RT [1]:

Capability to identify the location of the presentation and where to insert an overlay of the alternative presentation into the omnidirectional content:

- [while stitching the different camera images together in the sending client]

- while stitching the different camera images together in the network

- after the stitching of the camera images into the omnidirectional video (e.g. by reencoding the omnidirectional video in the network)

- after receiving the stitched omnidirectional video and the overlay by the receiving client

**Proposed Solution**

**6.3.X ITT4RT presentation overlay (screen share)**

One common situation in a meeting is to present additional material (e.g. slides, video, notes) on a display (screen or projector). When capturing such a display with a 360-degree camera, this can lead to significant quality degradations, based on the characteristics of the camera, display and lighting conditions. Simply most setups will not allow to capture both users and display both in high detail and ideal lighting, and display refresh rate and camera capture rate are often mis-aligned. To mitigate this problem the ITT4RT client allows to replace the captured content with the original presentation material. We can consider the replacement of image data in the 360-degree video as a special case of overlays that should either be handled in sending client of the 360-video or in the network (MRF/MCU) in the following way:

1. Signal that content replacement is available
2. Signal material as display content in 360-recording
3. Identify position of content in 360-recording
4. Replace content or signal overlay parameters

**1. Signal that content replacement is available**

Currently the 360-degree video is indicated with the “a:3gpp\_360video” attribute in the SDP negotiation (section 6.1). In order to indicate that content overlay replacement is available the SDP negotiation should add a new attribute “a:3gpp\_360video\_overlayreplacement:true”. This can either be done in the SDP offer by the sending 360-degree ITT4RT client or by the response from a central MRF/MCU entity.

Note: this step can be skipped if the replacement is fully handled in the 360-degree sending client (i.e. this client both is responsible for capturing the 360-degree content and the display of the presentation content)

**2. Signal material as display content in 360-recording**

The availability of the presentation content should be signalled with the SDP parameter “a=content:slides”[4]. Note: this step can be skipped if the replacement is fully handled in the 360-degree sending client (i.e. this client both is responsible for capturing the 360-degree content and the display of the presentation content)

**3. Identify position of content in 360-recording**

How the position is determined should be left as implementation detail that does not need further specification. The output of this analysis shall include the position of the content in the 360-degree video with the associated overlay characteristics to overlay/replace the image accordingly.

Note: Ideally while receiving both the 360-degree video and the presentation content the region should be identified automatically (e.g. with image recognition tasks like pattern matching [3]). However, a manual process could also be possible when handled directly by the sending UE.

Note: Assuming a static configuration of the 360-degree camera the content position only needs to be identified once for the lifetime of a ITT4RT communication session. Even if the presentation content changes positional parameters in the 360-degree video might be reused.

**4. Replace content or signal overlay parameters**

The solution is based on the definition of OMAF edition 1 that the remote users “viewing position is the centre of the unit sphere” [2] of the 360-degree image of the conference room. This means that all users view the 360-degree conference from the centre of the sphere, which is the capture position of the 360-degree camera.

Two options to replace content are possible, a) replace content directly in the 360-degree video (by injecting and re-encoding an adjusted version of the content given the identified overlay characteristics) and b) sending the video separately as overlay in the way specified in chapter 6.3.

Replacing the content directly in the 360-degree video can be done either in the sending client of the 360-degree video or in the network (MRF/MCU).

**Proposal**

With this contribution we propose to add the section 6.3.X in this document as a section in the permanent document of ITT4RT.

Based on the feedback during meeting #113, we will prepare a CR to add this section aligned to the overview sections in TS26.114.

**References**

[1] 3GPP SA4 ITT4RT Permanent Document v0.10.1

[2] S. Deshpande, Y.-K. Wang and M. M. Hannuksela. Text of ISO/IEC FDIS 23090-2 2nd edition OMAF. ISO/IEC JTC1 SC29 WG3 document N00072. Dec. 2020.

[3] https://en.wikipedia.org/wiki/Template\_matching

[4] RFC 4796, https://tools.ietf.org/html/rfc4796