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SDP Overlay Grouping framework for immersive telepresence media streams  
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## Abstract

This document defines semantics that allow for signalling a new SDP group "OL" for overlays in an immersive telepresence session. The "OL" attribute can be used by the application to relate all the overlay media streams enabling them to be added as overlay on top of the immersive video. The overlay grouping semantics is required, if the media data is separate and transported via different protocols.

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## 1. Introduction

Telepresence [RFC7205] can be described as a technology that allows a person the experience of "being present" at a remote location for video as well as audio telepresence sessions, so as to enable the users sense of realism and presence [TS26.223] . SDP [RFC4566] is being predominantly used for describing the format for multimedia communication session for telepresence conferencing. These use open standards such as RTP [RFC3550] and SIP [RFC3261] .

An SDP session may contain more than one media lines with each media line identified by "m=line". Each line denotes a single media stream. If multiple media lines are present in a session, a receiver needs to identify relationship between those media lines.

Overlay media stream can be defined as a piece of visual media which can be rendered over an immersive video or image or over a viewport [ISO23090] . When an overlay is transmitted, its media stream needs to be uniquely identified across multiple SDP descriptions exchanged with different receivers so that the streams can be identified in terms of its role in the session irrespective of its media type and transport protocol.

In an immersive telepresence session, one media is streamed as an immersive stream whereas other media streams are overlaid on top of the immersive video/image. An end user can stream more than one overlay, subject to its decoding capacity. When multiple overlay streams are transmitted within a session, the end application upon receiving, needs to be able to relate the media streams to each other. This can be achieved by SDP grouping framework by using the

"group" attribute that groups different "m" lines in a session. However, the current SDP signalling framework does not provide such grouping semantics for overlays.

This document describes a new SDP group semantics for grouping the overlays when an immersive media stream is transmitted for telepresence conferencing. SDP session description consists of one or multiple media lines know as "m" lines which can be identified by a token carried in a "mid" attribute. The SDP session describes a session-level group level attributes that groups different media lines using a defined group semantics. The semantics defined in this memo is to be used in conjunction with [RFC5888] titled "The Session Description Protocol (SDP) Grouping Framework".

## 2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119] .

## 3. Overview of Operation

A non-normative description of SDP overlay group semantics is described in this section. An immersive stream for a telepresence session may consist of one or more conference rooms with a 360-degree camera and the remote users using head mounted display for streaming. "Participant cameras" are used to capture the conference participants whereas "presentation cameras" or "content cameras" can be used for document display [RFC7205] . The remote participant can stream any of the available immersive video in the session as background whereas other available streams such as the presentation stream or 2D video from any other room or participant can be used as an overlay on top of the immersive video/image.

A user with a head mounted display may stream more than one overlay in a single SDP session. These overlay streams are transmitted via "m" line in SDP session description. Each "m" line in the session description is identified by a token carried via the "mid" attribute. When multiple overlay streams are transmitted within a session, the end application upon receiving, needs to be able to relate the media streams to each other. This is achieved by using the SDP grouping framework [RFC5888]. The session descriptions carries session-level "group" attribute for the overlays which groups different "m" lines using overlay(OL) group semantics.

#### 4. Overlay Stream Group Identification Attribute

The "overlay media stream identification" attribute is used to identify overlay media streams within a session description. In an overlay group, the media lines MAY have different media contents. Its formatting in SDP [RFC4566] is described by the following Augmented Backus-Naur Form (ABNF) [RFC5234] :

```
mid-attribute = "a=mid:" identification-tag
identification-tag = token
                  ; token is defined in RFC4566
```

This document defines a new group semantics "OL" identification media attribute, which is used to identify overlay group media streams within a session description. It is used for grouping the media streams for different overlays together within a session. An application that receives a session description that contains "m" lines grouped together using "OL" semantics MUST overlay the corresponding media streams on top of the immersive media stream.

#### 5. Use of group and mid

All group and mid attributes MUST follow the rules defined in [RFC5888]. The "mid" attribute should be used for all "m" lines within a session description. If for any "m" lines within a session, no "mid" attribute is identified for a session description, the application MUST NOT perform any media line grouping. If the identification-tags associated with "a=group" lines do not map to any "m" lines, it MUST be ignored.

```
group-attribute = "a=group:" semantics
                  *(SP identification-tag)
semantics = "OL" / semantics-extension
semantics-extension = token
                  ; token is defined in RFC4566
```

#### 6. Example of OL

The following two examples show a session description for overlays in an immersive telepresence conference. The "group" line indicates that the "m" lines with tokens 1 and 2 are grouped for the purpose of overlays and intended to be overlaid on top of the immersive video.

In the first example shown below, two overlays are being transmitted. The first media stream (mid:1) carries the video stream, and the second stream (mid:2) contains an audio stream.

```
v=0
o=Alice 292742730 29277831 IN IP4 233.252.0.74
c=IN IP4 233.252.0.79
t=0 0
a=group:OL 1 2
m=video 30000 RTP/AVP 31
a=mid:1
m=audio 30002 RTP/AVP 31
a=mid:2
```

The second example, below, uses 'content' attribute with the media streams which are transmitted for overlay purpose.

```
v=0
o=Alice 292742730 29277831 IN IP4 233.252.0.74
c=IN IP4 233.252.0.79
t=0 0
a=group:OL 1 2
m=video 30000 RTP/AVP 31
a= content:slides
a=mid:1
m=video 30002 RTP/AVP 31
a=content:speaker
a=mid:2
```

## 7. Security Considerations

All security considerations as defined in [RFC5888] apply:

Using the "group" parameter with FID semantics, an entity that managed to modify the session descriptions exchanged between the participants to establish a multimedia session could force the participants to send a copy of the media to any destination of its choosing.

Integrity mechanisms provided by protocols used to exchange session descriptions and media encryption can be used to prevent this attack. In SIP, Secure/Multipurpose Internet Mail Extensions (S/MIME) [RFC8550] and Transport Layer Security (TLS) [RFC8446] can be used to protect session description exchanges in an end-to-end and a hop-by-hop fashion, respectively.

## 8. IANA Considerations

The following contact information shall be used for all registrations included here:

Contact: Rohit Abhishek  
 email: rabhishek@rabhishek.com  
 tel : +1-816-585-7500

This document defines a new SDP group semantics for overlays for a immersive telepresence session. This attribute can be used by the application to group all the overlays in a session. Semantics values to be used with this framework should be registered by the IANA following the Standards Action policy [RFC8126]. This document adds a new group semantics and follows the registry group defined in [RFC5888].

The following semantics needs to be registered by IANA in Semantics for the "group" SDP Attribute under SDP Parameters.

Semantics	Token	Reference
Overlay	OL	RFCXXXX

The "OL" attribute is used to group different media streams to be rendered as overlays. Its format is defined in Section 4 .

The IANA Considerations section of the RFC MUST include the following information, which appears in the IANA registry along with the RFC number of the publication.

- o A brief description of the semantics.
- o Token to be used within the "group" attribute. This token may be of any length, but SHOULD be no more than four characters long.
- o Reference to a standards track RFC.

## 9. References

### 9.1. Normative References

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## 9.2. Informative References

- [ISO23090] "Information technology -- Coded representation of immersive media -- Part 2: Omnidirectional Media Format (OMAF) 2nd Edition", ISO ISO 23090-2:2020(E), February 2020.
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[TS26.223]

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