

Network Working Group	C. Jennings
Internet-Draft	A. Begen
Intended status: Standards Track	Cisco
Expires: January 12, 2012	July 11, 2011

Grouping of Adjacent Media in the Session Description Protocol
draft-jennings-mmusic-adjacent-grouping-04

Abstract

Applications such as multi-screen video conferencing systems or advertisement boards often have multiple audio and video streams that are organized to be rendered side by side or in a grid. This specification uses the RFC 5888 Grouping Framework to define new semantics for grouping the media streams to be rendered side by side or in a grid and indicating their relative ordering.

The IETF has been notified of intellectual property rights claimed in regard to some or all of the specification contained in this document. For more information consult the online list of claimed rights.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <http://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on January 12, 2012.

Copyright Notice

Copyright (c) 2011 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust's Legal Provisions Relating to IETF Documents (<http://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

*1. [Introduction](#)

- *2. [Terminology](#)
- *3. [Adjacent Media Grouping](#)
 - *3.1. ["ADJ" Grouping Semantics](#)
 - *3.2. [Grouping for SSRC-Multiplexed RTP Streams](#)
 - *3.3. [SDP Offer/Answer Model Considerations](#)
- *4. [SDP Examples](#)
 - *4.1. [Horizontal Layout](#)
 - *4.2. [Grid Layout](#)
 - *4.3. [Layout with SSRC multiplex](#)
- *5. [Security Considerations](#)
- *6. [IANA Considerations](#)
 - *6.1. [Registration of SDP Attributes](#)
 - *6.2. [Registration of Grouping Semantics](#)
- *7. [Acknowledgments](#)
- *8. [References](#)
 - *8.1. [Normative References](#)
 - *8.2. [Informative References](#)
- *[Authors' Addresses](#)

1. Introduction

There are many situations where applications create media streams that are meant to be rendered adjacent to each other. A common example is a multi-screen video conferencing system. Other examples are several video monitors placed side by side to display signs, and audio streams from a linear array of microphones, or a grid of display for monitoring security cameras. The Session Description Protocol (SDP) [\[RFC4566\]](#) allows negotiation of multiple media streams but does not have a way to describe the ordering information to indicate which media stream is adjacent to which one.

This specification introduces new grouping semantics, using the SDP Grouping Framework defined in [\[RFC5888\]](#), that indicate media streams are adjacent, and the adjacency order is defined by the order of the entries in the group.

2. Terminology

This specification uses all the terms defined in [\[RFC5888\]](#) and will not make sense unless you have read [\[RFC5888\]](#). The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD

NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\]](#).

3. Adjacent Media Grouping

3.1. "ADJ" Grouping Semantics

This specification defines new grouping semantics of "ADJ" that indicate the media streams in this group are meant to be played or displayed adjacently. Furthermore, the order of media streams in the group indicates the adjacency order. This only indicates the order the device sending the SDP believes is the preferred way to display the media described in this SDP.

N media streams could be in a linear horizontal layout, in which case we use a grid size of 1 x N. Alternatively, N media streams could be in a linear vertical layout, in which case we use a grid size of N x 1. In these configurations, the first stream in the group MUST be the one corresponding to the left most and top most output unit, respectively. In a more general grid size of N x M, we can group K (where $K \leq N \times M$) media streams starting from the one corresponding to the top-left output unit, and then doing a continuous horizontal scanning of the grid row by row (i.e., scanning first the top row from left to right, and then the second row from left to right, and so on). When we say left most, we mean from the point of view of the person looking at the display.

To indicate the dimensions of the layout grid in an SDP description, we define a new session-level attribute. The ABNF syntax [\[RFC5234\]](#) for the new attribute is as follows:

```
media-grid-dims-line = "a=media-grid-dims:" [gridname]
                        %20 rows "x" columns CRLF
```

```
gridname = token ; token is defined in RFC 4566
rows     = %x31-39 *DIGIT
columns  = %x31-39 *DIGIT
```

```
namechar = token // as defined in
```

The parameters 'rows' and 'columns' indicate the number of rows and columns for this media grid. They both MUST be an integer larger than zero. The gridname indicates a name for this grid. If there are multiple media-grid-dims attribute in the SDP, each MUST have a unique gridname.

If the 'media-grid-dims' attribute does not exist in the SDP description, then a 1 x N horizontal linear layout MUST be assumed.

Per [\[RFC5888\]](#), there MAY be more than one adjacent media group in a single SDP description. The 'media-grid-dims' attribute MUST come before the group or ssrc-group that it applies to. An group or SSRC-group for an ADJ group MUST use the first 'media-grid-dims' attribute found above it in the SDP.

3.2. Grouping for SSRC-Multiplexed RTP Streams

[RFC5576] defines an SDP media-level attribute, called 'ssrc-group', for grouping the RTP streams that are SSRC multiplexed and carried in the same RTP session. The grouping is based on the SSRC identifiers. Since SSRC-multiplexed RTP streams are defined in the same "m" line, the 'group' attribute cannot be used.

This section specifies how adjacency is described with SSRC-multiplexed streams using the 'ssrc-group' attribute [RFC5576].

The semantics of "ADJ" for the 'ssrc-group' attribute are the same as the one defined for the 'group' attribute except that the SSRC identifiers are used to designate the adjacency grouping associations: a=ssrc-group:ADJ *(SP ssrc-id) [RFC5576].

The SSRC identifiers for the RTP streams that are carried in the same RTP session MUST be unique per [RFC3550]. However, the SSRC identifiers are not guaranteed to be unique among different RTP sessions. Thus, the 'ssrc-group' attribute MUST only be used at the media level [RFC5576].

3.3. SDP Offer/Answer Model Considerations

When offering adjacent media grouping using SDP in an Offer/Answer model [RFC3264], the following considerations apply.

A node that is receiving an offer from a sender may or may not understand line grouping. It is also possible that the node understands line grouping but it does not understand the "ADJ" semantics. From the viewpoint of the sender of the offer, these cases are indistinguishable.

When a node is offered a session with the "ADJ" grouping semantics but it does not support line grouping or the adjacent media grouping semantics, as per [RFC5888], the node responds to the offer either (1) with an answer that ignores the grouping attribute or (2) with a refusal to the request (e.g., 488 Not Acceptable Here or 606 Not Acceptable in SIP).

In the first case, the original sender of the offer must send a new offer without any grouping. In the second case, if the sender of the offer still wishes to establish the session, it should retry the request with an offer without the adjacent media grouping. This behavior is specified in [RFC5888].

The offer contains the sender's suggested layout. The answer MAY contain the suggested layout of the streams that the system sending the answer will be sending to the system that sent the offer.

4. SDP Examples

This section provides SDP examples showing how to use the adjacent media grouping.

4.1. Horizontal Layout

A video system with two screens and one audio channels sends a SIP offer. The following figure shows a top-down view of the room with the three screen system that is sending the SIP offer. Screen A is the left most screen for the user in this room but should be displayed as the rightmost screen for the user at the far end that will be viewing the video.

Screen A Screen B
[-----][-----]

User

Assume the SDP mid values for the screens are sa and sb, for Screens A and B respectively. The offer contains the following in the SDP:

```
a=group:ADJ sb sa
```

The complete SDP in the offer could look like:

```
v=0
o=alice 2890844526 2890844526 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
a=group:ADJ sb sa
t=0 0
m=audio 49101 RTP/AVP 101
a=rtpmap:101 PCMU/8000
a=mid:sm
m=video 49111 RTP/AVP 111
a=rtpmap:111 H261/90000
a=mid:sa
m=video 49112 RTP/AVP 112
a=rtpmap:112 H261/90000
a=mid:sb
```

There might be other media streams, such as presentation video, that are not part of any "ADJ" group.

As a note to implementors, consider the case where each screen had two media flows that were in the same FID group. In this case all the media streams are still listed in the ADJ group and the order of two streams in the same FID group can be arbitrarily picked as they will be displayed on the same device.

4.2. Grid Layout

The following SDP is for a system providing 6 video streams. Four of these streams are arranged as a wall of screens on a 2 by 2 grid while the other 2 streams should be shown separate but still arranged side by side.

```
v=0
o=bob 2890844526 2890844526 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
a=media-grid-dims:A 2x2
a=group:ADJ 1 2 3 4
a=media-grid-dims:B 2x1
a=group:ADJ 5 6
t=0 0
m=video 49101 RTP/AVP 101
a=rtpmap:101 H261/90000
a=mid:1
m=video 49102 RTP/AVP 102
a=rtpmap:102 H261/90000
a=mid:2
m=video 49103 RTP/AVP 103
a=rtpmap:103 H261/90000
a=mid:3
m=video 49104 RTP/AVP 104
a=rtpmap:104 H261/90000
a=mid:4
m=video 49105 RTP/AVP 105
a=rtpmap:105 H261/90000
a=mid:5
m=video 49106 RTP/AVP 106
a=rtpmap:106 H261/90000
a=mid:6
```

4.3. Layout with SSRC multiplex

The following SDP is for a system providing 2 video streams using SSRC multiplexing. In this example, the SSRC for one stream is 12345 while for the other it is 67890.

```
v=0
o=bob 2890844526 2890844526 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
a=ssrc-group:ADJ 12345 67890
t=0 0
m=video 49170 RTP/AVP 96
a=rtpmap:96 H264/90000
```

5. Security Considerations

Like all SDP, integrity of this information is important. When carrying SDP in SIP, mechanisms such as Transport Layer Security (TLS) can provide hop by hop confidentiality and integrity. The receiver SHOULD do an integrity check on SDP and follow the security considerations of SDP [\[RFC4566\]](#) to trust only SDP from trusted sources. End-to-end integrity can be provided by [\[RFC4474\]](#).

6. IANA Considerations

Note to RFC Editor: Please replace [RFC-AAAA] with the RFC number for this specification.

6.1. Registration of SDP Attributes

This document registers a new attribute name in SDP.

SDP Attribute ("att-field"):

Attribute name: media-grid-dims
Long form: 2-D media grid dimensions
Type of name: att-field
Type of attribute: Session level
Subject to charset: No
Purpose: Specifies the dimensions for a media grid
Reference: [RFC-AAAA]
Values: See [RFC-AAAA]

6.2. Registration of Grouping Semantics

This document, following the Standards Action policy from [\[RFC5226\]](#), registers the following semantics with IANA in the "Semantics for the "group" SDP Attribute" registry under SDP Parameters:

Semantics	Token	Reference
Adjacent Media	ADJ	[RFC-AAAA]

This document also registers the following semantics with IANA in "Semantics for the 'ssrc-group' SDP Attribute" registry under SDP Parameters:

Token	Semantics	Reference
ADJ	Adjacent Media	[RFC-AAAA]

7. Acknowledgments

The authors would like to thank Flemming Andreasen, Allyn Romanow, Roni Even, Hakon Dahle, Ingemar Johansson, Paul Kyzivat, Peter Musgrave, Christer Holmberg, Magnus Westerlund, Stephen Botzko, and Geir Arne Sandbakken for their review comments.

8. References

8.1. Normative References

[RFC5888]	Camarillo, G. and H. Schulzrinne, " The Session Description Protocol (SDP) Grouping Framework ", RFC 5888, June 2010.
[RFC4566]	Handley, M., Jacobson, V. and C. Perkins, " SDP: Session Description Protocol ", RFC 4566, July 2006.
[RFC2119]	Bradner, S., " Key words for use in RFCs to Indicate Requirement Levels ", BCP 14, RFC 2119, March 1997.
[RFC5234]	Crocker, D. and P. Overell, " Augmented BNF for Syntax Specifications: ABNF ", STD 68, RFC 5234, January 2008.
[RFC5576]	Lennox, J., Ott, J. and T. Schierl, " Source-Specific Media Attributes in the Session Description Protocol (SDP) ", RFC 5576, June 2009.
[RFC3264]	

	Rosenberg, J. and H. Schulzrinne, " An Offer/Answer Model with Session Description Protocol (SDP) ", RFC 3264, June 2002.
--	---

8.2. Informative References

[RFC4474]	Peterson, J. and C. Jennings, " Enhancements for Authenticated Identity Management in the Session Initiation Protocol (SIP) ", RFC 4474, August 2006.
[RFC5226]	Narten, T. and H. Alvestrand, " Guidelines for Writing an IANA Considerations Section in RFCs ", BCP 26, RFC 5226, May 2008.
[RFC3550]	Schulzrinne, H., Casner, S., Frederick, R. and V. Jacobson, " RTP: A Transport Protocol for Real-Time Applications ", STD 64, RFC 3550, July 2003.

Authors' Addresses

Cullen Jennings Jennings Cisco 170 West Tasman Drive San Jose, CA 95134 USA Phone: +1 408 421-9990 EMail: fluffy@cisco.com

Ali Begen Begen Cisco 181 Bay Street Toronto, ON M5J 2T3 Canada EMail: abegen@cisco.com