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Annotated Example SDP for WebRTC
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Abstract

The Real-Time Communications in WEB-browsers (Rtcweb) working group is charged to provide protocol support for direct interactive rich communication using audio, video and data between two peers' web browsers. With in the Rtcweb framework, Session Description protocol (SDP) is used for negotiating session capabilities between the peers. Such a negotiation happens based on the SDP Offer/Answer exchange mechanism.

This document provides an informational reference in describing the role of SDP and the Offer/Answer exchange mechanism for the most common Rtcweb use-cases.

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SDP4WebRTC

March 2018

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Table of Contents

1.	Introduction	3
2.	Terminology	3
3.	SDP and the WebRTC	3
4.	Offer/Answer and the WebRTC	5
5.	WebRTC Session Description Examples	6
5.1.	Some Conventions	7
5.2.	Basic Examples	9
5.2.1.	Audio Only Session	9
5.2.2.	Audio/Video Session	13
5.2.2.1.	IPv4 audio/video session	14
5.2.2.2.	Dual Stack audio/video session	19
5.2.3.	Data Only Session	24
5.2.4.	Audio Call On Hold	27
5.2.5.	Audio with DTMF Session	30
5.2.6.	One Way Audio/Video Session - Document Camera	34
5.2.7.	Audio, Video Session with BUNDLE Support Unknown	38
5.2.8.	Audio, Video and Data Session	43
5.2.9.	Audio, Video Session with BUNDLE Unsupported	48
5.2.10.	Audio, Video BUNDLED, but Data (Not BUNDLED)	53
5.2.11.	Audio Only, Add Video to BUNDLE	58
5.3.	MultiResolution, RTX, FEC Examples	65
5.3.1.	Sendonly Simulcast Session with 2 cameras and 2 encodings per camera	65
5.3.2.	Successful SVC Video Session	72
5.3.3.	Successful Simulcast Video Session with Retransmission	77
5.3.4.	Successful 1-way Simulcast Session with 2 resolutions and RTX - One resolution rejected	82
5.3.5.	Simulcast Video Session with Forward Error Correction	87
5.4.	Others	92
5.4.1.	Audio Session - Voice Activity Detection	93
5.4.2.	Audio Conference - Voice Activity Detection	96
5.4.3.	Successful legacy Interop Fallback with bundle-only	99
5.4.4.	Legacy Interop with RTP/AVP profile	104

6.	IANA Considerations	108
7.	Security Considerations	108
8.	Acknowledgments	108
9.	Change Log	108
10.	Informative References	112

Appendix A.	Appendix	116
A.1.	JSEP SDP Attributes Checklist	116
A.1.1.	Common Checklist	116
A.1.2.	RTP Media Description Checklist	117
A.1.3.	DataChannel Media Description checklist	119
	Authors' Addresses	119

[1.](#) Introduction

Javascript Session Establishment Protocol(JSEP)

[[I-D.ietf-rtcweb-jsep](#)] specifies a generic protocol needed to generate [[RFC3264](#)] Offers and Answers negotiated between the [[WebRTC](#)] peers for setting up, updating and tearing down a WebRTC session. For this purpose, SDP is used to construct [[RFC3264](#)] Offers/Answers for describing (media and non-media) streams as appropriate for the recipients of the session description to participate in the session.

The remainder of this document is organized as follows: Sections [3](#) and 4 provides an overview of SDP and the Offer/Answer exchange mechanism. [Section 5](#) provides sample SDP generated for the most common WebRTC use-cases.

[2.](#) Terminology

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

[3.](#) SDP and the WebRTC

The purpose of this section is to provide a general overview of SDP and its components. For a more in-depth understanding, the readers are advised to refer to [[RFC4566](#)].

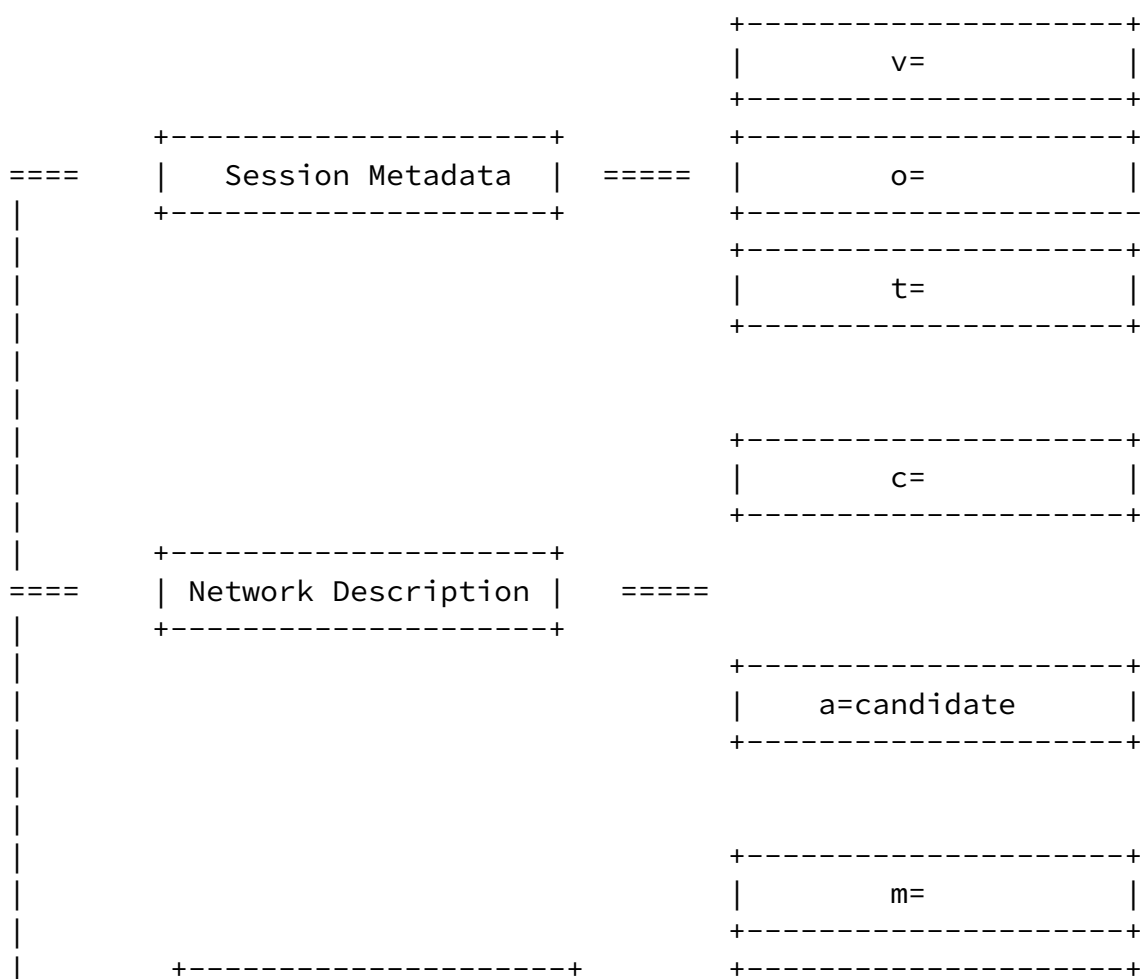
The Session Description Protocol (SDP) [[RFC4566](#)] describes multimedia sessions, which can contain audio, video, whiteboard, fax, modem, and

other streams. SDP provides a general purpose, standard representation to describe various aspects of multimedia session such as media capabilities, transport addresses and related metadata in a transport agnostic manner, for the purposes of session announcement, session invitation and parameter negotiation.

As of today SDP is widely used in the context of Session Initiation Protocol [[RFC3261](#)], Real-time Transport Protocol [[RFC3550](#)] and Real-time Streaming Protocol applications [[RFC7826](#)].

Below figure introduces high-level breakup of SDP into components that semantically describe a multimedia session, in our case, a

WebRTC session [[WebRTC](#)]. It by no means captures everything about SDP and hence, should be used for informational purposes only.



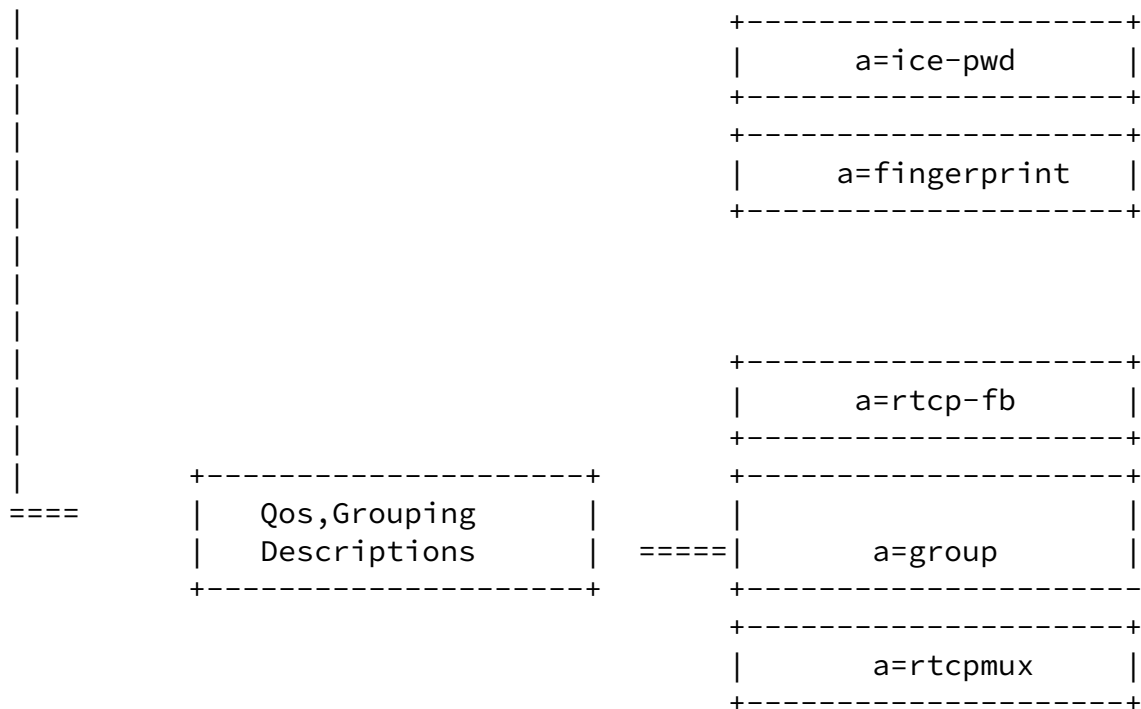
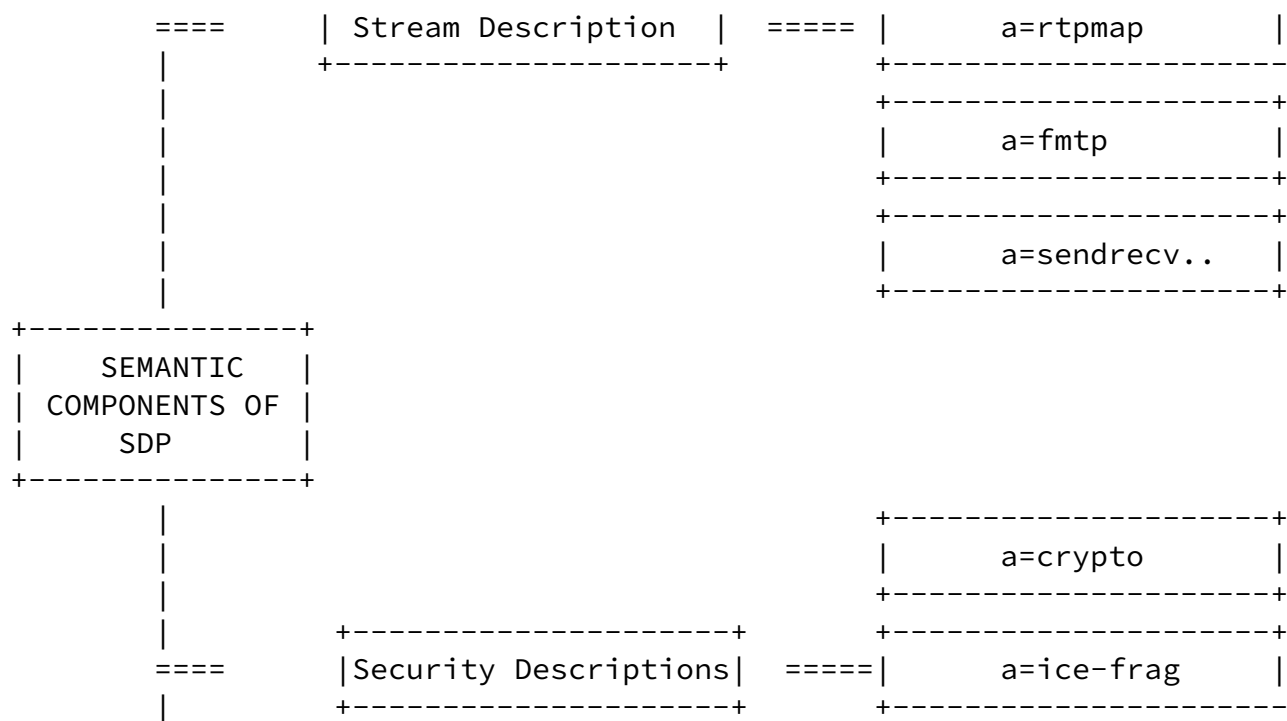


Figure 1: Semantic Components of SDP

[WebRTC] proposes JavaScript application to fully specify and control the signaling plane of a multimedia session as described in the JSEP specification [[I-D.ietf-rtcweb-jsep](#)]. JSEP provides mechanisms to create session characterization and media definition information to conduct the session based on SDP exchanges.

In this context, SDP serves two purposes:

1. Provide grammatical structure syntactically.
2. Semantically convey participant's intention and capabilities required to successfully negotiate a session.

[4.](#) Offer/Answer and the WebRTC

This section introduces SDP Offer/Answer Exchange mechanism mandated by WebRTC for negotiating session capabilities while setting up, updating and tearing down a WebRTC session. This section is intentionally brief in nature and interested readers are recommended to refer [[RFC3264](#)] for specific details on the protocol operation.

The Offer/Answer [[RFC3264](#)] model specifies rule for the bilateral exchange of Session Description Protocol (SDP) messages for creation of multimedia streams. It defines protocol with involved participants exchanging desired session characteristics from each others perspective constructed as SDP to negotiate the session between them.

In the most basic form, the protocol operation begins by one of the participants sending an initial SDP Offer describing its intent to start a multimedia communication session. The participant receiving the offer MAY generate an SDP Answer accepting the offer or it MAY reject the offer. If the session is accepted the Offer/Answer model guarantees a common view of the multimedia session between the participants.

At any time, either participant MAY generate a new SDP offer that updates the session in progress.

With in the context of WebRTC, the Offer/Answer model defines the state-machinery for WebRTC peers to negotiate session descriptions between them during the initial setup stages as well as for eventual session updates. JSEP specification [[I-D.ietf-rtcweb-jsep](#)] for WebRTC provides the mechanism for generating [[RFC3264](#)] SDP Offers and Answers in order for both sides of the session to agree upon the details such as the list of media formats to be sent/received, bandwidth information, crypto parameters, transport parameters, for example.

[5.](#) WebRTC Session Description Examples

A typical web based real-time multimedia communication session can be characterized as below:

- o It has zero or more Audio only, Video only or Audio/Video RTP Sessions,
- o MAY contain zero or more non-media data sessions,
- o All the sessions are secured with DTLS-SRTP,
- o Supports NAT traversal using ICE mechanism,
- o Provides RTCP based feedback mechanisms,
- o Sessions can be over IPv4-only, IPv6-only, dual-stack based clients,

- o Supports BUNDLE based grouping of media streams over a single 5-tuple transport.

[5.1.](#) Some Conventions

The examples given in this document follow the conventions listed below:

- o In all the examples, Alice and Bob are assumed to be the WebRTC peers.
- o It is assumed that for most of the examples, the support for [\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#) is established apriori either out-of-band or as a consequence of successful Offer/Answer negotiation between Alice and Bob, unless explicitly stated otherwise.
- o Call-flow diagrams that accompany the use-cases capture only the prominent aspects of the system behavior and intentionally is not detailed to improve readability.
- o Eventhough the call-flow diagrams shows SDP being exchanged between the parties, it doesn't represent the only way an WebRTC setup is expected to work. Other approaches may involve WebRTC applications to exchange the media setup information via non-SDP mechanisms as long as they confirm to the [\[I-D.ietf-rtcweb-jsep\]](#) API specification.
- o The SDP examples deviate from actual on-the-wire SDP notation in several ways. This is done to facilitate readability and to conform to the restrictions imposed by the RFC formatting rules.
 - * Visual markers/Empty lines in any SDP example are inserted to make functional divisions in the SDP clearer, and are not actually part of the SDP syntax.
 - * Any SDP line that is indented (compared to the initial line in the SDP block) is a continuation of the preceding line. The line break and indent are to be interpreted as a single space character.
 - * Excepting the above two conventions, line endings are to be interpreted as <CR><LF> pairs (that is, an ASCII 13 followed by an ASCII 10).
- o Against each SDP line, pointers to the appropriate RFCs are provided for further informational reference. Also an attempt has

understanding of the SDP usage, wherever appropriate.

- o Following SDP details are common across all the use-cases defined in this document unless mentioned otherwise.
 - * DTLS fingerprint for SRTP (a=fingerprint)
 - * RTP/RTCP Multiplexing (a=rtcp-mux)
 - * RTCP Feedback support (a=rtcp-fb)
 - * Host and server-reflexive candidate lines (a=candidate)
 - * SRTP Setup framework parameters (a=setup)
 - * RTCP attribute (a=rtcp)
 - * RTP header extension indicating audio-levels from client to the mixer

For specific details, readers must refer to [[I-D.ietf-rtcweb-jsep](#)] specification.

- o The term "Session" is used rather loosely in this document to refer to either a "Communication Session" or a "RTP Session" or a "RTP Stream" depending on the context.
- o Payload type 109 is usually used for OPUS, 0 for PCMU, 8 for PCMA, 99 for H.264 and 120 for VP8 in most of the examples to maintain uniformity.
- o The IP Address:Port combinations '192.0.2.4:61665' (host) and '203.0.113.141:54609' (Server Reflexive) is typically used for Alice.
- o The IP Address:Port combinations '198.51.100.7:51556' (host) and '203.0.113.77:49203' (Server Reflexive) is typically used for Bob.
- o The IPv6 addresses 2001:DB8:8101:3a55:4858:a2a9:22ff:99b9 and 2001:DB8:30c:1266:5916:3779:22f6:77f7 are used to represent Alice and Bob host addresses respectively.
- o In the actual use the values that represent SSRCs, ICE candidate foundations, WebRTC Mediastream, MediaStreamTrack Ids values shall be much larger and/or random than the ones shown in the examples.

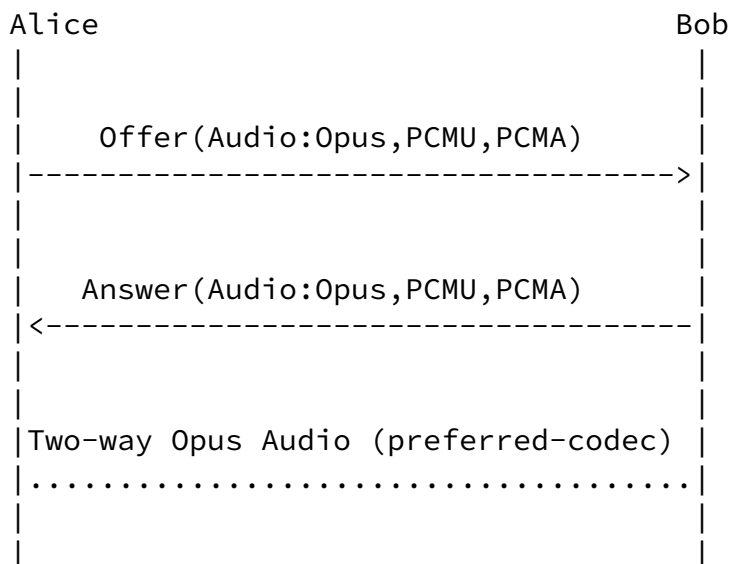
- o `tls-id` attribute values `89J2LRATQ3ULA24G9AHWVR31VJWSLB68` and `UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z` are used for Alice. The values `CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31` and `9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G` are used for Bob.
- o identity attribute values are split across multiple lines to enhance readability, thus any line breaks and indentations in the value must be ignored.
- o SDP attributes in the examples closely follow the checklist defined in section [Appendix A.1](#).

5.2. Basic Examples

5.2.1. Audio Only Session

This common scenario shows SDP for secure two-way audio session with Alice offering Opus, PCMU, PCMA and Bob accepting all the offered audio codecs.

2-Way Audio Only Session



Offer SDP Contents	RFC#/Notes
<code>v=0</code>	[RFC4566]
<code>o=- 20518 0 IN IP4 0.0.0.0</code>	[RFC4566] - Session Origin Information
<code>s=-</code>	[RFC4566]

t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sd

Internet-Draft	SDP4WebRTC	March 2018
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		p-bundle-negotiatio
		n]
a=ice-options:trickle		[I-D.ietf-mmusic-tr
		ickle-ice]
a=identity:eyJpZHAiOnsiZG9tYWluIjoibmlpZi5o		Section 5.6 of [I-D
dSIsInByb3RvY29sIjoiaWRwLmh0bWwifSwiYXNzZXJ		.ietf-rtcweb-securi
0a W9uIjoizXlKaGJHY2lPaUpTVXpJMU5pSXNjb1I1Y		ty-arch]
0NjNklrcFhVeUo5LmV5SmpiMjUwWlc1MGN5STZleUpt		
YVc1b lpYSndjbWx1ZENjNlczc2lZV3huYjNKcGRHaH		
RJam9pYzJoaExUSTFOaUlzSW1ScFoyVnpgQ0k2SWpre		
k9rTXdPa kl6T2pKR09rRXlPakF3T2pBd09qQkVPaV		
4T2tGRE9rUXlPaUwT2pZMU9rWTBPak5DT2pkRU9qa3		
lPa1JET2pnN E9qTXpPaV4T2pJek9qUXdPamN5T2pr		
eE9qZ3pPaLZDT2pBeE9qSkdPaV3T2pjNE9qTkdJbjF		
kZlN3aWFXUmxib lJwZEhraU9pSnRhWE5wUUc1cGFXW		
XVhSFVpZlEuSTVQdGhKNFFDT05TOFVXd2500Uh3MEda		
TDl3d0RBVGRrTWtFW llmdlNVTTJ6Umd5R09WSGgzRm		
pnc2FPZklkRnFsNUx6azBFbndVOTNQOUlCQ0xZ0Wtia		
3V1c0V1S25YRGVNLTNIN WFmdTJvZl9CTlZjUnB3Mmd		
BdlnNBbVR6SlltcEpqMFEdmV0TmtVT1huZE9HLUIzT3		
ZGb3QwZVNENlZSNUdhb2wyc GduS3FSTkt0d3dacEZ1		
eUZZbFRodHJIdGNiT19WV3o4QnZpTThKS250dExWd1J		
xNUhMX2ZLTlRCNzFDYkoyWmh5W XU1UEdwWDhXcXJMW		
C1ybm5YSFY3RnhoTTh50HdrLWd5cnRZazVnbFlZeUFr		
cTVqZklSXzRzWER5d19Qc1BWTW1aZ XltenVGv3BQTz		
VFWlJYR0ZpRjFET0o4Q0Q3Z3Zta2dUdlBXSWpkemtBI		
n0=		
***** Audio m=line *****		*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8		[RFC4566]
c=IN IP4 203.0.113.141		[RFC4566]
a=mid:audio		[RFC5888]
a=msid:ma ta		Identifies
		RTCMediaStream ID
		(ma) and
		RTCMediaStreamTrack
		ID (ta)
a=sendrecv		[RFC3264] - Alice
		can send and recv

a=rtpmap:109 opus/48000/2	audio [RFC7587] - Opus Codec 48khz, 2 channels
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=maxptime:120	[RFC4566]

a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245] - DTLS Fingerprint for SRTP
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp:60065 IN IP4 203.0.113.141	[RFC3605]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464] Alice supports RTP header extension to indicate audio levels
a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host	[RFC5245] - RTP Host Candidate
a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr	[RFC5245] - RTP Server Reflexive

<pre> 4 TlVoTVgyWkxUbFJDtnpGRFlrb3lXbWg1VyINCn0= ***** Audio m=line ***** m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 8 c=IN IP4 203.0.113.77 a=mid:audio a=msid:ma ta a=sendrecv a=rtpmap:109 opus/48000/2 a=rtpmap:0 PCMU/8000 a=rtpmap:8 PCMA/8000 a=maxptime:120 a=ice-ufrag:05067423 </pre>	<pre> ***** ***** [RFC4566] [RFC4566] [RFC5888] [I-D.ietf-mmusic-ms id] Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta) [RFC3264] - Bob can send and recv audio [RFC7587] Opus Codec [RFC3551] PCMU Audio Codec [RFC3551] PCMA Audio Codec [RFC4566] [RFC5245] - ICE user fragment </pre>
--	---

<pre> a=ice-pwd:1747d1ee3474a28a397a4c3f3af08a068 a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2: 51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2 4:C2:43:F0:A1:58:D0:A1:2C:19:08 a=setup:active a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31 a=rtcp-mux a=rtcp-rsize a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- </pre>	<pre> [RFC5245] - ICE password parameter [RFC5245] - DTLS Fingerprint for SRTP [RFC5763] - Bob is the DTLS client [I-D.ietf-mmusic-dt ls-sdp] [RFC5761] - Bob can perform RTP/RTCP Muxing on port 49203 [RFC5506] - Bob intends to use reduced size RTCP for this session [RFC6464] Bob </pre>
---	--

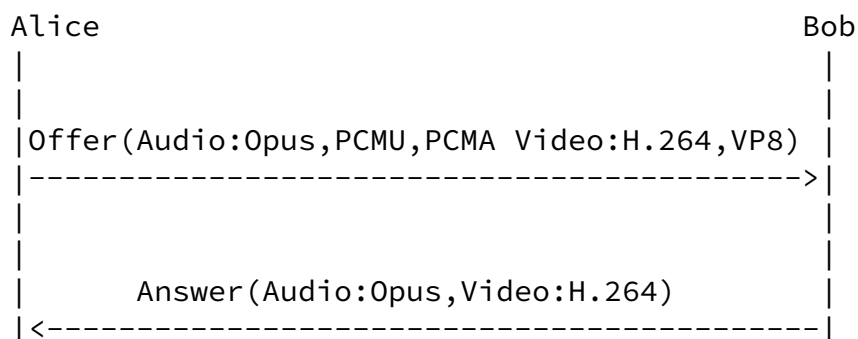
audio-level	supports audio level RTP header extension as well
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host	[RFC5245] - RTP/RTCP Host ICE Candidate
a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245] - RTP/RTCP Server Reflexive ICE Candidate
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

Table 2: 5.2.1 SDP Answer

5.2.2. Audio/Video Session

Alice and Bob establish a two-way audio and video session with Opus as the audio codec and H.264 as the video codec.

2-Way Audio,Video Session



5.2.2.1. IPv4 audio/video session

This section shows the IPv4 only Offer/Answer exchange.

Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888] - Alice wants to lip sync her audio and video streams
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	[I-D.ietf-mmusic-msid] Identifies RTCMediaStream ID

a=sendrecv	(ma) and RTCMediaStreamTrack ID (ta) [RFC3264] - Alice
------------	--

	can send and recv audio
a=rtpmap:109 opus/48000/2	[RFC7587] - Opus Codec 48khz, 2 channels
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245] - DTLS Fingerprint for SRTP
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host	[RFC5245] - RTP/RTCP Host Candidate
a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245] - RTP/RTCP Server Reflexive ICE Candidate
a=end-of-candidates	[I-D.ietf-mmusic-tr

***** Video m=line *****

m=video 0 UDP/TLS/RTP/SAVPF 99 120
c=IN IP4 203.0.113.141
a=bundle-only

a=mid:video
a=msid:ma tb

a=sendrecv

a=rtpmap:99 H264/90000

a=fmtp:99 profile-level-
id=4d0028;packetization-mode=1
a=rtpmap:120 VP8/90000

a=rtcp-fb:99 nack

a=rtcp-fb:99 nack pli

a=rtcp-fb:99 ccm fir

a=rtcp-fb:120 nack

a=rtcp-fb:120 nack pli

a=rtcp-fb:120 ccm fir

ickle-ice]

[[RFC4566](#)]

[[RFC4566](#)]

[I-D.ietf-mmusic-sdp-bundle-negotiation]

[[RFC5888](#)]

Identifies
RTCMediaStream ID
(ma) and
RTCMediaStreamTrack
ID (tb)

[[RFC3264](#)] - Alice
can send and recv
video

[[RFC6184](#)] - H.264
Video Codec

[[RFC6184](#)]

[[RFC7741](#)] - VP8
video codec

[[RFC5104](#)] -
Indicates NACK RTCP
feedback support

[[RFC5104](#)] -
Indicates support
for Picture loss
Indication and NACK

[[RFC5104](#)] - Full
Intra Frame
Request-Codec
Control Message
support

[[RFC5104](#)] -
Indicates NACK RTCP
feedback support

[[RFC5104](#)] -
Indicates support
for Picture loss
Indication and NACK

[[RFC5104](#)] - Full
Intra Frame
Request-Codec
Control Message
support

hdrext:sdes:mid	p-bundle-negotiatio
	n]

Table 3: 5.2.2.1 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session
s=-	Origin Information
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[RFC4566]
	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
a=group:LS audio video	[RFC5888] - Bob
	agrees to do the
	same
a=ice-options:trickle	[I-D.ietf-mmusic-tr
	ickle-ice]
***** Audio m=line *****	*****

m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendrecv	[RFC3264] - Bob can
	send and recv audio
a=rtpmap:109 opus/48000/2	[RFC7587] - Bob
	accepts only Opus
	Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245] - ICE

a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	username frag [RFC5245] - ICE
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	password [RFC5245] - DTLS Fingerprint for SRTP
a=setup:active	[RFC5763] - Bob is the DTLS client

a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mu x-exclusive]
a=rtcp-rsize	[RFC5506] - Bob intends to use reduced size RTCP for this session
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 3618095783 198.51.100.7 49203 typ host	[RFC5245] - RTP/RTCP Host ICE Candidate
a=candidate:1 1 UDP 565689203 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245] - RTP/RTCP Server Reflexive ICE Candidate
a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]
***** Video m=line *****	***** *****
m=video 0 UDP/TLS/RTP/SAVPF 99	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=mid:video	[RFC5888]

a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264] - Bob can send and recv video
a=rtpmap:99 H264/90000	[RFC6184] - Bob accepts H.264 Video Codec.
a=fmtp:99 profile-level- id=4d0028;packetization-mode=1	[RFC6184]
a=rtcp-fb:99 nack	[RFC5104] - Indicates support for NACK based RTCP

a=rtcp-fb:99 nack pli	feedback [RFC5104] - Indicates support for Picture loss Indication and NACK
a=rtcp-fb:99 ccm fir	[RFC5104] - Full Intra Frame Request- Codec Control Message support
a=extmap:2 urn:ietf:params:rtp- hdnext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]

Table 4: 5.2.2.1 SDP Answer

[5.2.2.2.](#) Dual Stack audio/video session

This section captures offer/answer exchange when Alice and Bob support both IPv4 and IPv6 host addresses.

Offer SDP Contents	RFC#/Notes
--------------------	------------

v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888] - Alice wants to lip sync her audio and video streams
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and

	RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264] - Alice can send and recv audio
a=rtpmap:109 opus/48000/2	[RFC7587] - Opus Codec 48khz, 2 channels
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	[RFC5245] - DTLS Fingerprint for

4:A9:0E:05:E9:26:33:E8:70:88:A2	SRTP
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host	[RFC5245] - RTP/RTCP Host Candidate
a=candidate:0 1 UDP 2122194687 2001:DB8:8101:3a55:4858:a2a9:22ff:99b9 61665 typ host	[RFC5245] - RTP/RTCP IPv6 Host Candidate
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****

m=video 0 UDP/TLS/RTP/SAVPF 99 120	*****
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[RFC4566]
a=mid:video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=msid:ma tb	[RFC5888]
	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)

a=sendrecv	[RFC3264] - Alice can send and recv video
a=rtpmap:99 H264/90000	[RFC6184] - H.264 Video Codec
a=fmtp:99 profile-level-id=4d0028;packetization-mode=1	[RFC6184]
a=rtpmap:120 VP8/90000	[RFC7741] - VP8 video codec
a=rtcp-fb:99 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=rtcp-fb:99 nack pli	[RFC5104] - Indicates support for Picture loss Indication and NACK
a=rtcp-fb:99 ccm fir	[RFC5104] - Full Intra Frame Request-Codec Control Message support
a=rtcp-fb:120 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=rtcp-fb:120 nack pli	[RFC5104] - Indicates support for Picture loss Indication and NACK
a=rtcp-fb:120 ccm fir	[RFC5104] - Full Intra Frame Request-Codec Control Message support
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888] - Bob agrees to do the same
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264] - Bob can send and recv audio
a=rtpmap:109 opus/48000/2	[RFC7587] - Bob accepts only Opus Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245] - DTLS Fingerprint for SRTP
a=setup:active	[RFC5763] - Bob is the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]

a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506] - Bob intends to use reduced size RTCP for this session
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 3618095783 198.51.100.7 49203 typ host	[RFC5245] - RTP/RTCP Host ICE Candidate
a=candidate:0 1 UDP 3618095783 2001:DB8:30c:1266:5916:3779:22f6:77f7 49203 typ host	[RFC5245] - RTP/RTCP IPv6 Host ICE Candidate
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 99	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264] - Bob can send and recv video
a=rtpmap:99 H264/90000	[RFC6184] - Bob accepts H.264 Video Codec.
a=fmtp:99 profile-level-id=4d0028;packetization-mode=1	[RFC6184]
a=rtcp-fb:99 nack	[RFC5104] - Indicates support for NACK based RTCP feedback
a=rtcp-fb:99 nack pli	[RFC5104] - Indicates support

Internet-Draft

SDP4WebRTC

March 2018

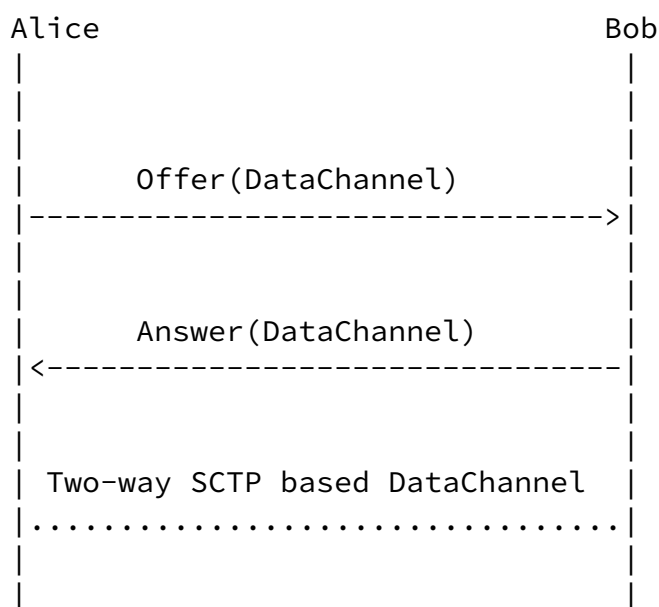
a=rtcp-fb:99 ccm fir	for Picture loss Indication and NACK
	[RFC5104] - Full Intra Frame
	Request- Codec Control Message support
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Table 6: 5.2.2.2 SDP Answer

5.2.3. Data Only Session

This scenario illustrates the SDP negotiated to setup a data-only session based on the SCTP Data Channel, thus enabling use-cases such as file-transfer, real-time game control for example.

2-Way DataChannel Session



Internet-Draft

SDP4WebRTC

March 2018

Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Application m=line *****	*****
m=application 54609 UDP/DTLS/SCTP webrtc-datachannel	[I-D.ietf-rtcweb-data-channel]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:data	[RFC5888]
a=sendrecv	[RFC3264] - Alice can send and recv non-media data
a=sctp-port:5000	[I-D.ietf-mmusic-sctp-sdp]
a=max-message-size:100000	[I-D.ietf-mmusic-sctp-sdp]
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=ice-ufrag:074c6550	[RFC5245] - Session Level ICE parameter
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - Session Level ICE parameter

a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245] - Session DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

Table 7: 5.2.3 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Application m=line *****	*****
m=application 49203 UDP/DTLS/SCTP webrtc-datachannel	[I-D.ietf-mmusic-sctp-sdp]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:data	[RFC5888]
a=sendrecv	[RFC3264] - Bob can send and recv non-media data
a=sctp-port:5000	[I-D.ietf-mmusic-sctp-sdp]
a=max-message-size:100000	[I-D.ietf-mmusic-sctp-sdp]
a=setup:active	[RFC5763] - Bob is the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]

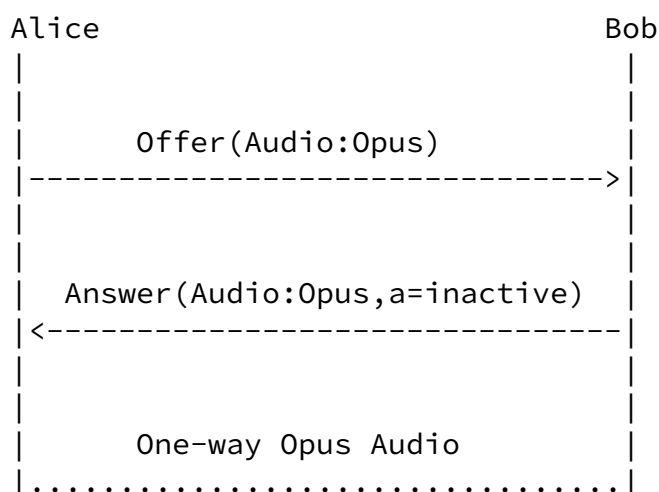
a=ice-ufrag:c300d85b	[RFC5245] - Session Level ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - Session Level ICE password
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245] - Session DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

Table 8: 5.2.3 SDP Answer

[5.2.4.](#) Audio Call On Hold

Alice calls Bob, but when Bob answers he places Alice on hold by setting the SDP direction attribute to a=inactive in the Answer.

Audio On Hold



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264] - Alice

a=rtpmap:109 opus/48000/2	can send and recv audio [RFC7587] - Opus Codec 48khz, 2 channels
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245] - DTLS Fingerprint for SRTP
a=setup:actpass	[RFC5763] - Alice

a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	can act as DTLS client or server [I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

Table 9: 5.2.4 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]

t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]

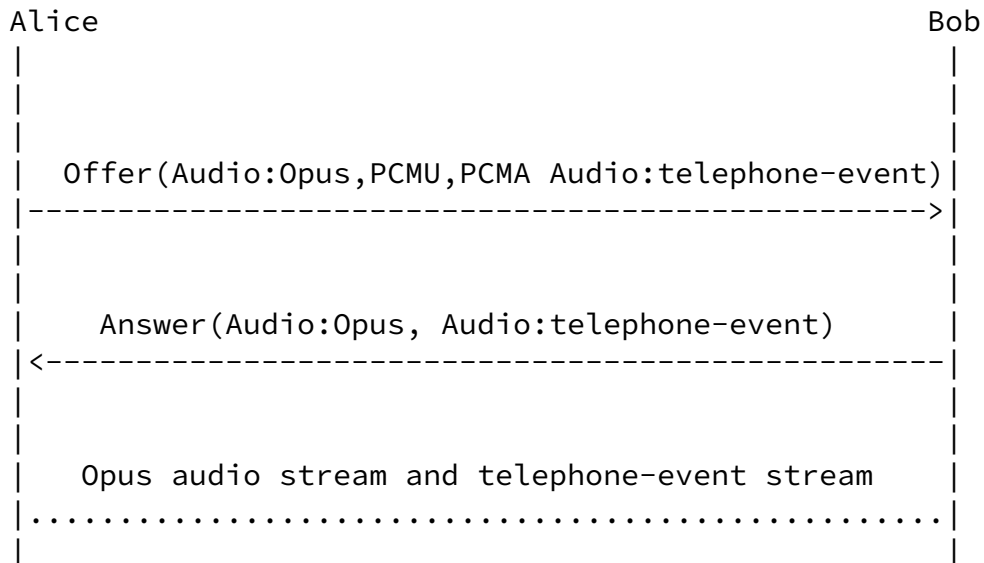
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=inactive	[RFC3264] - Bob puts call On Hold
a=rtpmap:109 opus/48000/2	[RFC7587] - Bob accepts Opus Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2: 51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2 4:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245] - DTLS Fingerprint for SRTP
a=setup:active	[RFC5763] - Bob is the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mu x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host	[RFC5245] - Host candidate
a=candidate:1 1 UDP 1685987071 203.0.113.141 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245] - Server Reflexive candidate
a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]

Table 10: 5.2.4 SDP Answer

5.2.5. Audio with DTMF Session

In this example, Alice wishes to establish two separate audio streams, one for normal audio and the other for telephone-events. Alice offers first audio stream with three codecs and the other with [\[RFC4733\]](#) tones (for DTMF). Bob accepts both the audio streams by choosing Opus as the audio codec and telephone-event for the other stream.

Audio Session with DTMF



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio dtmf	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

Internet-Draft

SDP4WebRTC

March 2018

m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendrecv	[RFC3264] - Alice
	can send and recv
	audio
a=rtpmap:109 opus/48000/2	[RFC7587] - Opus
	Codec 48khz, 2
	channels
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU
	Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA
	Audio Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245] - ICE
	user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE
	password parameter
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245] - DTLS
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	Fingerprint for
4:A9:0E:05:E9:26:33:E8:70:88:A2	SRTCP
a=setup:actpass	[RFC5763] - Alice
	can act as DTLS
	client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-mux	[RFC5761] - Alice
	can perform
	RTP/RTCP Muxing
a=rtcp-mux-only	[I-D.ietf-mmusic-mu
	x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdext:sdes:mid	p-bundle-negotiatio
	n]
a=candidate:0 1 UDP 2122194687 192.0.2.4	[RFC5245]

61665 typ host	
a=candidate:1 1 UDP 1685987071	[RFC5245]
203.0.113.141 54609 typ srflx raddr	
192.0.2.4 rport 61665	
a=end-of-candidates	[I-D.ietf-mmusic-tr

	ickle-ice]
***** DTMF m=line *****	*****

m=audio 0 UDP/TLS/RTP/SAVPF 126	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
a=mid:dtmf	[RFC5888]
a=msid:ma tb	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)
a=sendonly	[RFC3264] - Alice
	can send DTMF
	Events
a=rtpmap:126 telephone-event/8000	[RFC4733]
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdxext:sdes:mid	p-bundle-negotiatio
	n]
+-----+-----+	+-----+-----+

Table 11: 5.2.5 SDP Offer

+-----+-----+	+-----+-----+
Answer SDP Contents	RFC#/Notes
+-----+-----+	+-----+-----+
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session
	Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio dtmf	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio

hdnext:sdes:mid	p-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** DTMF m=line *****	*****
m=audio 0 UDP/TLS/RTP/SAVPF 126	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:dtmf	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID

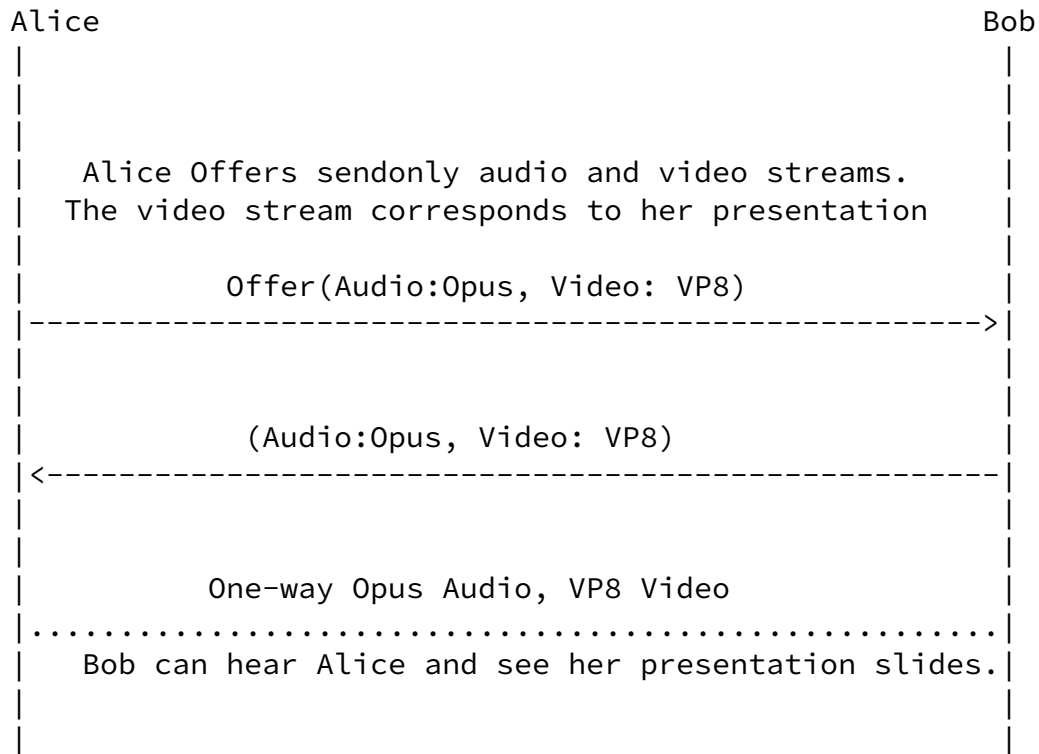
a=recvonly	(ma) and RTCMediaStreamTrack ID (tb) [RFC3264] - Alice can receive DTMF events
a=rtpmap:126 telephone-event/8000	[RFC4733]
a=extmap:2 urn:ietf:params:rtp-hdnext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Table 12: 5.2.5 SDP Answer

5.2.6. One Way Audio/Video Session - Document Camera

In this scenario Alice and Bob engage in a 1 way audio and video session with Bob receiving Alice's audio and her presentation slides as video stream.

One Way Audio & Video Session - Document Camera



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendonly	[RFC3264] - Send only audio stream
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mu x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2122194687 203.0.113.141 54609 typ host	[RFC5245]

a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd p-bundle-negotiatio

a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendonly	[RFC3264] - Send only video stream
a=rtpmap:120 VP8/90000	[RFC7741]
a=content:slides	[RFC4796] - Alice's presentation video stream
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]

Table 13: 5.2.6 SDP Offer

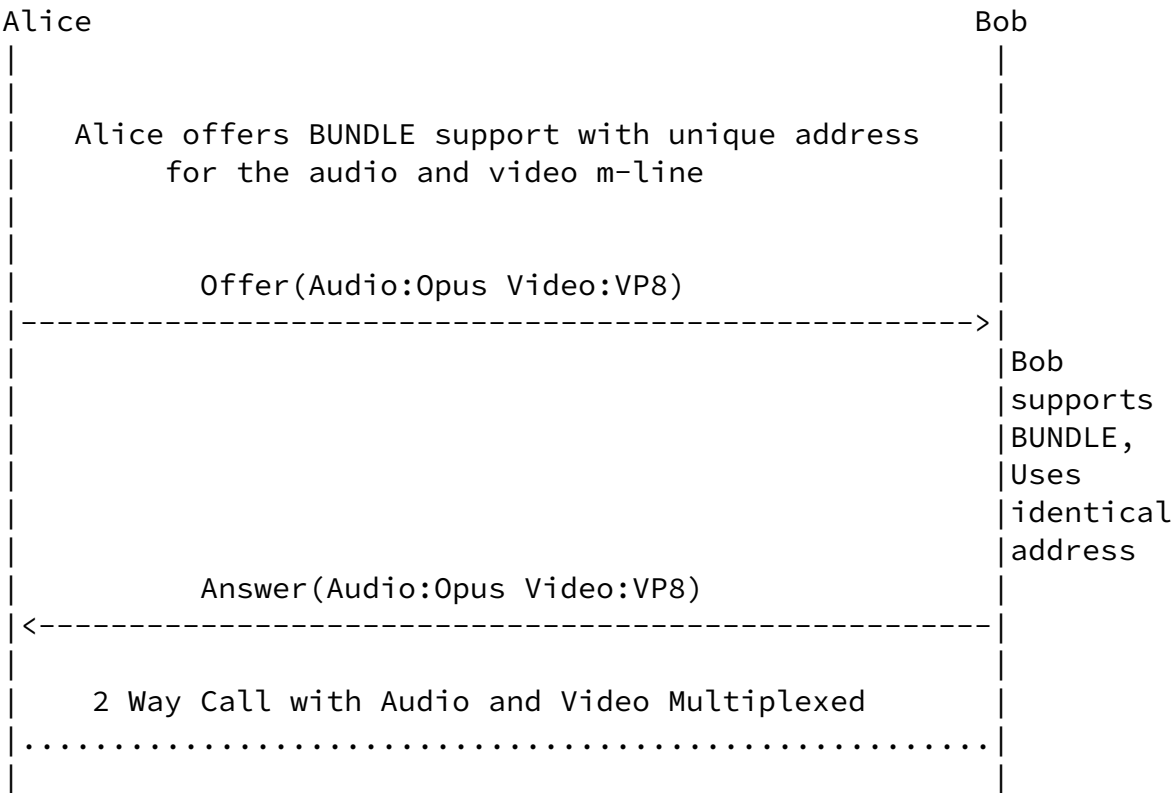
Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-tr ickle-ice]
***** Audio m=line *****	***** *****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]

c=IN IP4 203.0.113.77	[RFC4566]
-----------------------	---------------------------

a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=recvonly	[RFC3264] - Receive
	only audio stream
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:	[RFC5245]
51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2	
4:C2:43:F0:A1:58:D0:A1:2C:19:08	
a=setup:active	[RFC5763] - Bob is
	the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mu
	x-exclusive]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdrext:sdes:mid	p-bundle-negotiatio
	n]
a=candidate:0 1 UDP 2113667327 203.0.113.77	[RFC5245]
49203 typ host	
a=end-of-candidates	[I-D.ietf-mmusic-tr
	ickle-ice]
***** Video m=line *****	*****

m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)
a=recvonly	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=content:slides	[RFC4796] -

Two-Way Secure Audio,Video with BUNDLE support unknown



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS audio video	[RFC5888]

a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888] Audio
	m=line part of
	BUNDLE group with a

a=msid:ma ta	unique port number
	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245]
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	
4:A9:0E:05:E9:26:33:E8:70:88:A2	
a=setup:actpass	[RFC5763] - Alice
	can act as DTLS
	client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp:54610 IN IP4 203.0.113.141	[RFC3605] - RTCP
	port different from
	RTP Port
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrex:src-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sdp-
hdrex:sdes:mid	bundle-negotiation]
a=candidate:0 1 UDP 2122194687 192.0.2.4	[RFC5245] - RTP
61665 typ host	host candidate
a=candidate:1 1 UDP 1685987071	[RFC5245] - RTP

203.0.113.141 54609 typ srflx raddr	Server Reflexive
192.0.2.4 rport 61665	candidate
a=candidate:0 2 UDP 2122194687 192.0.2.4	[RFC5245] - RTCP
61666 typ host	host candidate
a=candidate:1 2 UDP 1685987071	[RFC5245] - RTCP
203.0.113.141 54610 typ srflx raddr	Server Reflexive
192.0.2.4 rport 61666	candidate
***** Video m=line *****	*****

m=video 62537 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:video	[RFC5888] Video
	m=line part of the
	Bundle group with a
	unique port number
a=msid:ma tb	Identifies

	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=ice-ufrag:6550074c	[RFC5245]
a=ice-pwd:74af08a068a28a397a4c3f31747d1ee34	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245]
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	
4:A9:0E:05:E9:26:33:E8:70:88:A2	
a=setup:actpass	[RFC5763] - Alice
	can act as DTLS
	client or server
a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp:62538 IN IP4 203.0.113.141	[RFC3605]
a=rtcp-rsize	[RFC5506]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdnext:sdes:mid	p-bundle-negotiatio
	n]

a=candidate:0 1 UDP 2122194687 192.0.2.4	[RFC5245] - RTP	
61886 typ host	Host candidate	
a=candidate:1 1 UDP 1685987071	[RFC5245] - RTP	
203.0.113.141 62537 typ srflx raddr	Server Reflexive	
192.0.2.4 rport 61886	candidate	
a=candidate:0 2 UDP 2122194687 192.0.2.4	[RFC5245] - RTCP	
61888 typ host	host candidate	
a=candidate:1 2 UDP 1685987071	[RFC5245] - RTCP	
203.0.113.141 62538 typ srflx raddr	Server Reflexive	
192.0.2.4 rport 61888	candidate	
+-----+-----+		

Table 15: 5.2.7 SDP Offer w/BUNDLE

Answer SDP Contents	RFC#/Notes	
+-----+-----+		
v=0	[RFC4566]	
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]	
s=-	[RFC4566]	
t=0 0	[RFC4566]	
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sd	

	p=	
	bundle-negotiatio	
	n] Bob supports	
	BUNDLE semantics.	
a=group:LS audio video	[RFC5888]	
a=ice-options:trickle	[I-D.ietf-mmusic-tr	
	ickle-ice]	
***** Audio m=line *****	*****	

m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]	
c=IN IP4 203.0.113.77	[RFC4566]	
a=mid:audio	[RFC5888] Audio	
	m=line part of the	
	BUNDLE group	
a=msid:ma ta	Identifies	
	RTCMediaStream ID	
	(ma) and	
	RTCMediaStreamTrack	
	ID (ta)	

a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763] - Bob is the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 198.51.100.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.77 51556 typ srflx raddr 198.51.100.7 rport 49203	[RFC5245]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]

a=mid:video	n]
	[RFC5888] Video
	m=line part of the
	BUNDLE group with
	the port from audio
	line repeated
a=msid:ma tb	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)

a=sendrecv	[RFC3264]	
a=rtpmap:120 VP8/90000	[RFC7741]	
a=rtcp-fb:120 nack	[RFC5104]	
a=rtcp-fb:120 nack pli	[RFC5104]	
a=rtcp-fb:120 ccm fir	[RFC5104]	
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
+-----+-----+		

Table 16: 5.2.7 SDP Answer w/BUNDLE

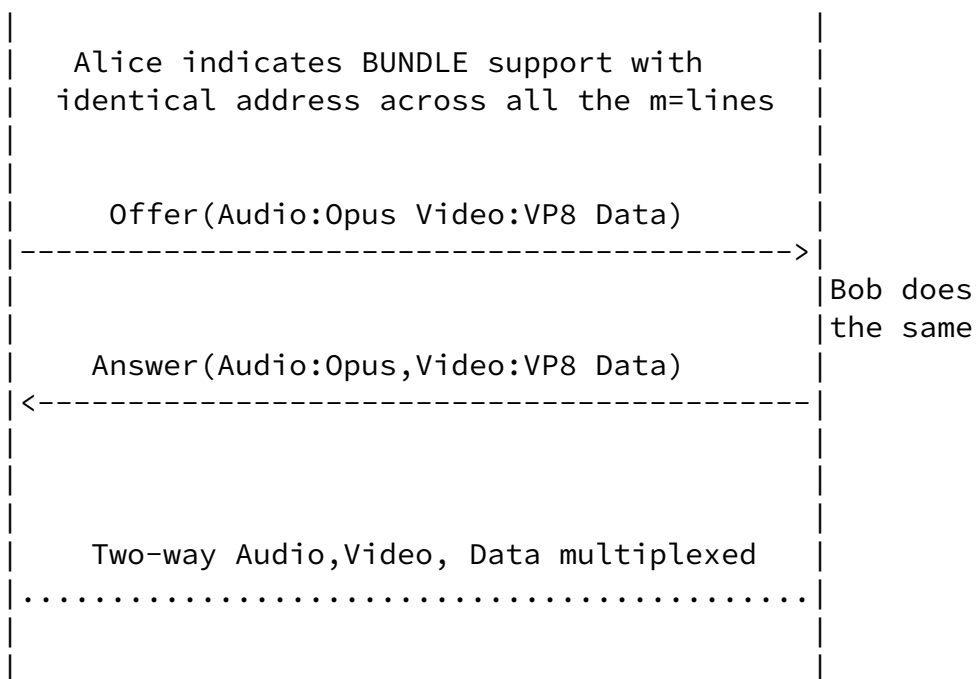
[5.2.8.](#) Audio, Video and Data Session

This example shows SDP for negotiating a session with Audio, Video and data streams between Alice and Bob with BUNDLE support known.

Audio,Video,Data with BUNDLE support known

Alice
|

Bob
|



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio	[RFC5888]
a=sendrecv	[RFC3264]

a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mu x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc- audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp- hdrext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp- hdrext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]

***** Application m=line *****	*****
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Internet-Draft	SDP4WebRTC	March 2018
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<pre> m=application 0 UDP/DTLS/SCTP webrtc- datachannel c=IN IP4 203.0.113.141 a=bundle-only a=mid:data a=sctp-port:5000 a=max-message-size:100000 a=sendrecv </pre>	<pre> ***** [I-D.ietf-rtcweb-da ta-channel] [RFC4566] [I-D.ietf-mmusic-sd p-bundle-negotiatio n] [RFC5888] [I-D.ietf-mmusic-sc tp-sdp] [I-D.ietf-mmusic-sc tp-sdp] [RFC3264] </pre>
---	---

Table 17: 5.2.8 SDP Offer

Answer SDP Contents	RFC#/Notes
<pre> v=0 o=- 16833 0 IN IP4 0.0.0.0 s=- t=0 0 a=group:BUNDLE audio video data a=group:LS audio video a=ice-options:trickle ***** Audio m=line ***** m=audio 49203 UDP/TLS/RTP/SAVPF 109 c=IN IP4 203.0.113.77 a=msid:ma ta </pre>	<pre> [RFC4566] [RFC4566] - Session Origin Information [RFC4566] [RFC4566] [I-D.ietf-mmusic-sd p-bundle-negotiatio n] [RFC5888] [I-D.ietf-mmusic-tr ickle-ice] ***** ***** [RFC4566] [RFC4566] Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack </pre>

a=mid:audio	ID (ta)
a=sendrecv	[RFC5888]
a=rtpmap:109 opus/48000/2	[RFC3264]
a=maxptime:120	[RFC7587]
a=ice-ufrag:c300d85b	[RFC4566]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:	[RFC5245]

51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2	
4:C2:43:F0:A1:58:D0:A1:2C:19:08	
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack

a=sendrecv	ID (tb)
a=rtpmap:120 VP8/90000	[RFC3264]
a=rtcp-fb:120 nack	[RFC7741]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrex:sdex:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Application m=line *****	*****
m=application 0 UDP/DTLS/SCTP webrtc-datachannel	[I-D.ietf-mmusic-sctp-sdp]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp]

	p-bundle-negotiation]
a=mid:data	[RFC5888]
a=sctp-port:5000	[I-D.ietf-mmusic-sctp-sdp]
a=max-message-size:100000	[I-D.ietf-mmusic-sctp-sdp]
a=sendrecv	[RFC3264]

Table 18: 5.2.8 SDP Answer

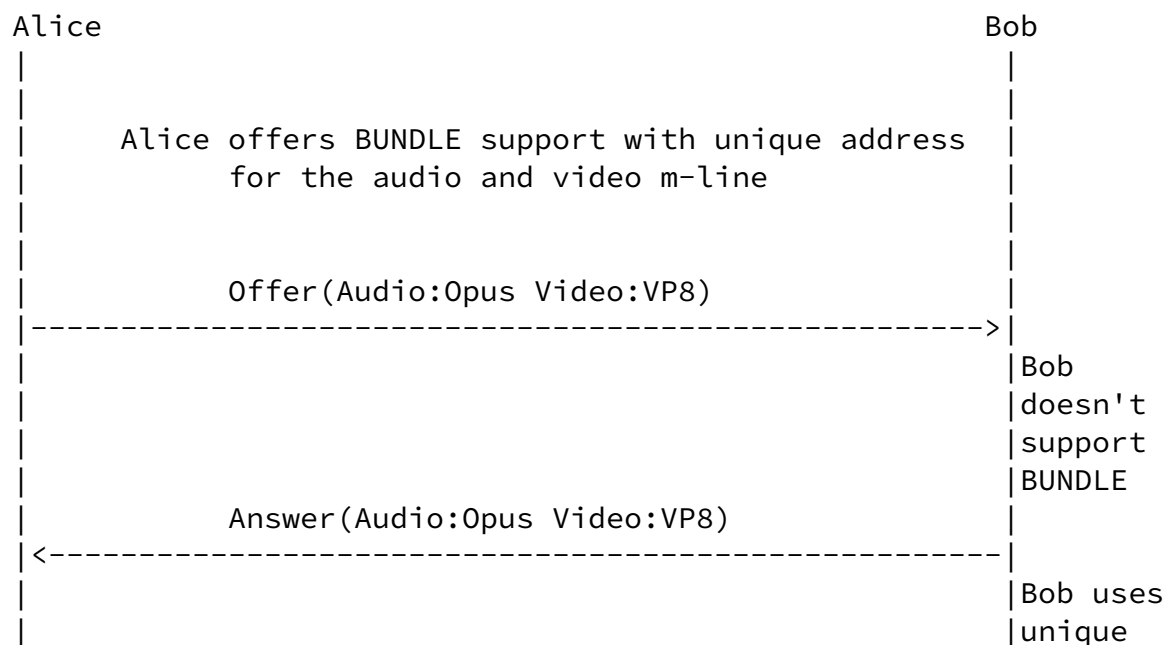
[5.2.9.](#) Audio, Video Session with BUNDLE Unsupported

This use-case illustrates SDP Offer/Answer exchange where the far-end (Bob) either doesn't support media bundling or doesn't want to group m=lines over a single 5-tuple.

The same is indicated by dropping the "a=group:BUNDLE" line and BUNDLE RTP header extension in the Answer SDP.

On successful Offer/Answer exchange, Alice and Bob each end up using unique 5-tuple for audio and video media streams respectively.

Two-Way Secure Audio,Video with BUNDLE Unsupported



	addresses across the m=lines
2Way Call with Audio and Video on different 5-tuples	

Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]

c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]

a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp:55232 IN IP4 203.0.113.141	[RFC3605] - RTCP port different from RTP port
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.0.2.4 61666 typ host	[RFC5245]
a=candidate:1 2 UDP 1685987071 203.0.113.141 55232 typ srflx raddr 192.0.2.4 rport 61666	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 54332 UDP/TLS/RTP/SAVPF 120	[RFC4566]

c=IN IP4 203.0.113.141	[RFC4566]
a=mid:video	[RFC5888] Video m=line part of the BUNDLE group with a unique port number

a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=ice-ufrag:7872093	[RFC5245]
a=ice-pwd:ee3474af08a068a28a397a4c3f31747d1	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763] - Alice can act as DTLS client or server
a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp:60052 IN IP4 203.0.113.141	[RFC3605]
a=rtcp-rsize	[RFC5506]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp- hdnext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2122194687 192.0.2.4 71775 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.141 54332 typ srflx raddr 192.0.2.4 rport 71775	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.0.2.4 71776 typ host	[RFC5245]
a=candidate:1 2 UDP 1685987071 203.0.113.141 60052 typ srflx raddr 192.0.2.4 rport 71776	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]

Table 19: 5.2.9 SDP Offer w/BUNDLE

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 53214 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTC MediaStreamTrack ID (ta)
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-frag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763] - Bob is the DTLS client
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 203.0.113.77 53214 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=candidate:0 2 UDP 2122194687 198.51.100.7 51558 typ host	[RFC5245]
a=candidate:1 2 UDP 1685987071 203.0.113.77 60065 typ srflx raddr 198.51.100.7 rport 51558	[RFC5245]
***** Video m=line *****	*****
m=video 58679 UDP/TLS/RTP/SAVPF 120	[RFC4566]

Internet-Draft

SDP4WebRTC

March 2018

c=IN IP4 203.0.113.77	[RFC4566]	
a=mid:video	[RFC5888]	
a=msid:ma tb	Identifies	
	RTCMediaStream	
	ID (ma) and RTC	
	MediaStreamTrac	
	k ID (tb)	
a=sendrecv	[RFC3264]	
a=rtpmap:120 VP8/90000	[RFC7741]	
a=ice-ufrag:85bC300	[RFC5245]	
a=ice-pwd:325921d5d47efbabd9a2de4e99bd291c	[RFC5245]	
a=fingerprint:sha-256	[RFC5245]	
6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35		
:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:0		
8		
a=setup:active	[RFC5763] - Bob	
	is the DTLS	
	client	
a=tls-id:9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G	[I-D.ietf-mmusi	
	c-dtls-sdp]	
a=rtcp-mux	[RFC5761]	
a=rtcp-rsize	[RFC5506]	
a=rtcp-fb:120 nack	[RFC5104]	
a=rtcp-fb:120 nack pli	[RFC5104]	
a=rtcp-fb:120 ccm fir	[RFC5104]	
a=candidate:0 1 UDP 2122194687 198.51.100.7	[RFC5245]	
61556 typ host		
a=candidate:1 1 UDP 1685987071 203.0.113.77	[RFC5245]	
58679 typ srflx raddr 198.51.100.7 rport 61556		
a=end-of-candidates	[I-D.ietf-mmusi	
	c-trickle-ice]	

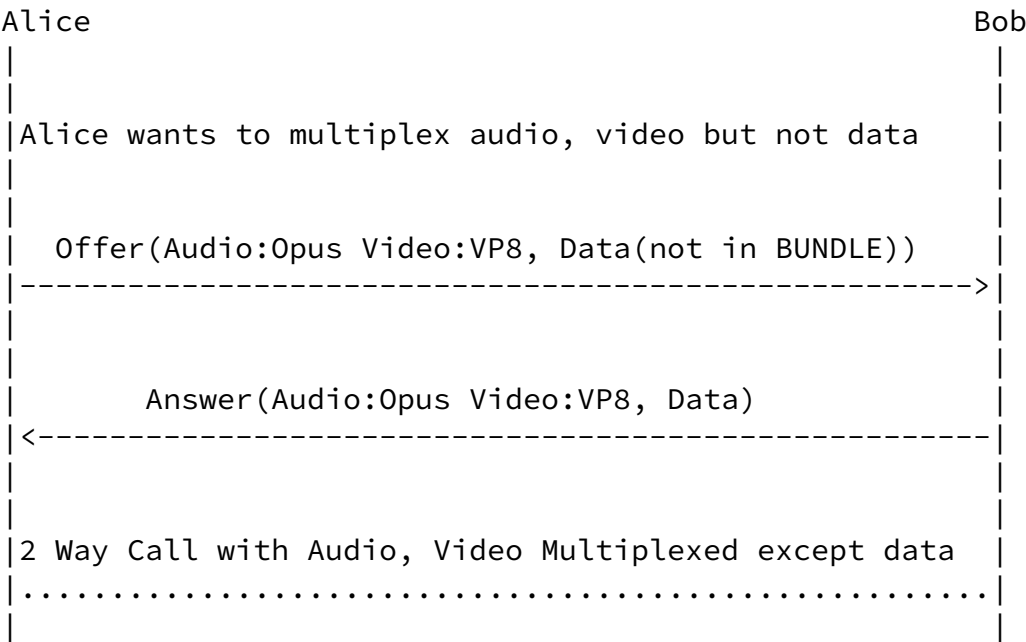
Table 20: 5.2.9 SDP Answer without BUNDLE

[5.2.10](#). Audio, Video BUNDLED, but Data (Not BUNDLED)

This example show-cases SDP for negotiating a session with Audio, Video and data streams between Alice and Bob with data stream not being part of the BUNDLE group. This is shown by assigning unique port for data media section and not adding the "mid" identification

tag to the BUNDLE group.

Audio, Video, with Data (Not in BUNDLE)



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice wants to BUNDLE only audio and video media.
a=group:LS audio video	[RFC5888]

a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendrecv	[RFC3264]

a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245]
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	
4:A9:0E:05:E9:26:33:E8:70:88:A2	
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mu
	x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdext:sdes:mid	p-bundle-negotiatio
	n]
a=candidate:0 1 UDP 2113667327 192.0.2.4	[RFC5245]
54609 typ host	
a=end-of-candidates	[I-D.ietf-mmusic-tr
	ickle-ice]
***** Video m=line *****	*****

m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd

a=mid:video	p-bundle-negotiation]
a=msid:ma tb	[RFC5888]
	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Application m=line *****	*****

m=application 10000 UDP/DTLS/SCTP webrtc-datachannel	[I-D.ietf-rtcweb-data-channel]

c=IN IP4 203.0.113.141	[RFC4566]
a=mid:data	[RFC5888]
a=sctp-port:5000	[I-D.ietf-mmusic-sctp-sdp]
a=max-message-size:100000	[I-D.ietf-mmusic-sctp-sdp]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC5763]
a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z	[I-D.ietf-mmusic-dtls-sdp]
a=ice-ufrag:89819013	[RFC5245]
a=ice-pwd:1747d1ee3474af08a068a28a397a4c3f3	[RFC5245]
a=fingerprint:sha-256 29:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.0.2.4 10000 typ host	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

Table 21: 5.2.10 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)

a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]

a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 198.51.100.7 49203 typ host	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Application m=line *****	*****
m=application 20000 UDP/DTLS/SCTP webrtc-	[I-D.ietf-mmusic-sc

datachannel	tp-sdp]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:data	[RFC5888]
a=sctp-port:5000	[I-D.ietf-mmusic-sc
a=max-message-size:100000	tp-sdp]
	[I-D.ietf-mmusic-sc
	tp-sdp]

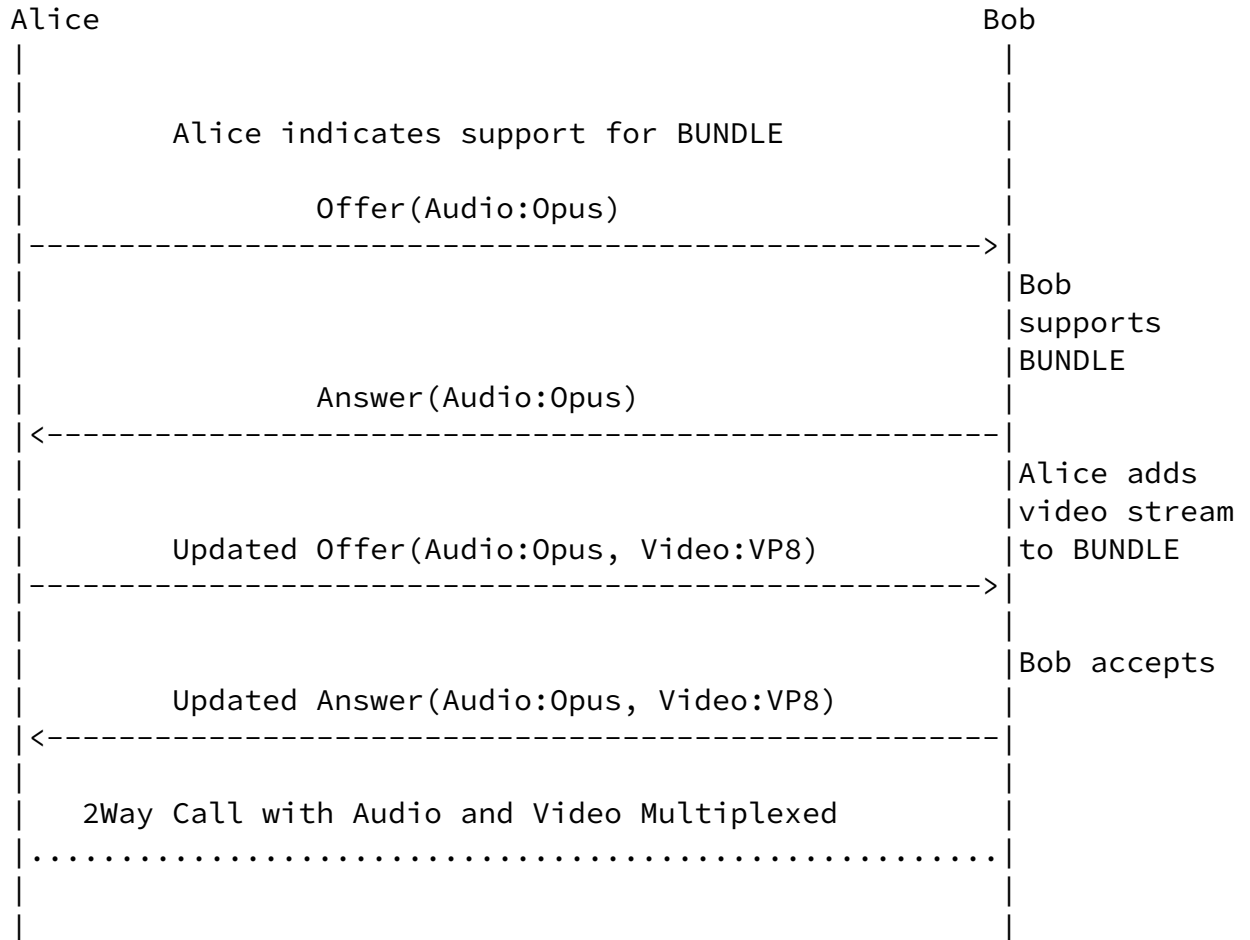
a=setup:active	[RFC5763]	
a=tls-id:9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G	[I-D.ietf-mmusic-dt	
	ls-sdp]	
a=sendrecv	[RFC3264]	
a=ice-ufrag:991Ca2a5e	[RFC5245]	
a=ice-pwd:921d5d47efbabd9a2de4e99bd291c325	[RFC5245]	
a=fingerprint:sha-256 7B:8B:F0:65:5F:78:E2:	[RFC5245]	
51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2		
4:C2:43:F0:A1:58:D0:A1:2C:19:08		
a=candidate:0 1 UDP 2113667327 198.51.100.7	[RFC5245]	
20000 typ host		
a=end-of-candidates	[I-D.ietf-mmusic-tr	
	ickle-ice]	
-----	-----	

Table 22: 5.2.10 SDP Answer

[5.2.11](#). Audio Only, Add Video to BUNDLE

This example involves 2 Offer/Answer exchanges. First one is used to negotiate and setup BUNDLE support for Audio-only session followed by an updated Offer/Answer exchange to add video stream to the ongoing session. Also the newly added video stream is BUNDLED with the audio stream.

Audio Only , Add Video and BUNDLE



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice adds audio m=line to the BUNDLE group
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]

Internet-Draft

SDP4WebRTC

March 2018

a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mu x-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-tr ickle-ice]

Table 23: 5.2.11 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]

t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
a=ice-options:trickle	[I-D.ietf-mmusic-tr

	ickle-ice]

	[RFC4566]
	[RFC4566]
	[RFC5888]
	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
	[RFC3264]
	[RFC7587]
	[RFC4566]
	[RFC5245]
	[RFC5245]
	[RFC5245]
	[RFC5763]
	[I-D.ietf-mmusic-dt
	ls-sdp]
	[RFC5761]
	[I-D.ietf-mmusic-mu
	x-exclusive]
	[RFC5506]
	[RFC6464]
	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
	[RFC5245]
	[RFC5245]

a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]	
+-----+	+-----+	+-----+

Table 24: 5.2.10 SDP Answer

+-----+	+-----+	+-----+
Updated Offer SDP Contents	RFC#/Notes	
+-----+	+-----+	+-----+
v=0	Version number incremented	

o=- 20518 1 IN IP4 0.0.0.0	[RFC4566]	
s=-	[RFC4566]	
t=0 0	[RFC4566]	
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=group:LS audio video	[RFC5888]	
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]	

***** Audio m=line *****	*****	
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]	
c=IN IP4 203.0.113.141	[RFC4566]	
a=mid:audio	[RFC5888]	
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)	
a=sendrecv	[RFC3264]	
a=rtpmap:109 opus/48000/2	[RFC7587]	
a=maxptime:120	[RFC4566]	
a=ice-ufrag:074c6550	[RFC5245]	
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]	
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]	
a=setup:actpass	[RFC5763]	

a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp] Alice wants to use the same DTLS association
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Table 25: 5.2.11 SDP Updated Offer

Updated Answer SDP Contents	RFC#/Notes
v=0	[RFC4566] Version number incremented
o=- 16833 1 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS audio video	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID

a=sendrecv	(ma) and
a=rtpmap:109 opus/48000/2	RTCMediaStreamTrack
a=maxptime:120	ID (ta)
a=ice-ufrag:c300d85b	[RFC3264]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC7587]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC4566]
a=setup:active	[RFC5245]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[RFC5245]
	[RFC5763]
	[I-D.ietf-mmusic-dtls-sdp] - Bob
	agrees to use the

	same DTLS association
a=rtcp-mux	[RFC5761]
a=rtcp-mux-only	[I-D.ietf-mmusic-mux-exclusive]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:120 VP8/90000	[RFC7741]

a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

+-----+-----+

[5.3.](#) MultiResolution, RTX, FEC Examples

This section deals with scenarios related to multi-source, multi-stream negotiation such as layered coding, simulcast, along with techniques that deal with providing robustness against transmission errors such as FEC and RTX. Also to note, mechanisms such as FEC and RTX could be envisioned in the above basic scenarios as well.

[5.3.1.](#) Sendonly Simulcast Session with 2 cameras and 2 encodings per camera

The SDP below shows Offer/Answer exchange with one audio and two video sources. Each of the video source can be sent at two different resolutions.

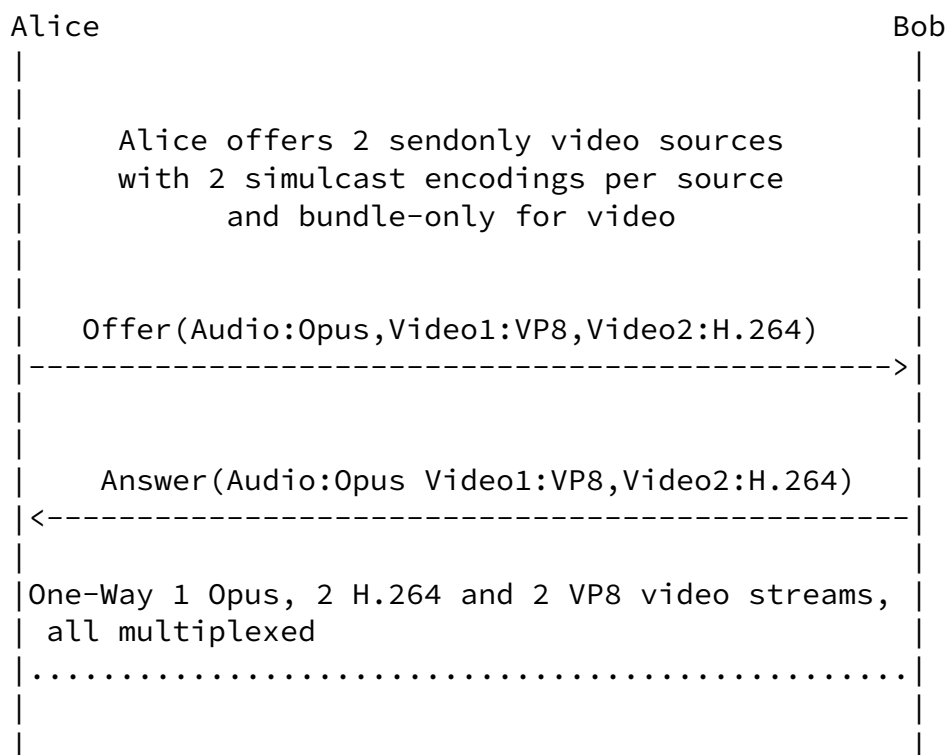
One video source corresponds to VP8 encoding, while the other corresponds to H.264 encoding.

[I-D.ietf-mmusic-rid] framework is used to further constrain the media format encodings and map the payload types (PT) to the 'rid' identifiers.

[I-D.ietf-mmusic-sdp-simulcast] framework identifies the simulcast streams via their 'rid' identifiers.

bundle-only attribute is used for the video sources in the Offer to ensure enabling video sources in the context of BUNDLE alone.

BUNDLE grouping framework enables multiplexing of all the 5 streams (1 audio stream + 4 video streams) over a single RTP Session.



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID

<pre> a=sendonly a=rtpmap:109 opus/48000/2 a=maxptime:120 a=ice-ufrag:074c6550 a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068 a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2 a=setup:actpass a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68 a=rtcp-mux a=rtcp-rsize a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665 a=end-of-candidates ***** Video-1 m=line ***** m=video 0 UDP/TLS/RTP/SAVPF 98 100 c=IN IP4 203.0.113.141 a=bundle-only a=mid:m1 a=msid:ma tb a=sendonly </pre>	<pre> (ma) and RTCMediaStreamTrack ID (ta) [RFC3264] [RFC7587] [RFC4566] [RFC5245] [RFC5245] [RFC5245] [RFC5763] [I-D.ietf-mmusic-dt ls-sdp] [RFC5761] [RFC5506] [RFC6464] [I-D.ietf-mmusic-sd p-bundle-negotiatio n] [RFC5245] [RFC5245] [I-D.ietf-mmusic-tr ickle-ice] ***** ***** bundle-only video line with port number set to zero [RFC4566] [I-D.ietf-mmusic-sd p-bundle-negotiatio n] [RFC5888] Video m=line part of BUNDLE group Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb) [RFC3264] - Send only video stream </pre>
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a=rtpmap:98 VP8/90000	[RFC7741]	
a=fmtp:98 max-fr=30	[RFC4566]	

Internet-Draft

SDP4WebRTC

March 2018

a=rtpmap:100 VP8/90000	[RFC7741]	
a=fmtp:100 max-fr=15	[RFC4566]	
a=rtcp-fb:* nack	[RFC5104]	
a=rtcp-fb:* nack pli	[RFC5104]	
a=rtcp-fb:* ccm fir	[RFC5104]	
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	[I-D.ietf-avtext-rid]	
a=rid:1 send pt=98;max-width=1280;max-height=720	[I-D.ietf-mmusic-rid] 1:1 rid mapping to payload type and specify resolution constraints	
a=rid:2 send pt=100;max-width=640;max-height=480	[I-D.ietf-mmusic-rid] 1:1 rid mapping to payload type and specify resolution constraints	
a=simulcast:send 1;~2	[I-D.ietf-mmusic-sdp-simulcast] Alice can send 2 resolutions identified by the 'rid' identifiers. Also, the second stream is initially paused.	
***** Video-2 m=line *****	*****	
m=video 0 UDP/TLS/RTP/SAVPF 101 102	bundle-only video line with port number set to zero	
c=IN IP4 203.0.113.141	[RFC4566]	
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=mid:m2	[RFC5888] Video	

a=msid:ma tc	m=line part of BUNDLE group Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tc)
a=sendonly	[RFC3264] - Send only video stream

a=rtpmap:101 H264/90000	[RFC6184]
a=rtpmap:102 H264/90000	[RFC6184]
a=fmtp:101 profile-level-id=42401f;packetization-mode=0;max-fr=30	[RFC6184] Camera-2,E ncoding-1
a=fmtp:102 profile-level-id=42401f;packetization-mode=1;max-fr=15	[RFC6184] Camera-2,E ncoding-2
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	[I-D.ietf-avtext-rid]
a=rid:3 send pt=101;max-width=1280;max-height=720	[I-D.ietf-mmusic-rid] 1:1 rid mapping to payload type and specify resolution constraints
a=rid:4 send pt=102;max-width=640;max-height=360	[I-D.ietf-mmusic-rid] 1:1 rid mapping to payload type and specify resolution constraints
a=simulcast:send 3;4	[I-D.ietf-mmusic-sdp-simulcast] Alice can send 2 resolutions identified by the 'rid' identifiers

Table 27: 5.3.1 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics

a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=recvonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]

a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrex:src-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrex:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 198.51.100.7 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video-1 m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100	BUNDLE accepted
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group

a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=recvonly	[RFC3264] - receive only video stream
a=rtpmap:98 VP8/90000	[RFC7741]
a=rtpmap:100 VP8/90000	[RFC7741]
a=fmtp:98 max-fr=30	[RFC4566]
a=fmtp:100 max-fr=15	[RFC4566]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrex:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=extmap:3 urn:ietf:params:rtp-	[I-D.ietf-avtext-ri

	hdrex:sd:sdes:rtp-stream-id		d]	
	a=rid:1 recv pt=98;max-width=1280;max-		[I-D.ietf-mmusic-ri	
	height=720		d] Bob accepts the	
			offered payload	
			format constraints	
	a=rid:2 recv pt=100;max-width=640;max-		[I-D.ietf-mmusic-ri	
	height=480		d] Bob accepts the	
			offered payload	
			format constraints	
	a=simulcast:recv 1;2		[I-D.ietf-mmusic-sd	
			p-simulcast] Bob	
			accepts the offered	
			simulcast streams	
			and removes the	
			paused state of	
			stream with 'rid'	
			value 2.	
	***** Video-2 m=line *****		*****	

	m=video 0 UDP/TLS/RTP/SAVPF 101 102		BUNDLE accepted	
	c=IN IP4 203.0.113.77		[RFC4566]	
	a=bundle-only		[I-D.ietf-mmusic-sd	
			p-bundle-negotiatio	
			n]	
	a=mid:m2		[RFC5888] Video	
			m=line part of	
			BUNDLE group	
			Identifies	
	a=msid:ma tc		RTCMediaStream ID	
			(ma) and	

			RTCMediaStreamTrack	
			ID (tc)	
	a=recvonly		[RFC3264]	
	a=rtpmap:101 H264/90000		[RFC6184]	
	a=rtpmap:102 H264/90000		[RFC6184]	
	a=fmtp:101 profile-level-		[RFC6184]	
	id=42401f;packetization-mode=1;max-fr=30			
	a=fmtp:102 profile-level-		[RFC6184]	
	id=42401f;packetization-mode=1;max-fr=15			
	a=rtcp-fb:* nack		[RFC5104]	
	a=rtcp-fb:* nack pli		[RFC5104]	

a=rtcp-fb:* ccm fir	[RFC5104]	
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	[I-D.ietf-avtext-ridd]	
a=rid:3 recv pt=101;max-width=1280;max-height=720	[I-D.ietf-mmusic-ridd] Bob accepts the offered payload format constraints	
a=rid:4 recv pt=102;max-width=640;max-height=360	[I-D.ietf-mmusic-ridd] Bob accepts the offered payload format constraints	
a=simulcast:recv 3;4	[I-D.ietf-mmusic-sdp-simulcast] Bob accepts the offered simulcast streams.	
+-----+-----+-----+		

Table 28: 5.3.1 SDP Answer

5.3.2. Successful SVC Video Session

This section shows an SDP Offer/Answer for a session with an audio and a single video source. The video source is encoded as layered coding at 3 different resolutions based on [[RFC5583](#)]. The video m=line shows 3 streams with last stream (payload 100) dependent on streams with payload 96 and 97 for decoding.

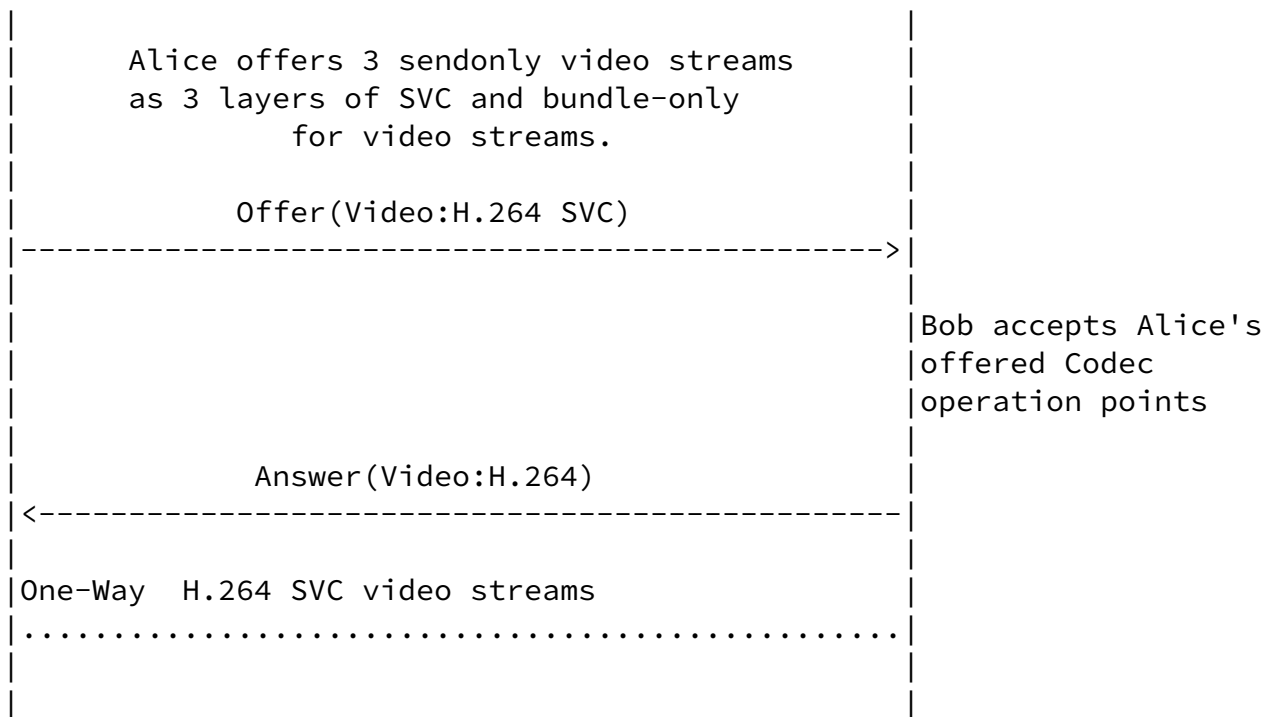
SVC Session - 3 Layers w/BUNDLE

Alice

|

Bob

|



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:m0	[RFC5888] Audio m=line part of

a=msid:ma ta	BUNDLE group with a unique port number Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 96 97 100	bundle-only video line with port number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888] Video m=line part of
a=msid:ma tb	BUNDLE group Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack

Internet-Draft

SDP4WebRTC

March 2018

a=sendonly	[RFC3264] - Send only video stream
a=rtpmap:96 H264/90000	[RFC6184]
a=fmtp:96 profile-level-id=4d0028; packetization-mode=1; max-fr=30; max-fs=8040	[RFC6184] H.264 Layer 1
a=rtpmap:97 H264/90000	[RFC6184]
a=fmtp:97 profile-level-id=4d0028; packetization-mode=1; max-fr=15; max-fs=1200	[RFC6184] H.264 Layer 2
a=rtpmap:100 H264-SVC/90000	[RFC6184]
a=fmtp:100 profile-level-id=4d0028; packetization-mode=1; max-fr=30; max-fs=8040	[RFC6184]
a=depend:100 lay m1:96,97	[RFC5583] Layer 3 dependent on layers 1 and 2
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Table 29: 5.3.2 SDP Offer with SVC

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

<pre> ***** Audio m=line ***** m=audio 49203 UDP/TLS/RTP/SAVPF 109 c=IN IP4 203.0.113.77 a=mid:m0 a=msid:ma ta </pre>	<pre> ***** ***** [RFC4566] [RFC4566] [RFC5888] Identifies RTCMediaStream ID (ma) and </pre>
---	--

Internet-Draft SDP4WebRTC March 2018

<pre> a=recvonly a=rtpmap:109 opus/48000/2 a=maxptime:120 a=ice-ufrag:074c6550 a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068 a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2: 51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2 4:C2:43:F0:A1:58:D0:A1:2C:19:08 a=setup:active a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31 a=rtcp-mux a=rtcp-rsize a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level a=extmap:2 urn:ietf:params:rtp- hdext:sdes:mid a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556 a=end-of-candidates ***** Video m=line ***** m=video 0 UDP/TLS/RTP/SAVPF 96 100 c=IN IP4 203.0.113.77 a=bundle-only </pre>	<pre> RTCMediaStreamTrack ID (ta) [RFC3264] [RFC7587] [RFC4566] [RFC5245] [RFC5245] [RFC5245] [RFC5763] [I-D.ietf-mmusic-dt ls-sdp] [RFC5761] [RFC5506] [RFC6464] [I-D.ietf-mmusic-sd p-bundle-negotiatio n] [RFC5245] [RFC5245] [I-D.ietf-mmusic-tr ickle-ice] ***** ***** BUNDLE accepted. [RFC4566] [I-D.ietf-mmusic-sd p-bundle-negotiatio </pre>
---	--

a=mid:m1	n]
a=msid:ma tb	[RFC5888] Video m=line part of BUNDLE group Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=recvonly	[RFC3264] - Receive only video stream
a=rtpmap:96 H264/90000	[RFC6184]
a=fmtp:96 profile-level- id=4d0028;packetization-mode=1; max- fr=30;max-fs=8040	[RFC6184]H.264 Layer 1

a=rtpmap:100 H264-SVC/90000	[RFC6184]
a=fmtp:100 profile-level- id=4d0028;packetization-mode=1; max- fr=30;max-fs=8040	[RFC6184]
a=depend:100 lay m1:96	[RFC5583] Bob chooses 2 Codec Operation points
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp- hdnext:sdes:mid	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]

Table 30: 5.3.2 SDP Answer with SVC

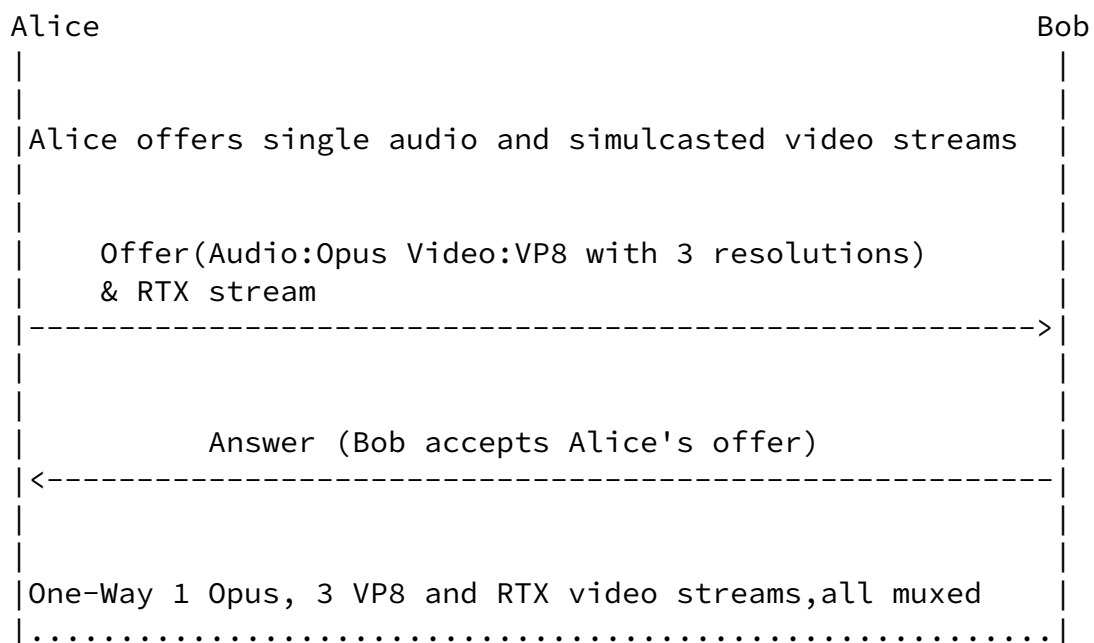
5.3.3. Successful Simulcast Video Session with Retransmission

This section shows an SDP Offer/Answer exchange for a simulcast scenario with 3 resolutions and has [RFC4588] style re-transmission flows.

[I-D.ietf-mmusic-rid] framework is used to specify all the (3) resolution constraints mapped to a single Payload Type (98).

[I-D.ietf-mmusic-sdp-simulcast] framework identifies the simulcast streams via their 'rid' identifiers.

Simulcast Streams with Retransmission



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:m0	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=msid:ma ta	Identifies

a=sendonly	RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtpmap:109 opus/48000/2	[RFC3264]
a=maxptime:120	[RFC7587]
a=ice-ufrag:074c6550	[RFC4566]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]

a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 103	bundle-only video line with port number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendonly	[RFC3264]
a=rtpmap:98 VP8/90000	[RFC7741]
a=fmtp:98 max-fr=30	[RFC4566]
a=rtpmap:103 rtx/90000	[RFC4588]
a=fmtp:103 apt=98;rtx-time=200	[RFC4588]

a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	n]
a=rid:1 send pt=98;max-fs=921600;max-fr=30	[I-D.ietf-avtext-rid]
a=rid:2 send pt=98;max-fs=614400;max-fr=15	[I-D.ietf-mmusic-rid]
a=rid:3 send pt=98;max-fs=230400;max-fr=30	[I-D.ietf-mmusic-rid]
a=simulcast:send 1;2;3	[I-D.ietf-mmusic-sdp-simulcast] Alice can send all the simulcast streams

Table 31: 5.3.3 SDP Offer w/Simulcast, RTX

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Bob supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack

a=recvonly	ID (ta) [RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103 c=IN IP4 203.0.113.77	BUNDLE accepted
a=bundle-only	[RFC4566]
	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=recvonly	[RFC3264]
a=rtpmap:98 VP8/90000	[RFC7741]
a=fmtp:98 max-fr=30	[RFC4566]
a=rtpmap:103 rtx/90000	[RFC4588]
a=fmtp:103 apt=98;rtx-time=200	[RFC4588]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]

Internet-Draft

SDP4WebRTC

March 2018

a=rtcp-fb:* ccm fir	[RFC5104]	
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	[I-D.ietf-avtext-rtd]	
a=rid:1 recv pt=98;max-fs=921600;max-fr=30	[I-D.ietf-mmusic-rtd]	
a=rid:2 recv pt=98;max-fs=614400;max-fr=15	[I-D.ietf-mmusic-rtd]	
a=rid:3 recv pt=98;max-fs=230400;max-fr=30	[I-D.ietf-mmusic-rtd]	
a=simulcast:recv 1;2;3	[I-D.ietf-mmusic-sdp-simulcast]	
	Bob	
	accepts the offered	
	simulcast streams	
+-----+-----+		

Table 32: 5.3.3 SDP Answer w/Simulcast, RTX

[5.3.4.](#) Successful 1-way Simulcast Session with 2 resolutions and RTX - One resolution rejected

This section shows an SDP Offer/Answer exchange for a simulcast scenario with 2 two resolutions.

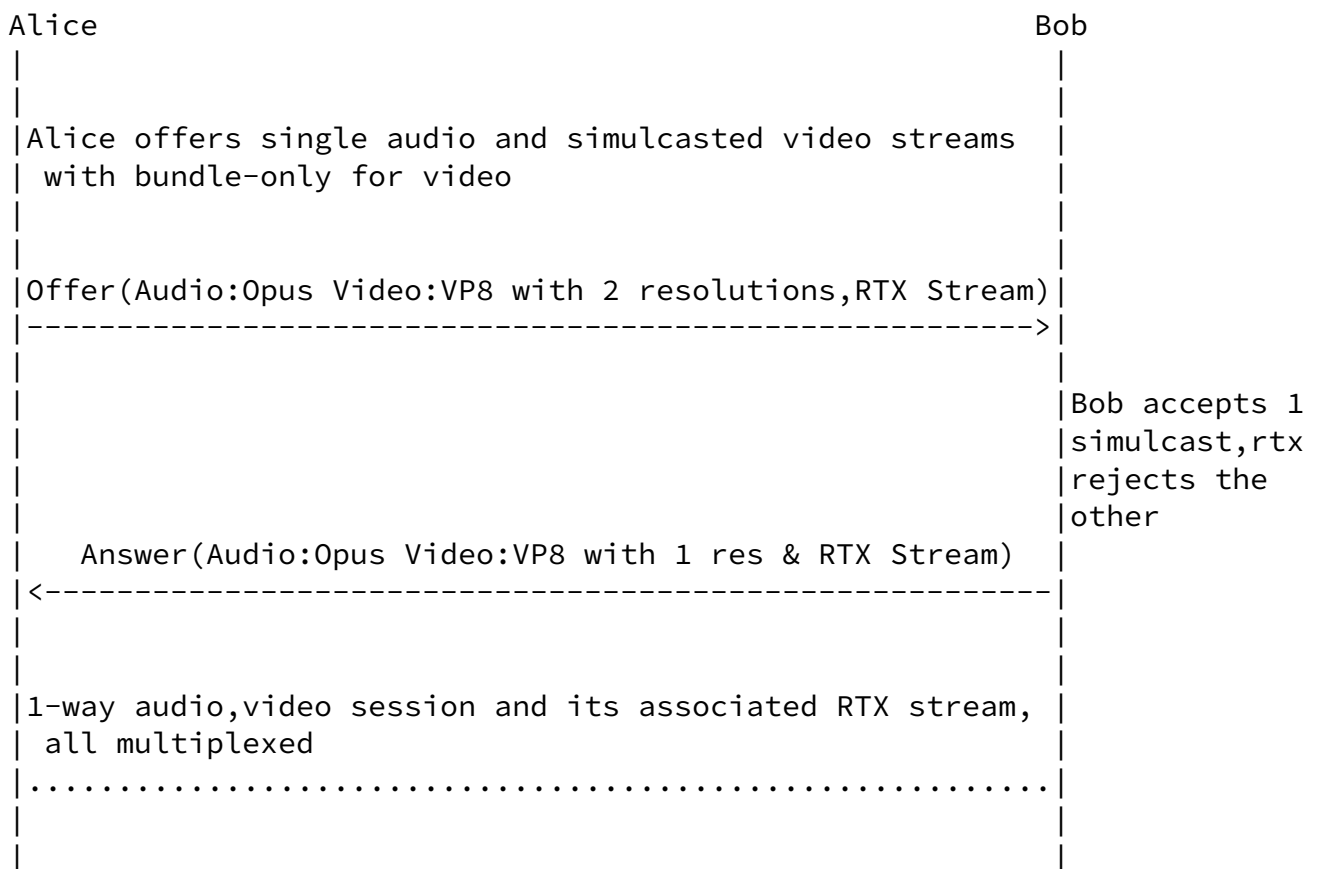
It also showcases where Bob rejects one of the Simulcast Video Stream which results in the rejection of the associated repair stream implicitly.

Internet-Draft

SDP4WebRTC

March 2018

Simulcast Streams with Retransmission Rejected



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]

a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]

a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]

a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103	bundle-only video line with port number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb
a=sendonly	[RFC3264]
a=rtpmap:98 VP8/90000	[RFC7741]
a=rtpmap:100 VP8/90000	[RFC7741]

a=rtpmap:101 rtx/90000	[RFC4588]
a=rtpmap:103 rtx/90000	[RFC4588]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:100 max-fr=15;max-fs=1200	[RFC4566]
a=fmtp:101 apt=98;rtx-time=200	[RFC4588]
a=fmtp:103 apt=100;rtx-time=200	[RFC4588]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id	[I-D.ietf-avtext-rid]
a=rid:1 send pt=98	[I-D.ietf-mmusic-rid] 1:1 mapping between the PT and the 'rid' identifier
a=rid:2 send pt=100	[I-D.ietf-mmusic-rid] 1:1 mapping

a=simulcast:send 1;2	between the PT and the 'rid' identifier [I-D.ietf-mmusic-sdp-simulcast]
----------------------	--

Table 33: 5.3.4 SDP Offer w/Simulcast, RTX

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Bob supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 49203 UDP/TLS/RTP/SAVPF 109	***** [RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=recvonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]

a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 101	BUNDLE accepted
c=IN IP4 203.0.113.77	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=recvonly	[RFC3264]

a=rtpmap:98 VP8/90000	[RFC7741]
a=rtpmap:101 VP8/90000	[RFC7741]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:101 apt=98;rtx-time=200	[RFC4588]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

a=extmap:3 urn:ietf:params:rtp-	[I-D.ietf-avtext-ri
hdrext:sdes:rtp-stream-id	d]
a=rid:1 recv pt=98	[I-D.ietf-mmusic-ri
	d]
a=simulcast:recv 1	[I-D.ietf-mmusic-sd
	p-simulcast] Bob
	rejects the second
	simulcast stream
	and the associated
	rtx stream.
+-----+-----+	+-----+-----+

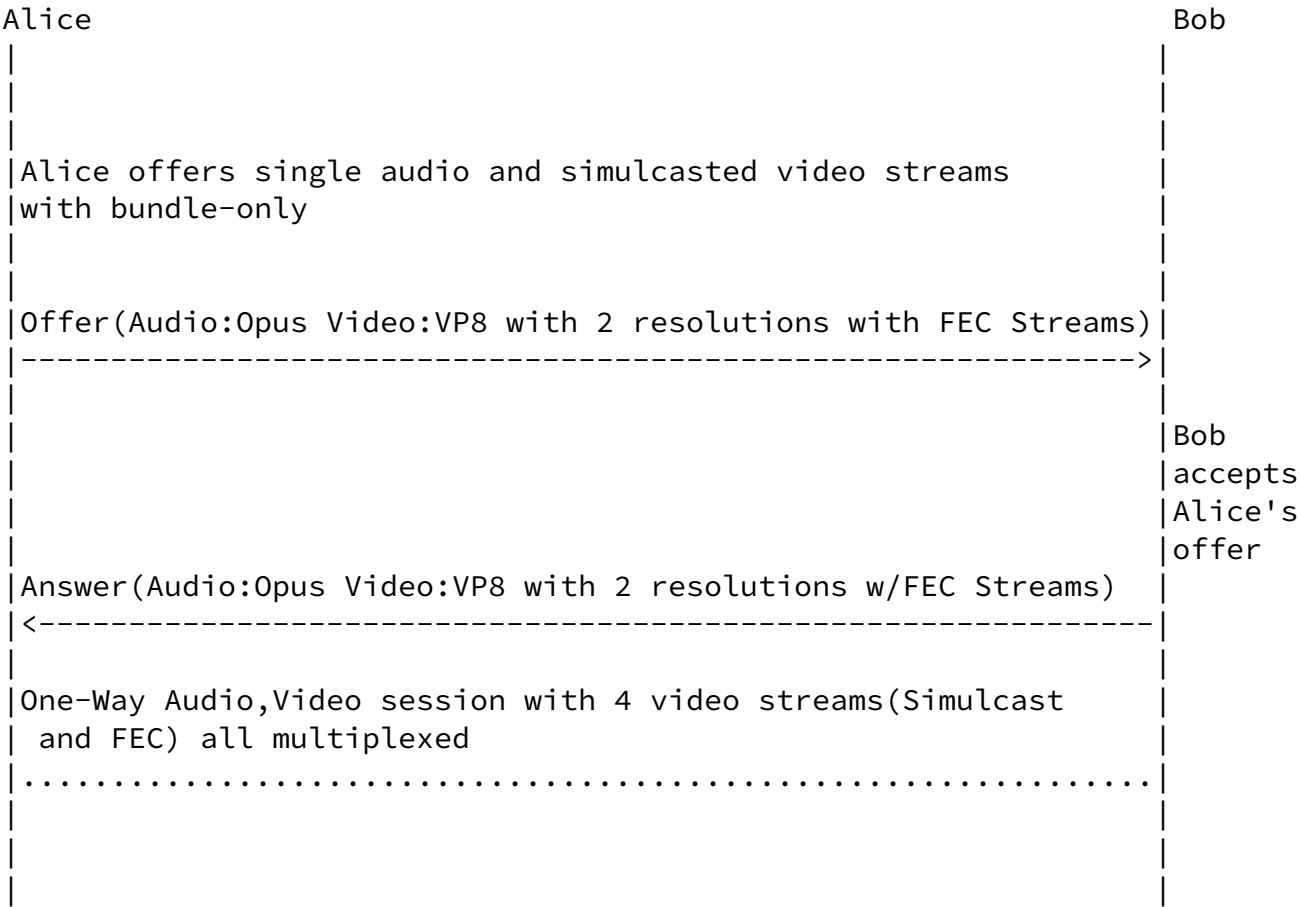
Table 34: 5.3.4 SDP Answer (one Simulcast Rejected)

[5.3.5.](#) Simulcast Video Session with Forward Error Correction

This section shows an SDP Offer/Answer exchange for Simulcast video stream at two resolutions and has [[RFC5956](#)] style FEC flows.

On completion of the Offer/Answer exchange mechanism we end up one audio stream, 2 simulcast video streams and 2 associated FEC streams are sent over a single 5-tuple.

Simulcast Streams with Forward Error Correction



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]

Internet-Draft

SDP4WebRTC

March 2018

a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245]
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0	
4:A9:0E:05:E9:26:33:E8:70:88:A2	
a=setup:actpass	[RFC5763]
a=rtcp-mux	[RFC5761]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdext:sdes:mid	p-bundle-negotiatio
	n]
a=candidate:0 1 UDP 2113667327 192.0.2.4	[RFC5245]
61665 typ host	
a=candidate:1 1 UDP 694302207 203.0.113.141	[RFC5245]
54609 typ srflx raddr 192.0.2.4 rport 61665	
a=end-of-candidates	[I-D.ietf-mmusic-tr
	ickle-ice]
***** Video m=line *****	*****

m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103	bundle-only video
	line with port
	number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sd
	p-bundle-negotiatio
	n]
a=mid:m1	[RFC5888] Video
	m=line part of
	BUNDLE group
a=msid:ma tb	Identifies

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=group:LS m0 m1	[RFC5888]

a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:m0	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=recvonly	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-	[RFC6464]

audio-level	
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103 c=IN IP4 203.0.113.77	BUNDLE accepted.
a=bundle-only	[RFC4566]
	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m1	[RFC5888] Video

	m=line part of
	BUNDLE group
a=msid:ma tb	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (tb)
a=recvonly	[RFC3264]
a=rtpmap:98 VP8/90000	[RFC7741]
a=rtpmap:100 VP8/90000	[RFC7741]
a=rtpmap:101 flexfec/90000	[I-D.ietf-payload-flexible-fec-scheme]
	[I-D.ietf-payload-flexible-fec-scheme]
a=rtpmap:103 flexfec/90000	[RFC4566]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:100 max-fr=15;max-fs=1200	[I-D.ietf-payload-flexible-fec-scheme]
a=fmtp:101 L=5; D=10; ToP=2; repair-window=200000	[I-D.ietf-payload-flexible-fec-scheme]
a=fmtp:103 L=5; D=10; ToP=2; repair-window=200000	[RFC5104]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	

a=rtcp-fb:* ccm fir	[RFC5104]	
a=extmap:2 urn:ietf:params:rtp-hdrex	[I-D.ietf-mmusic-sdp-bundle-negotiation]	
a=extmap:3 urn:ietf:params:rtp-hdrex	[I-D.ietf-avtext-ridd]	
a=rid:1 recv pt=98	[I-D.ietf-mmusic-ridd]	
a=rid:2 recv pt=100	[I-D.ietf-mmusic-ridd]	
a=simulcast:recv 1;2	[I-D.ietf-mmusic-sdp-simulcast]	
+-----+-----+		

Table 36: 5.3.5 SDP Answer

5.4. Others

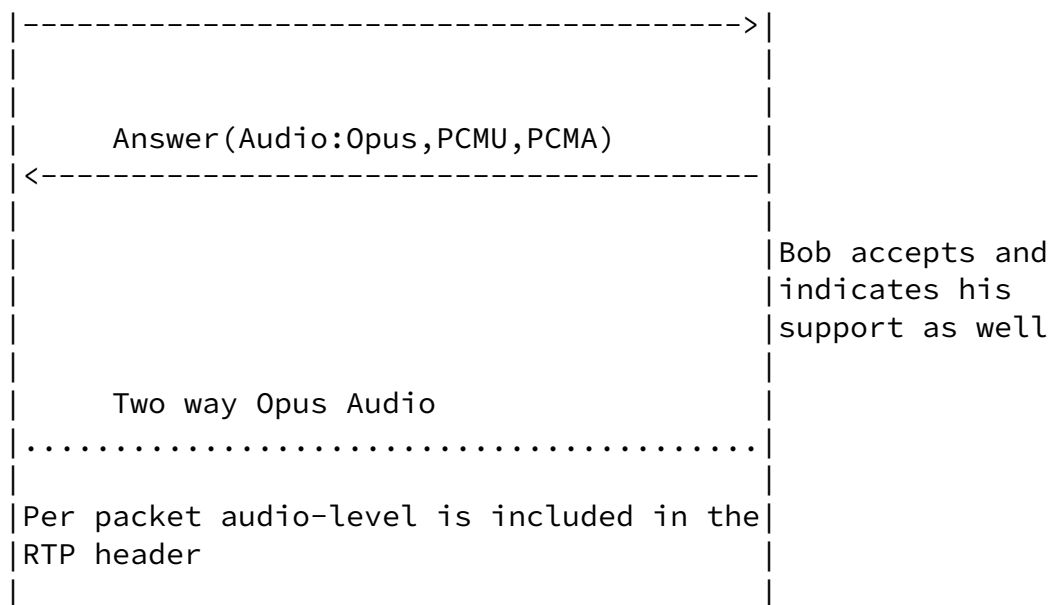
The examples in the section provide SDP Offer/Answer exchange for a variety of scenarios related to RTP Header extension for conference usages, Legacy Interop scenarios and more.

5.4.1. Audio Session - Voice Activity Detection

This example shows Alice indicating the support of the RTP header extension to include the audio-level of the audio sample carried in the RTP packet.

2-Way Audio with VAD

Alice	Bob
Alice indicates support for including	
audio level in RTP header	
Offer(Audio:Opus,PCMU,PCMA)	



Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)

a=sendrecv	[RFC3264]	
a=rtpmap:109 opus/48000/2	[RFC7587]	
a=rtpmap:0 PCMU/8000	[RFC3551]	
a=rtpmap:8 PCMA/8000	[RFC3551]	
a=maxptime:120	[RFC4566]	
a=ice-ufrag:074c6550	[RFC5245]	
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]	
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:	[RFC5245]	
E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0		
4:A9:0E:05:E9:26:33:E8:70:88:A2		
a=setup:actpass	[RFC5763]	
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt	
	ls-sdp]	
a=rtcp-mux	[RFC5761]	
a=rtcp-rsize	[RFC5506]	
a=rtcp-fb:* nack	[RFC5104]	
a=extmap:1 urn:ietf:params:rtp-hdrex:src-	[RFC6464]	
audio-level		
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd	
hdrex:sdes:mid	p-bundle-negotiatio	
	n]	
a=candidate:0 1 UDP 2113667327 192.0.2.4	[RFC5245]	
61665 typ host		
a=candidate:1 1 UDP 694302207 203.0.113.141	[RFC5245]	
54609 typ srflx raddr 192.0.2.4 rport 61665		
a=end-of-candidates	[I-D.ietf-mmusic-tr	
	ickle-ice]	
-----	-----	

Table 37: 5.4.1 SDP Offer

Answer SDP Contents	RFC#/Notes	
-----	-----	
v=0	[RFC4566]	
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]	
s=-	[RFC4566]	
t=0 0	[RFC4566]	
a=group:BUNDLE audio	[I-D.ietf-mmusic-sd	

a=ice-options:trickle	n]
***** Audio m=line *****	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 98	*****
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC4566]
a=msid:ma ta	[RFC5888]
	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack
	ID (ta)
a=sendrecv	[RFC3264] - Bob can
a=rtpmap:109 opus/48000/2	send and recv audio
	[RFC7587] - Bob
	accepts only Opus
	Codec
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU
	Audio Codec
a=rtpmap:0 PCMA/8000	[RFC3551] PCMA
	Audio Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:	[RFC5245]
51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2	
4:C2:43:F0:A1:58:D0:A1:2C:19:08	
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dtls-sdp]
	[RFC5761] - Bob can
a=rtcp-mux	perform RTP/RTCP
	Muxing on port
	49203
a=rtcp-rsize	[RFC5506]
a=rtcp-fb:* nack	[RFC5104]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-	[RFC6464]
audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sdp-bundle-negotiation]
hdext:sdes:mid	
a=candidate:0 1 UDP 2113667327 198.51.100.7	[RFC5245]
51556 typ host	
a=candidate:1 1 UDP 1694302207 203.0.113.77	[RFC5245]
49203 typ srflx raddr 198.51.100.7 rport	
51556	

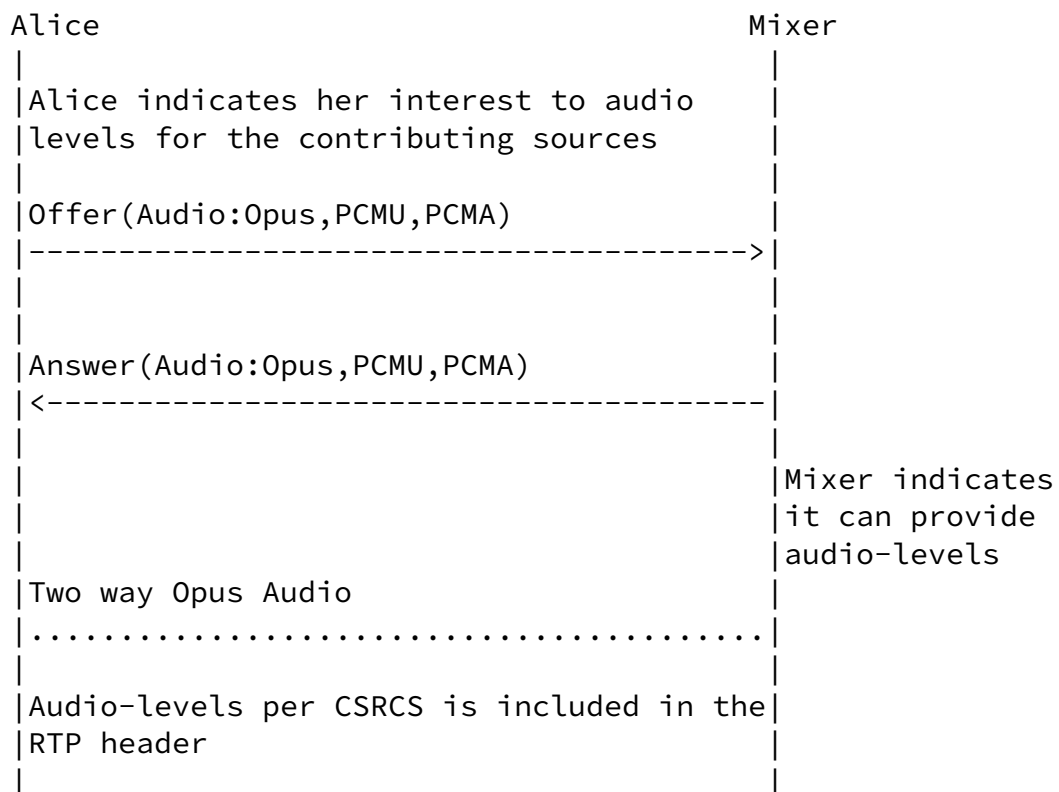
a=end-of-candidates	[I-D.ietf-mmusic-tr
	ickle-ice]
+-----+	+-----+

Table 38: 5.4.1 SDP Answer

[5.4.2.](#) Audio Conference - Voice Activity Detection

This example shows SDP for RTP header extension that allows RTP-level mixers in audio conferences to deliver information about the audio level of individual participants.

Audio Conference with VAD Support



+-----+	+-----+
Offer SDP Contents	RFC#/Notes
+-----+	+-----+
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566] - Session

s=-	Origin Information [RFC4566]
-----	---

Internet-Draft

SDP4WebRTC

March 2018

t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sd p-bundle-negotiatio n]
a=ice-options:trickle	[I-D.ietf-mmusic-tr ickle-ice]
***** Audio m=line *****	*****
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264] - Alice can send and recv audio
a=rtpmap:109 opus/48000/2	[RFC7587]
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:0 PCMA/8000	[RFC3551] PCMA Audio Codec
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81: E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:0 4:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dt ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=rtcp-fb:* nack	[RFC5104]
a=extmap:1/recvonly urn:ietf:params:rtp- hdnext:csrc-audio-level	[RFC6465]
a=extmap:2 urn:ietf:params:rtp-hdnext:ssrc-	[RFC6464]

audio-level	
a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=end-of-candidates	[I-D.ietf-mmusic-trickle-ice]

	trickle-ice]
--	--------------

Table 39: 5.4.2 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 98	[RFC4566]
c=IN IP4 203.0.113.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU

a=rtpmap:0 PCMA/8000	Audio Codec
	[RFC3551] PCMA
a=maxptime:120	Audio Codec
a=ice-ufrag:c300d85b	[RFC4566]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:	[RFC5245]
51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:2	
4:C2:43:F0:A1:58:D0:A1:2C:19:08	
a=setup:active	[RFC5763]
a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31	[I-D.ietf-mmusic-dt
	ls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp-rsize	[RFC5506]
a=rtcp-fb:* nack	[RFC5104]
a=extmap:1/sendonly urn:ietf:params:rtp-	[RFC6465]

hdrext:csrc-audio-level	
a=extmap:2 urn:ietf:params:rtp-	[I-D.ietf-mmusic-sd
hdrext:sdes:mid	p-bundle-negotiatio
	n]
a=candidate:0 1 UDP 2113667327 198.51.100.7	[RFC5245]
51556 typ host	
a=candidate:1 1 UDP 1694302207 203.0.113.77	[RFC5245]
49203 typ srflx raddr 198.51.100.7 rport	
51556	
a=end-of-candidates	[I-D.ietf-mmusic-tr
	ickle-ice]

Table 40: 5.4.2 SDP Answer

[5.4.3.](#) Successful legacy Interop Fallback with bundle-only

In the scenario described below, Alice is a multi-stream capable WebRTC endpoint while Bob is a legacy VOIP end-point. The SDP Offer/Answer exchange demonstrates successful session setup with fallback to audio only stream negotiated via bundle-only framework between the end-points. Specifically,

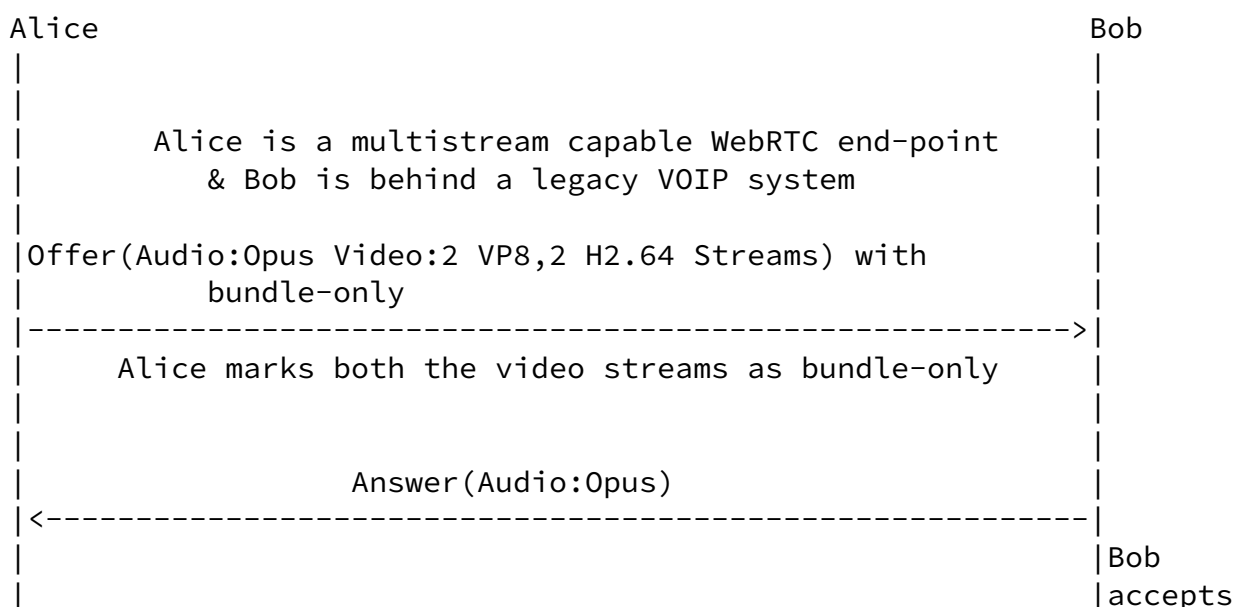
- o Offer from Alice describes 2 cameras via 2 video m=lines with both

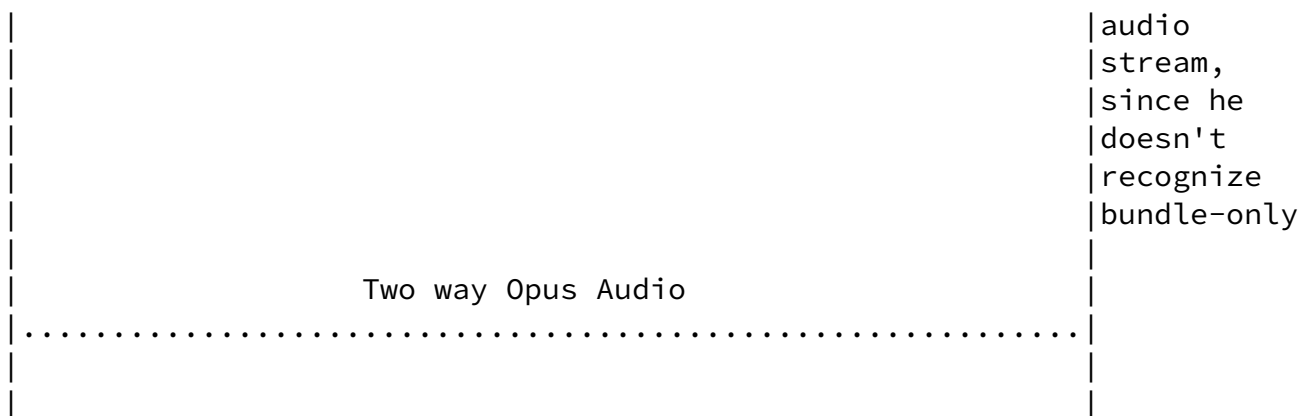
marked as bundle-only.

- o Since Bob doesnot recognize either the BUNDLE mechanism or the bundle-only attribute, he accepts only the audio stream from Alice.

NOTE: Since Alice is unaware of Bob's support for BUNDLE framework, Alice ensures to include separate RTP/RTCP ports and candidate information.

Successful 2-Way WebRTC <-> VOIP Interop





Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=group:LS m0 m1	[RFC5888]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
***** Audio m=line *****	*****

m=audio 54609 UDP/TLS/RTP/SAVPF 109	*****
c=IN IP4 203.0.113.141	[RFC4566]
a=mid:m0	[RFC4566]
	[RFC5888] Audio
	m=line part of
	BUNDLE group with a
	unique port number
a=msid:ma ta	Identifies
	RTCMediaStream ID
	(ma) and
	RTCMediaStreamTrack

a=sendrecv	ID (ta) [RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=setup:actpass	[RFC5763]
a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68	[I-D.ietf-mmusic-dtls-sdp]
a=rtcp-mux	[RFC5761]
a=rtcp:64678 IN IP4 203.0.113.141	[RFC3605]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level	[RFC6464]
a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4 rport 61665	[RFC5245]
a=candidate:0 1 UDP 2113667326 192.0.2.4 61667 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302206 203.0.113.141 64678 typ srflx raddr 192.0.2.4 rport 61667	[RFC5245]
***** Video-1 m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100	bundle-only video line with port number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]

a=mid:m1	n] [RFC5888] Video m=line part of BUNDLE group
----------	---

a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=sendrecv	[RFC3264]
a=rtpmap:98 VP8/90000	[RFC7741]
a=imageattr:98 [x=1280,y=720]	[RFC6236]
a=fmtp:98 max-fr=30	[RFC4566]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]
***** Video-2 m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 101 103	bundle-only video line with port number set to zero
c=IN IP4 203.0.113.141	[RFC4566]
a=bundle-only	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=mid:m2	[RFC5888] Video m=line part of BUNDLE group
a=msid:ma tc	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tc)
a=sendrecv	[RFC3264]
a=rtpmap:101 H264/90000	[RFC6184]
a=rtpmap:103 H264/90000	[RFC6184]
a=fmtp:101 profile-level-id=4d0028;packetization-mode=1;max-fr=30	[RFC6184] Camera-2, E ncoding-1 Resolution
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid	[I-D.ietf-mmusic-sdp-bundle-negotiation]

Table 41: 5.4.3 SDP Simulcast bundle-only

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
***** Audio m=line *****	*****
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 203.0.113.141	[RFC4566]
a=rtcp:60065 IN IP4 203.0.113.141	[RFC3605]
a=sendrecv	[RFC3264]
a=rtpmap:109 opus/48000/2	[RFC7587]
a=maxptime:120	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3 B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43: F0:A1:58:D0:A1:2C:19:08	[RFC5245]
a=setup:active	[RFC5763]
a=rtcp-rsize	[RFC5506]
a=extmap:1 urn:ietf:params:rtp-hdext:ssrc- audio-level	[RFC6464]
a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.77 49203 typ srflx raddr 198.51.100.7 rport 51556	[RFC5245]
a=candidate:0 2 UDP 2113667326 198.51.100.7 51558 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 203.0.113.77 60065 typ srflx raddr 198.51.100.7 rport 51558	[RFC5245]
***** Video m=line *****	*****
m=video 0 UDP/TLS/RTP/SAVPF 98 100	Bob doesn't recognize bundle-only and hence the m=line is rejected implicitly due to port 0

m=video 0 UDP/TLS/RTP/SAVPF 98 100	***** Bob doesn't recognize bundle-only and hence the m=line is rejected implicitly due to port 0
------------------------------------	---

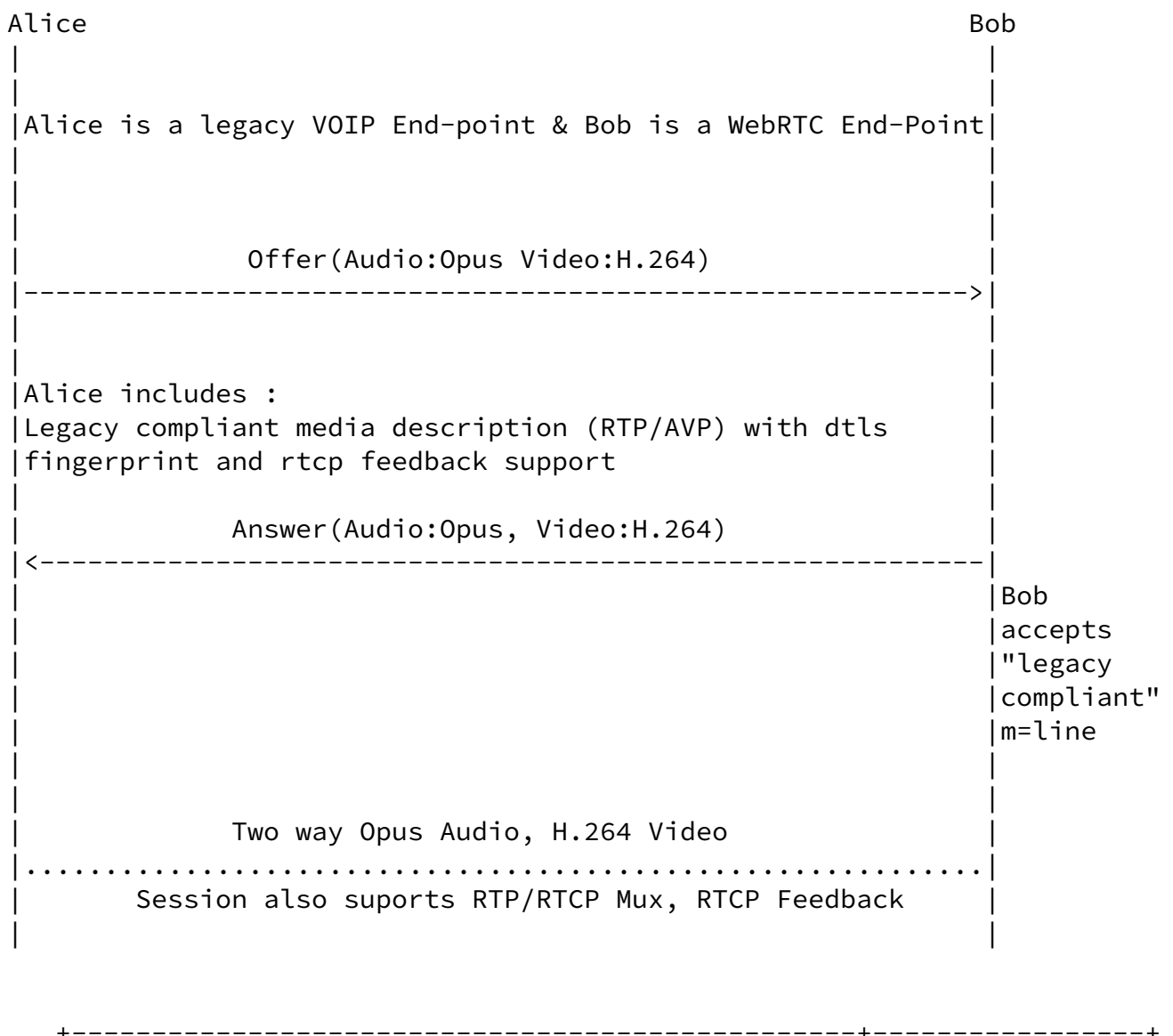
On the other hand, Bob being a WebRTC end-point follows the procedures in section 5.1.2 of [\[I-D.ietf-rtcweb-jsep\]](#) and accepts the Alice's offer for DTLS-SRTP based session with RTCP feedback.

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March 2018

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Offer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=rtcp-rsize	[RFC5506]
***** Audio m=line *****	*****

m=audio 54732 RTP/AVP 109	[RFC4566] Alice includes RTP/AVP audio stream

	description
c=IN IP4 203.0.113.141	[RFC4566]
a=fingerprint:sha-256 19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:E9:26:33:E8:70:88:A2	[RFC5245]
a=rtpmap:109 opus/48000	
a=ptime:20	
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761] Alice still includes RTP/RTCP Mux support
a=rtcp:64678 IN IP4 203.0.113.141	[RFC3605]
a=candidate:0 1 UDP 2113667327 192.0.2.4 54732 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 203.0.113.141 54732 typ srflx raddr 192.0.2.4 rport 54732	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.0.2.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 203.0.113.141 64678 typ srflx raddr 192.0.2.4 rport 64678	[RFC5245]
***** Video m=line *****	*****

m=video 62445 RTP/AVP 120	[RFC4566] Alice includes RTP/AVP video

c=IN IP4 203.0.113.141	stream description
a=fingerprint:sha-256 DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08:6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35	[RFC4566]
a=rtpmap:120 VP8/90000	[RFC5245]
a=sendrecv	[RFC7741]
a=rtcp-mux	[RFC3264]
	[RFC5761] Alice intends to perform RTP/RTCP Mux
a=rtcp:54721 IN IP4 203.0.113.141	[RFC3605]
a=candidate:0 1 UDP 2113667327 192.0.2.4 62445 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 203.0.113.141 62537 typ srflx raddr 192.0.2.4 rport 62445	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.0.2.4 54721 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 203.0.113.141 54721 typ srflx raddr 192.0.2.4 rport 54721	[RFC5245]
a=rtcp-fb:120 nack pli	[RFC5104] Alice

a=rtcp-fb:120 ccm fir	indicates support for Picture loss Indication and NACK RTCP feedback
	[RFC5104]

Table 43: 5.4.5 SDP Offer

Answer SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]

***** Audio m=line *****	*****
m=audio 49203 RTP/AVP 109	*****
	[RFC4566] Bob
	accepts RTP/AVP
	based audio
	stream
	[RFC4566]
c=IN IP4 203.0.113.77	
a=rtpmap:109 opus/48000	
a=ptime:20	
a=sendrecv	[RFC3264]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-256 BB:05:2F:70:9F:04:A9:0E:0	[RFC5245]
5:E9:26:33:E8:70:88:A2:19:E2:1C:3B:4B:9F:81:E6:	
B8:5C:F4:A5:A8:D8:73:04	
a=rtcp-mux	[RFC5761]
a=candidate:0 1 UDP 2113667327 198.51.100.7	[RFC5245]
49203 typ host	
a=candidate:1 1 UDP 1694302207 203.0.113.77	[RFC5245]
49203 typ srflx raddr 198.51.100.7 rport 49203	
***** Video m=line *****	*****

m=video 63130 RTP/SAVP 120	[RFC4566] Bob
	accepts RTP/AVP
	based video
	stream
	[RFC4566]
c=IN IP4 203.0.113.77	
a=rtpmap:120 VP8/90000	[RFC7741]
a=sendrecv	[RFC3264]

a=ice-ufrag:e39091na	[RFC5245]
a=ice-pwd:dbc325921d5dd29e4e99147efbabd9a2	[RFC5245]
a=fingerprint:sha-256 BB:0A:0E:05:E9:26:33:E8:7	[RFC5245]
0:88:A2:2F:70:9F:04:19:E2:1C:3B:4B:9F:81:56:2F:	
70:9F:04:F4:A5:A8:D8	
a=rtcp-mux	[RFC5761]
a=candidate:0 1 UDP 2113667327 198.51.100.7	[RFC5245]
63130 typ host	
a=candidate:1 1 UDP 1694302207 203.0.113.77	[RFC5245]
63130 typ srflx raddr 198.51.100.7 rport 63130	
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]

+-----+-----+

Table 44: 5.4.5 SDP Answer

[6.](#) IANA Considerations

This document requires no actions from IANA.

[7.](#) Security Considerations

The IETF has published separate documents [[I-D.ietf-rtcweb-security-arch](#)] [[I-D.ietf-rtcweb-security](#)] describing the security architecture for WebRTC as a whole.

In addition, since the SDP offer and answer messages can contain private information about addresses and sessions to be established between parties, if this information needs to be kept private, some security mechanism (using TLS transport for example) in the protocol used to carry the offers and answers must be used.

[8.](#) Acknowledgments

We would like to thank Justin Uberti, Chris Flo, Paul Kyzivat, Nils Ohlmeier for their detailed review and inputs. Thanks to Adam Roach for providing syntax validation script to help highlight syntax and formatting errors.

[9.](#) Change Log

[RFC EDITOR NOTE: Please remove this section when publishing]

Changes from [draft-ietf-rtcweb-sdp-08](#)

- o Fixed formatting and syntax issues pointed out by Adam Roach's validator script. List of issues are here:
<https://github.com/fluffy/ietf/issues?q=is%3Aissue+is%3Aclosed>
- o Align examples to match latest bundle specification as pointed by

Christer Holmberg

Changes from [draft-ietf-rtcweb-sdp-07](#)

- o Incorporate review from Nils.

Changes from [draft-ietf-rtcweb-sdp-06](#)

- o Keep Alive Version.

Changes from [draft-ietf-rtcweb-sdp-05](#)

- o Title change.

Changes from [draft-ietf-rtcweb-sdp-04](#)

- o Add IPv6 Example.
- o Add a=rtcp-mux-only and fix a=rtcp in examples.
- o Fix Idnits.
- o Add Security Considerations section.

Changes from [draft-ietf-rtcweb-sdp-02](#) to [draft-ietf-rtcweb-sdp-04](#)

- o Alignment with JSEP-19.
- o Added a=identity example.
- o Added a=dtls-id, a=group:LS in the examples.
- o Added Appendix section to capture list of checklists for the attributes.
- o Removed SSRC lines to match JSEP-19.
- o Closed open issues on a=fingerprint, a=rtcp and a=rtcp-mux-only from ietf96 to reflect JSEP-19.
- o Simplified Inter-op example

Changes from [draft-ietf-rtcweb-sdp-02](#)

- o Version increment to avoid expiry

Changes from [draft-ietf-rtcweb-sdp-01](#)

- o Complete face-lift
- o Added visual markers around m=lines to indicate their type, added spacing between tables for aiding readers
- o Updated table names to indicate offer vs answer
- o Attempted to align to latest versions of SCTP, BUNDLE, MSID drafts
- o Added mid header extensions to all the lines
- o Harmonized BUNDLE semantics and conventions updated.

Changes from [draft-ietf-rtcweb-sdp-00](#)

- o Updated Simulcast/FEC/RTX examples to use RID framework
- o Fixed BUNDLE references for a=bundle-only

Changes from [draft-nandakumar-rtcweb-sdp-08](#)

- o Fixed typos
- o Moved to a WG version

Changes from [draft-nandakumar-rtcweb-sdp-06](#) and [draft-nandakumar-rtcweb-sdp-07](#)

- o Added clarification on Call-Flow diagram usage
- o More cleanups

Changes from [draft-nandakumar-rtcweb-sdp-05](#)

- o Added Ascii chart for all the SDP Examples
- o Improved text and updated SDP Examples for Simulcast and FEC
- o Fixed MediaStream ID Semantics SDP Errors

Changes from [draft-nandakumar-rtcweb-sdp-04](#)

- o Interim version of the draft to avert expiry

Internet-Draft

SDP4WebRTC

March 2018

- o Corrected placement of c= line as per [RFC4566](#)
- o Updated simulcast SDP to reflect [draft-westerlund-avtcore-rtp-simulcast-04](#)

Changes from [draft-nandakumar-rtcweb-sdp-03](#)

- o Aligned more closely with JSEP version -05
- o Added Conventions to help readability
- o Add more examples to clarify BUNDLE use-cases

Changes from [draft-nandakumar-rtcweb-sdp-02](#)

- o Major refactoring was done to group the examples in to categories
- o SDP was updated through out to reflect JSEP-04 style of defining attributes per m=line than at the session level.
- o Added 8 new examples.
- o Updated references for Trickle, Unified Plan
- o Add section to explain the syntax conventions followed in the examples.

Changes from [draft-nandakumar-rtcweb-sdp-01](#)

- o Updated references to OPUS RTP Payload Specification.
- o Updated BUNDLE examples based on the latest [draft-ietf-mmusic-sdp-bundle-negotiation](#).
- o Added examples for multiple audio and video flows based on Unified Plan.
- o Added new examples for RTX and FEC streams
- o Updated Simulcast and SVC examples

Changes from [draft-nandakumar-rtcweb-sdp-00](#)

- o Fixed editorial comments on the mailing list.
- o Updated Data-channel SDP information based on [draft-ietf-mmusic-sctp-sdp](#).

- o Updated BUNDLE examples based on [draft-ietf-mmusic-sdp-bundle-negotiation](#).
- o Added examples for few more BUNDLE variants
- o Added new examples for Simulcast and SVC

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[Appendix A](#). Appendix

[A.1](#). JSEP SDP Attributes Checklist

This section compiles a high-level checklist of the required SDP attributes to be verified against the examples defined in this specification. The goal here is to ensure that the examples are compliant to the rules defined in [section 5](#) of the [\[I-D.ietf-rtcweb-jsep\]](#) specification.

[A.1.1](#). Common Checklist

This subsection lists SDP attributes that mostly apply at the session level.

- o v=0 MUST be the first SDP line.
- o o= line MUST follow with values '-' for username, 64 bit value for session id and dummy values for 'nettype', 'addrtype' and 'unicast-address' (for example: IN IP4 0.0.0.0).
- o o= line MUST have the session version incremented in the cases of subsequent offers.

- o s= MUST be the third line with the value of '-'.
- o t= line MUST follow with the values for 'start-time' and 'stop-time' set to zeroes.
- o a=identity line MUST be included at the session level if WEBRTC Identity mechanism is being used.
- o a=ice-options:trickle MUST be present at the session level in all offers and answers when supported.

[A.1.2.](#) RTP Media Description Checklist

Following set of checklist items apply to RTP audio and video media descriptions.

- o The media description's port value MUST either be set to dummy value of '9' or MUST use the port from the default candidate, if available.
- o The media description's proto value MUST be 'UDP/TLS/RTP/SAVPF' for JSEP offers.
- o JSEP answerer MUST support any combination of "RTP/[S]AVP[F]" for interoperability scenarios as defined in section 5 of [\[I-D.ietf-rtcweb-jsep\]](#)
- o c= line MUST be the first line in a media description. A dummy value of 'IN IP 0.0.0.0' is set if there are no candidates gathered or its value MUST match the default candidate.
- o a=mid attribute MUST be included.
- o One of a=sendrecv/a=sendonly/a=recvonly/a=inactive SDP direction attributes MUST be present.
- o a=rtpmap and a=fmtp attributes per primary, retransmission and forward error correction media format MUST be included.
- o a=rtcp-fb lines for each supported feedback mechanism MUST be included when using RTP with feedback
- o a=imageattr can be optionally present for video media descriptions.
- o a=msid line MUST be included for all the media senders identifying the MediaStreamTrack (i.e when a=sendonly/a=sendrecv attribute is present).

Internet-Draft

SDP4WebRTC

March 2018

- o a=extmap line identifying the BUNDLE header extension MUST be present.
- o a=extmap lines for other supported RTP header extensions MUST be included.
- o a=rid line 'per encoding' with the direction of 'send' MUST be included when further constraining the media format or multiple encodings per media format is needed.
- o a=simulcast line MUST be present if there exists more than one 'a=rid' lines for the media senders.
- o a=bundle-only attribute MUST be present for media descriptions that are impacted by various bundle policies (such as max-bundle/balanced)
- o For media descriptions that aren't "a=bundle-only" and that have unique address, following attributes MUST be present:
 - * a=ice-ufrag and a=ice-pwd
 - * a=fingerprint
 - * a=setup with value 'actpass' in the offers and a value of 'active'/'passive' in the answerer.
 - * a=tls-id
 - * a=rtcp
 - * a=rtcp-mux
 - * For offerers requiring RTCP to be multiplexed, 'a=rtcp-mux-only' line
 - * a=rtcp-rsize
- o a=group:BUNDLE line with all the 'mid' identifiers part of the BUNDLE group is included at the session level.
- o a=group:LS session level attribute MUST be included with the 'mid' identifiers that are part of the lip same sync group.

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[A.1.3.](#) DataChannel Media Description checklist

If a datachannel is required, an 'application' type media description MUST be included with the following properties:

- o Media description's proto value MUST be 'UDP/DTLS/SCTP' in the JSEP offers.
- o An JSEP answerer MUST support reception of 'UDP/DTLS/SCTP'/'TCP/DTLS/SCTP'/'DTLS/SCTP' for backward compatibility reasons.
- o A value of 'webrtc-datachannel' MUST be used for the media description 'fmt' value.
- o a=mid line MUST be present.
- o a=sctp-port with SCTP port number MUST be included.
- o a=max-message-size MAY be included, if appropriate.

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[Page 119]