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SDP for the WebRTC
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Abstract

The Web Real-Time Communication [WebRTC] 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 WebRTC framework, Session Description protocol (SDP) [RFC4566] is used for negotiating session capabilities between the peers. Such a negotiation happens based on the SDP Offer/Answer exchange mechanism described in [RFC3264].

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

This SDP examples provided in this document is still a work in progress, but it aims to align closest to the evolving standards work.

Status of This Memo

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1. Introduction

Javascript Session Exchange 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

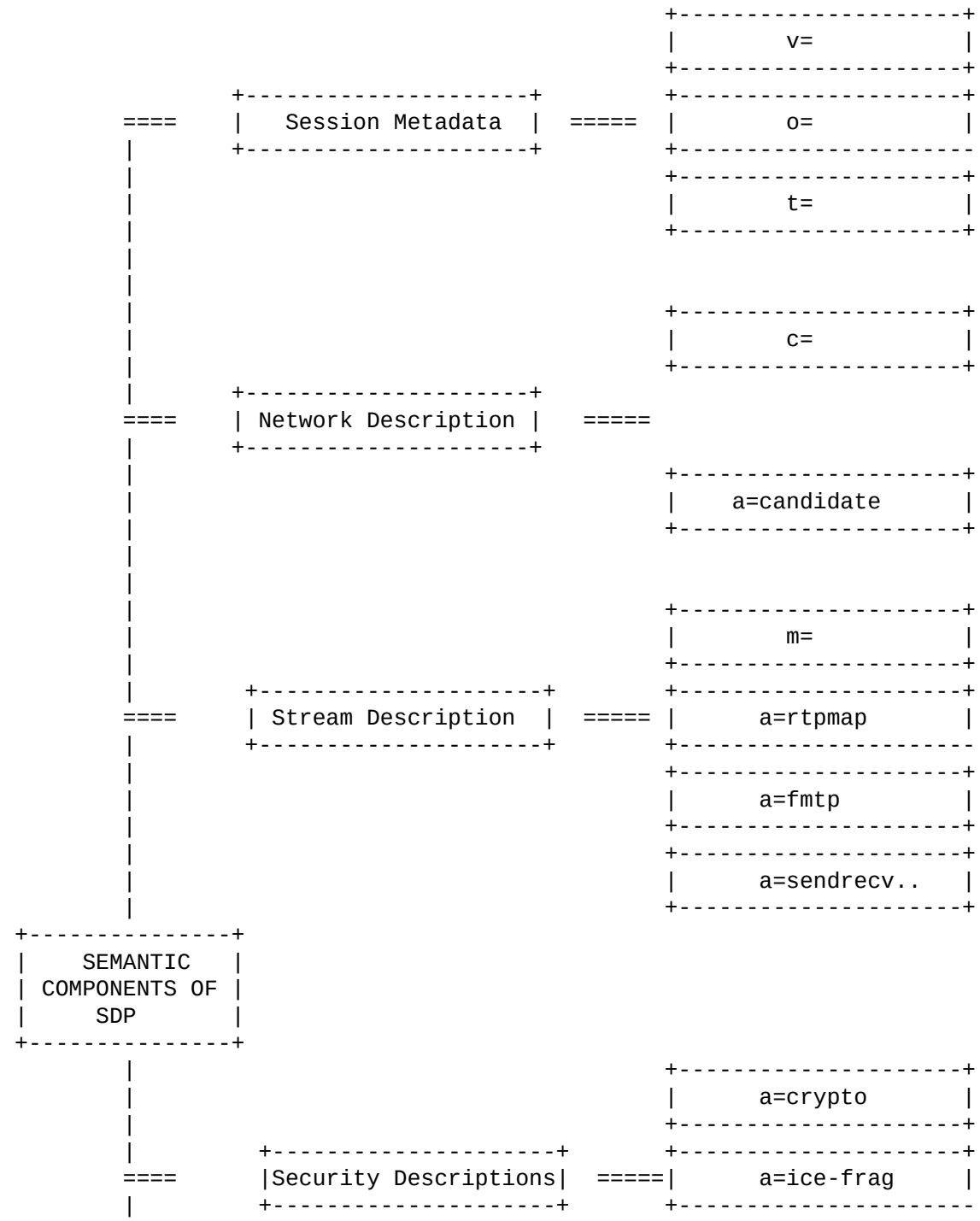
The purpose of this section is to provide a general overview of SDP and its components. For a more in-depth understanding, the readers are advised to refer to [RFC4566].

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 [RFC2326].

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.



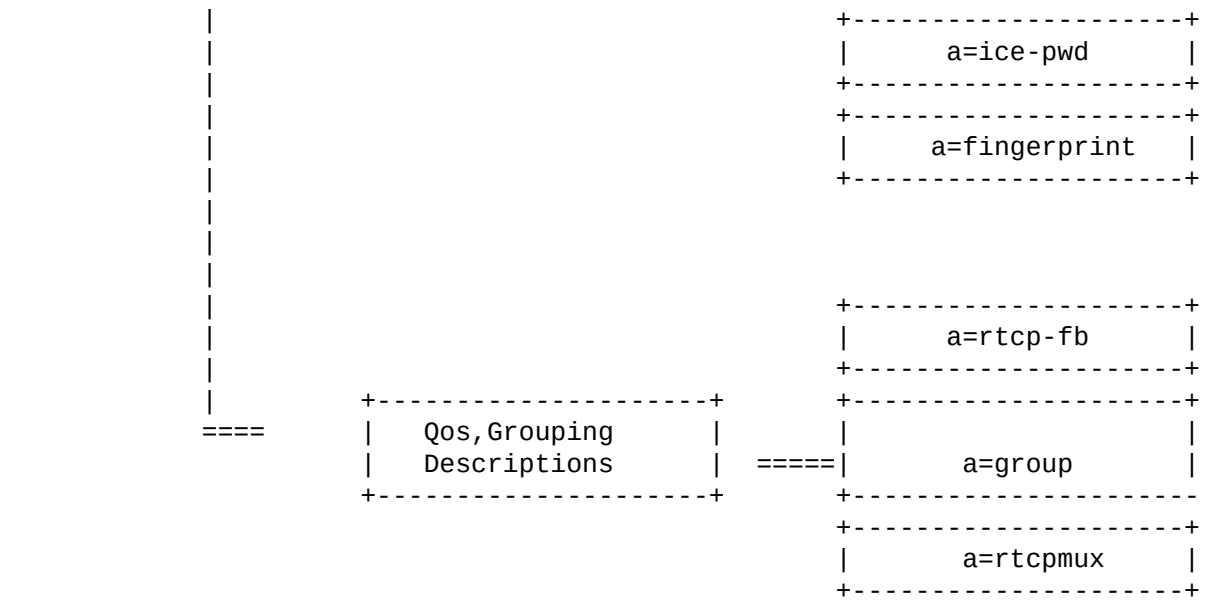


Figure 1: Semantic Components of SDP

[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 partipant'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. Javascript Session Establishment Protocol 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 details such as 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:

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

5.1. Some Conventions

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

- In all the examples, Alice and Bob are assumed to be the WebRTC peers.
- [I-D.ietf-mmusic-sdp-bundle-negotiation] support for multiplexing several media streams over a single underlying transport is assumed by default unless explicitly specified otherwise.
- 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.
- 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.
- 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.
  - 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.
  - 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.
  - 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).
- Against each SDP line, pointers to the appropriate RFCs are provided for further informational reference. Also an attempt has been made to provide explanatory notes to enable better understanding of the SDP usage, wherever appropriate.
- 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 more details, readers are recommended to refer to [I-D.ietf-rtcweb-jsep] specification.

- 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.

- 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.

- In the actual use the values that represent SSRCs, ICE candidate foundations, WebRTC Mediastream and MediaStreamTrack Ids shall be much larger and random than the ones shown in the examples.

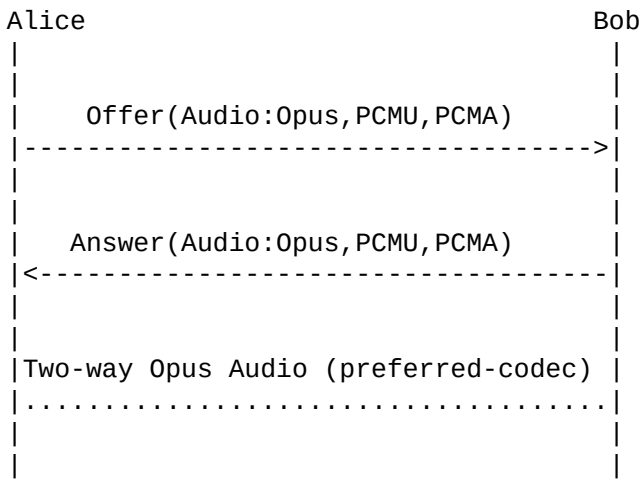
  [OPEN ISSUE-1]: SDP Examples for Data Channel, Simulcast, SVC are still being discussed and doesn’t represent the final solution.

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



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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Opus Codec 48khz, 2 channels
a=ptime:60	[I-D.ietf-payload-rtp-opus] - Opus packetization of 60ms
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=extmap:1 urn:ietf:params:rtp-	[RFC6464] Alice supports RTP

hdrext:ssrc-audio-level	header extension to indicate audio levels
a=sendrecv	[RFC3264] - Alice can send and recv audio
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTP Host Candidate
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTCP Host Candidate
a=candidate:1 1 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTP Server Reflexive ICE Candidate
a=candidate:1 2 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTCP Server Reflexive Candidate
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:12345 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 1: 5.2.1 SDP Offer

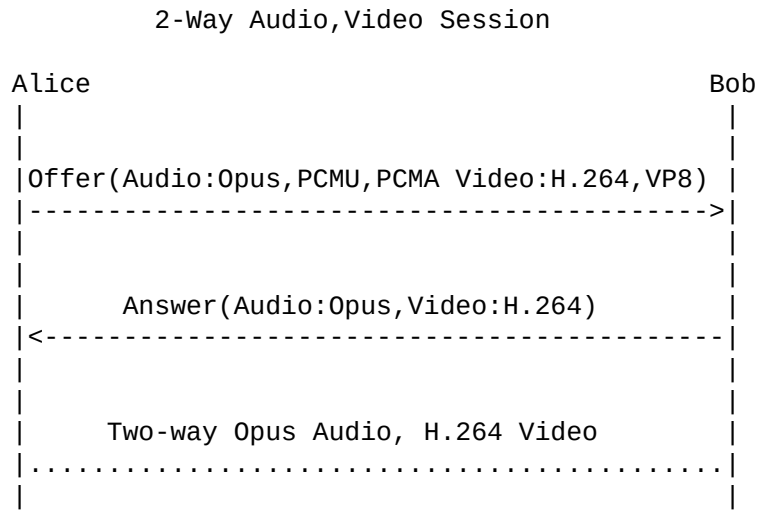
SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]

a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] Opus Codec
a=ptime:60	[I-D.ietf-payload-rtp-opus] Packetization of 60ms
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464] Bob supports audio level RTP header extension as well
a=sendrecv	[RFC3264] - Bob can send and recv audio
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing on port 49203
a=fingerprint:sha-1 c9:c7:70:9d:1f:66:79:a8:07:99:41:49:83:4a:97:0e:1f:ef:6d:f7	[RFC5245] - DTLS Fingerprint for SRTP
a=ice-ufrag:05067423	[RFC5245] - ICE user fragment
a=ice-pwd:1747d1ee3474a28a397a4c3f3af08a068	[RFC5245] - ICE password parameter
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245] - RTP/RTCP Host ICE Candidate
a=candidate:1 1 UDP 1685987071 98.248.92.77 60654 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245] - RTP/RTCP Server Reflexive ICE Candidate
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:54321 cname:NWs1ao1HmN4Xa5/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506] - Bob intends to use reduced size RTCP for this session
a=ice-options:trickle	[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.



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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Opus Codec 48khz, 2 channels
a=ptime:60	[I-D.ietf-payload-rtp-opus] - Opus packetization of 60ms
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]

a=sendrecv	[RFC3264] - Alice can send and recv audio
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTP Host Candidate
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTCP Host Candidate
a=candidate:1 1 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTP Server Reflexive ICE Candidate
a=candidate:1 2 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTCP Server Reflexive Candidate.
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:12345 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 54609 UDP/TLS/RTP/SAVPF 99 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:99 H264/90000	[RFC3984] - H.264 Video Codec
a=fmtp:99 profile-level-id=4d0028;packetization-mode=1	[RFC3984]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8] - VP8 video codec
a=sendrecv	[RFC3264] - Alice can send and recv video
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives

a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTP Host ICE Candidate
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245] - RTCP Host Candidate
a=candidate:1 1 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTP Server Reflexive ICE Candidate
a=candidate:1 2 UDP 1685987071 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245] - RTCP Server Reflexive Candidate
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=ssrc:1366781083 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 3: 5.2.2 SDP Offer

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

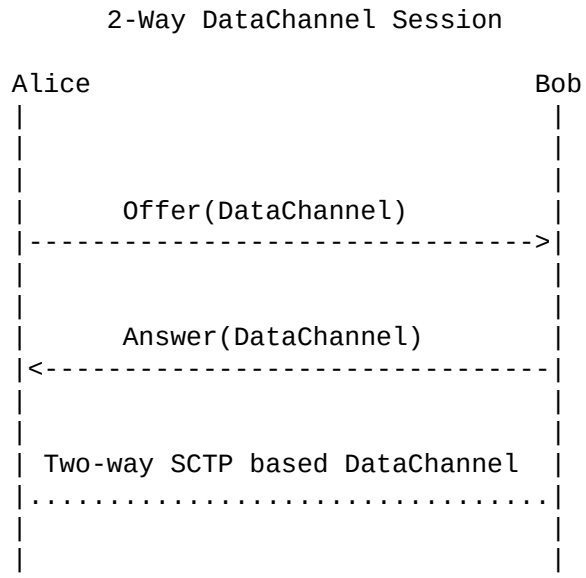
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Bob accepts only Opus Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:60	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264] - Bob can send and recv audio
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 3618095783 192.168.1.7 49203 typ host	[RFC5245] - RTP/RTCP Host ICE Candidate
a=candidate:1 1 UDP 565689203 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245] - RTP/RTCP Server Reflexive ICE Candidate
a=ssrc:1366788312 cname:1f0fcgEocUG/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506] - Bob intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 49203 UDP/TLS/RTP/SAVPF 99	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtpmap:99 H264/90000	[RFC3984] - Bob accepts H.264

	Video Codec.
a=fmtp:99 profile-level-id=4d0028;packetization-mode=1	[RFC3984]
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=sendrecv	[RFC3264] - Bob can send and recv video
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245] - Host ICE Candidate for Opus Stream
a=candidate:1 1 UDP 1694302207 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245] - Server Reflexive ICE Candidate for the above host candidate
[RFC5245] - Server Reflexive Candidate for the Second Host Candidate	a=rtcp-fb:99 nack
[RFC5104] - Indicates support for NACK based RTCP feedback	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=ssrc:3229706345 cname:Q/NWs1ao1HmN4Xa5
[RFC5576]	a=rtcp-rsize
[RFC5506] - Bob intends to use reduced size RTCP for this session	a=ice-options:trickle
[I-D.ietf-mmusic-trickle-ice]	

Table 4: 5.2.2 SDP Answer

5.2.3. Data Only Session

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


2-Way DataChannel Session
Alice
Bob
Offer(DataChannel)
Answer(DataChannel)
Two-way SCTP based DataChannel

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-ufrag:074c6550	[RFC5245] - Session Level ICE parameter
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - Session Level ICE parameter
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - Session DTLS Fingerprint for SRTP
m=application 56966 DTLS/SCTP 5000	[I-D.ietf-rtcweb-data-channel]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-DataChannel streams=16;label="channel 1"; subprotocol="chat";	[I-D.ietf-mmusic-sctp-sdp]
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=sendrecv	[RFC3264] - Alice can send and recv non-media data
a=candidate:0 1 UDP 2113667327 192.168.1.7 56966 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 24.23.204.141 56966 typ srflx raddr 192.168.1.7 rport 56966	[RFC5245]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 5: 5.2.3 SDP Offer

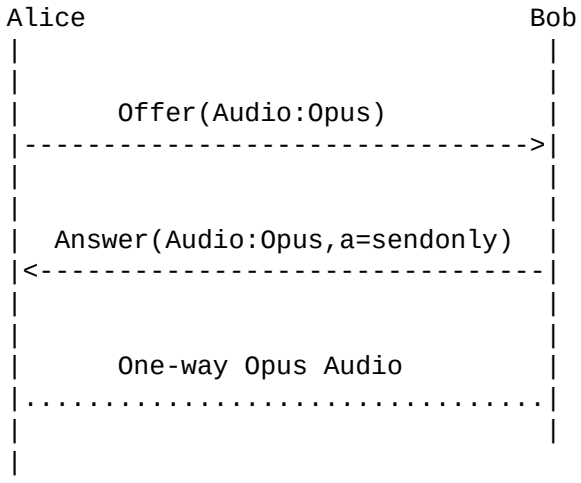
SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=group:BUNDLE data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=application 55700 DTLS/SCTP 5000	[I-D.ietf-mmusic-sctp-sdp]
c=IN IP4 98.248.92.771	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-DataChannel:5000 streams=1;label="channel 1" ;subprotocol="chat";	[I-D.ietf-mmusic-sctp-sdp]
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=sendrecv	[RFC3264] - Bob can send and recv non-media data
a=ice-ufrag:c300d85b	[RFC5245] - Session Level ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - Session Level ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - Session DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2113667327 192.168.1.7 55700 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 55700 typ srflx raddr 192.168.1.7 rport 55700	[RFC5245]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 6: 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=sendonly in the Answer.

Audio On Hold



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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Opus Codec 48khz, 2 channels
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus] - Opus packetization of 20ms
a=sendrecv	[RFC3264] - Alice can send and recv audio

a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:3229706345 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 7: 5.2.4 SDP Offer

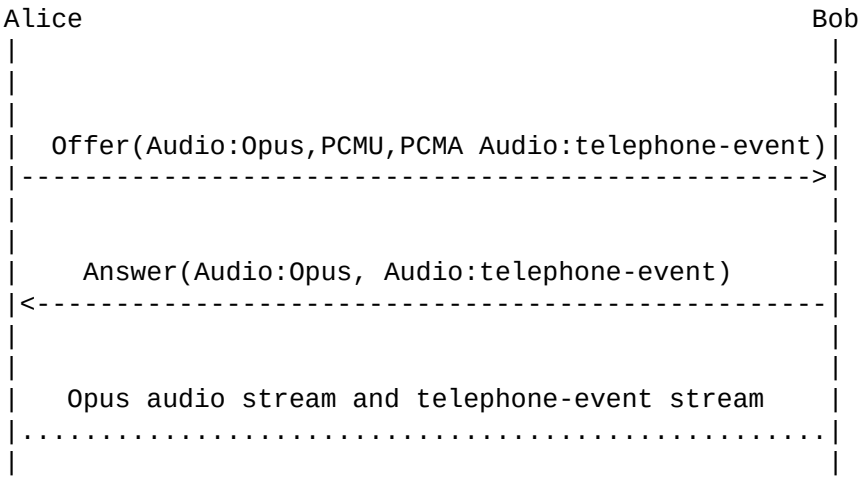
SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Bob accepts Opus Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendonly	[RFC3264] - Bob puts call On Hold
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:1366781083 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 8: 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 [RFC2833] 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



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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio dtmf	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data

a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Opus Codec 48khz, 2 channels
a=ptime:20	[I-D.ietf-payload-rtp-opus] - Opus packetization of 20ms
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:8 PCMA/8000	[RFC3551] PCMA Audio Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=sendrecv	[RFC3264] - Alice can send and recv audio
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:3229706345 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 126	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:dtmf	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp-mux	[RFC5761]
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:126 telephone-event/8000	[RFC2833]

a=sendonly	[RFC3264] - Alice can send DTMF Events
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550	[RFC5245] - ICE user fragment
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245] - ICE password parameter
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - DTLS Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104] - Indicates NACK RTCP feedback support
a=ssrc:9032206345 cname:L/N9lk1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 9: 5.2.5 SDP Offer

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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio dtmf	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)

a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Bob accepts Opus Codec
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264] - Bob can send and receive Opus audio
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing on port 49203
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245] - Fingerprint for SRTP
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:0634322975 cname:Q/o1HmN4XNWs1aa5	[RFC5576]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 126	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:dtmf	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtpmap:126 telephone-event/8000	[RFC2833]
a=recvonly	[RFC3264] - Alice can receive DTMF events
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761] - Alice can perform RTP/RTCP Muxing on port 54690
a=ice-ufrag:c300d85b	[RFC5245] - ICE username frag
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245] - ICE password
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d	[RFC5245] - Fingerprint for SRTP

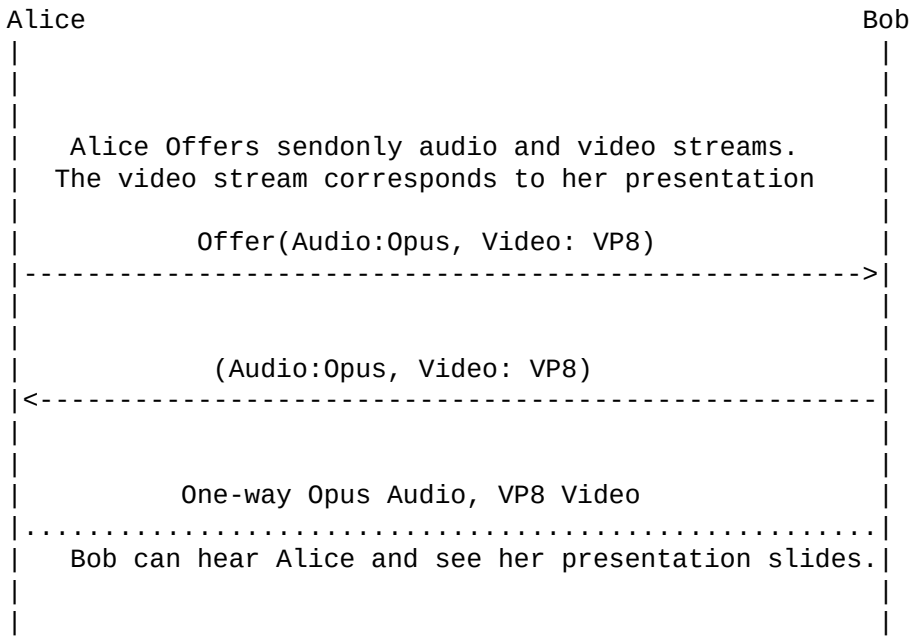
: 1f:66:79:a8:07	
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:6345903220 cname:L/k1aN9lo1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506] - Alice intends to use reduced size RTCP for this session
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 10: 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



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp-mux	[RFC5761]
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendonly	[RFC3264] - Send only audio stream
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 24.23.204.141 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 24.23.204.141 54609 typ host	[RFC5104]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:6345903220 cname:L/k1aN9lo1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 54609 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:video	[RFC5888]
a=msid:ma tb	Identifies RTCMediaStream ID

		(ma) and RTCMediaStreamTrack ID (tb)
a=rtcp-mux		[RFC5761]
a=rtcp:54609 IN IP4 24.23.204.141		[RFC3605] - Port for RTCP data
a=rtpmap:120 VP8/90000		[I-D.ietf-payload-vp8]
a=content:slides		[RFC4796] -Alice's presentation video stream
a=sendonly		[RFC3264] - Send only video stream
a=setup:actpass		[RFC4145] - Alice can perform DTLS before Answer arrives
a=ice-ufrag:074c6550		[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068		[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07		[RFC5245]
a=candidate:0 1 UDP 2113667327 24.23.204.141 54609 typ host		[RFC5245]
a=candidate:0 2 UDP 2113667326 24.23.204.141 54609 typ host		[RFC5104]
a=rtcp-fb:120 nack		[RFC5104]
a=rtcp-fb:120 nack pli		[RFC5104]
a=rtcp-fb:120 ccm fir		[RFC5104]
a=ssrc:3429951804 cname:Q/NWs1ao1HmN4Xa5		[RFC5576]
a=rtcp-rsize		[RFC5506]
a=ice-options:trickle		[I-D.ietf-mmusic-trickle-ice]

Table 11: 5.2.6 SDP Offer

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID

		(ma) and RTCMediaStreamTrack ID (ta)
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]	
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]	
a=ptime:20	[I-D.ietf-payload-rtp-opus]	
a=recvonly	[RFC3264]	- Receive only audio stream
a=setup:active	[RFC4145]	- Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761]	
a=ice-ufrag:c300d85b	[RFC5245]	
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]	
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d : 1f:66:79:a8:07	[RFC5245]	
a=candidate:0 1 UDP 2113667327 98.248.92.77 49203 typ host	[RFC5245]	
a=ssrc:9513429804 cname:Q/o1HmNWs1aN4Xa5	[RFC5576]	
a=rtcp-rsize	[RFC5506]	
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]	
m=video 49203 UDP/TLS/RTP/SAVPF 120	[RFC4566]	
c=IN IP4 98.248.92.77	[RFC4566]	
a=mid:video	[RFC5888]	
a=msid:ma tb		Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]	
a=content:slides	[RFC4796]	
a=recvonly	[RFC3264]	- Receive Only Alice’s presentation stream
a=setup:active	[RFC4145]	- Bob carries out DTLS Handshake in parallel
a=rtcp-mux	[RFC5761]	
a=ice-ufrag:c300d85b	[RFC5245]	
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]	
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]	
a=candidate:0 1 UDP 2113667327 98.248.92.77 49203 typ host	[RFC5245]	
a=ssrc:1366781083 cname:EocUG1f0fcg/yvY7	[RFC5576]	
a=rtcp-rsize	[RFC5506]	

a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 12: 5.2.6 SDP Answer

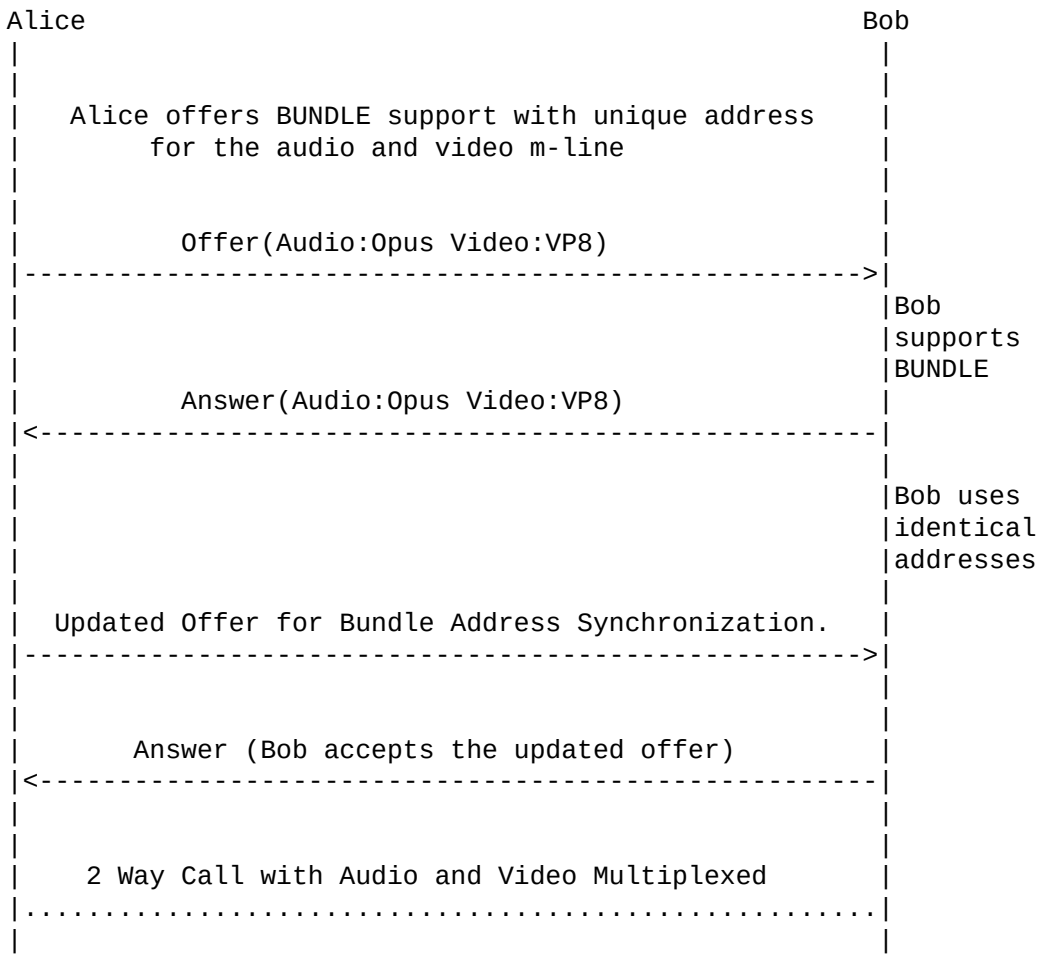
5.2.7. Audio, Video Session with BUNDLE Support Unknown

In this example, since Alice is unsure of the Bob's support of the BUNDLE framework, following 3 step procedures are performed in order to negotiate and setup a BUNDLE Address for the session

- An SDP Offer, in which the Alice assigns unique addresses to each "m=" line in the BUNDLE group, and requests the Answerer to select the Offerer's BUNDLE address.
- An SDP Answer, in which the Bob indicates its support for BUNDLE, and assigns its own BUNDLE address for the BUNDLED m= lines.
- A subsequent SDP Offer from Alice, which is used to perform BUNDLE Address Synchronization (BAS).

Once the Offer/Answer exchange completes, both Alice and Bob each end up using single RTP Session for both the Media Streams.

Two-Way Secure Audio,Video with BUNDLE support unknown



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]

c=IN IP4 24.23.204.141	[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=rtcp-mux	[RFC5761]
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ssrc:11111 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 62537 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[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=rtcp-mux	[RFC5761]

a=rtcp:62537 IN IP4 24.23.204.141	[RFC3605] - Port for RTCP data
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=ssrc:22222 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=ice-ufrag:6550074c	[RFC5245]
a=ice-pwd:74af08a068a28a397a4c3f 31747d1ee34	[RFC5245]
a=fingerprint:sha-1 1f:ef:6d:f7: c9:c7:70:9d:1f:66:99:41:49:83: 4a:97:0e79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 62537 typ host	[RFC5245]
a=candidate:0 2 2122194687 192.168.1.4 62537 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 62537 typ srflx raddr 192.168.1.4 rport 62537	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 62537 typ srflx raddr 192.168.1.4 rport 62537	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 13: 5.2.7 SDP Offer w/BUNDLE

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Bob supports BUNDLE semantics.
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID

		(ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio		[RFC5888] Audio m=line part of the BUNDLE group
a=rtpmap:109 opus/48000/2		[I-D.ietf-payload-rtp-opus]
a=ptime:20		[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level		[RFC6464]
a=sendrecv		[RFC3264]
a=setup:active		[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-fb:109 nack		[RFC5104]
a=rtcp-mux		[RFC5761]
a=ssrc:33333		[RFC5576]
cname:Q/1HmN4Xa5NWs1ao		
a=ice-ufrag:c300d85b		[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2		[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07		[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host		[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203		[RFC5245]
a=rtcp-rsize		[RFC5506]
a=ice-options:trickle		[I-D.ietf-mmusic-trickle-ice]
m=video 49203 UDP/TLS/RTP/SAVPF 120		[RFC4566]
c=IN IP4 98.248.92.77		[RFC4566]
a=mid:video		[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=rtpmap:120 VP8/90000		[I-D.ietf-payload-vp8]
a=sendrecv		[RFC3264]
a=setup:active		[RFC4145] - Bob carries out DTLS Handshake in parallel
a=rtcp-mux		[RFC5761]
a=ssrc:44444		[RFC5576]
cname:Q/2AqlmN4Xa5NWs		
a=ice-ufrag:85bc300d		[RFC5245]
a=ice-pwd:bd2de4e9991c325921d5d4 7efbabd9a2		[RFC5245]
a=fingerprint:sha-1 41:49:83:4a:		[RFC5245]

99:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 14: 5.2.7 SDP Answer w/BUNDLE

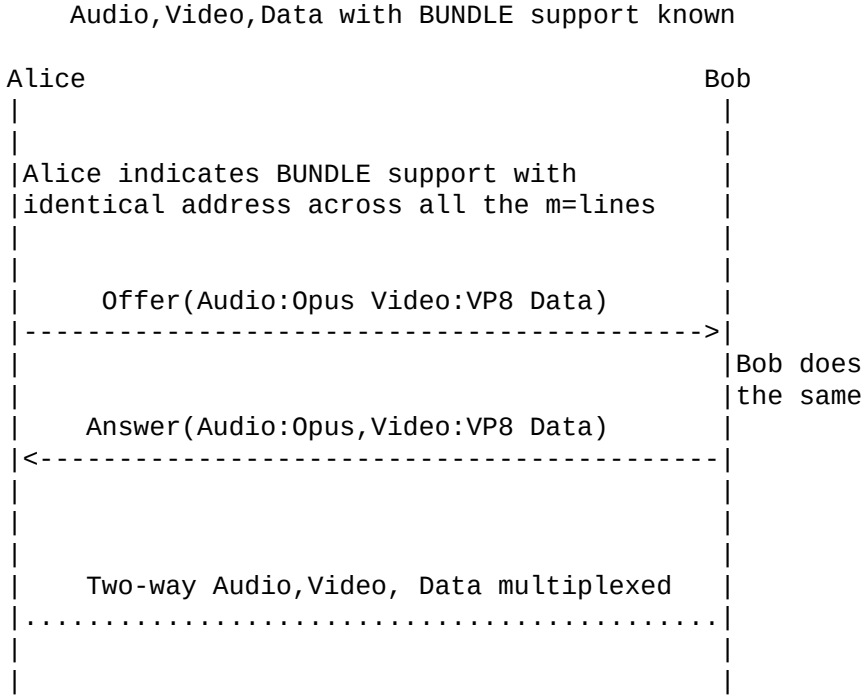
SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio	[RFC5888] - Port number finalized as Bundle Address.
a=rtcp-mux	[RFC5761]
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=ssrc:11111 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]

a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 54609 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:22222 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 15: 5.2.7 SDP Offer for BAS

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.



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:54609 IN IP4	[RFC3605]

24.23.204.141	
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=video 54609 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605]
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:	[RFC5245]

9d:1f:66:79:a8:07	
a=candidate:0 1 UDP 2122194687	[RFC5245]
192.168.1.4 54609 typ host	
a=candidate:0 2 UDP 2122194687	[RFC5245]
192.168.1.4 54609 typ host	
a=candidate:1 1 UDP 1685987071	[RFC5245]
24.23.204.141 54609 typ srflx	
raddr 192.168.1.4 rport 54609	
a=candidate:1 2 UDP 1685987071	[RFC5245]
24.23.204.141 54609 typ srflx	
raddr 192.168.1.4 rport 54609	
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:22222	[RFC5576]
cname:Q/aoNWs11HmN4Xa5	
a=rtcp-rsize	[RFC5506]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=application 54609 DTLS/SCTP	[I-D.ietf-rtcweb-data-channel]
5000	
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-	[I-D.ietf-mmusic-sctp-sdp]
DataChannel	
streams=1;label="channel 1";	
subprotocol="chat";	
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3	[RFC5245]
474af08a068	
a=fingerprint:sha-1 99:41:49:83:	[RFC5245]
4a:97:0e:1f:ef:6d:f7:c9:c7:70:	
9d:1f:66:79:a8:07	
a=candidate:0 1 UDP 2122194687	[RFC5245]
192.168.1.4 54609 typ host	
a=candidate:1 1 UDP 1685987071	[RFC5245]
24.23.204.141 54609 typ srflx	
raddr 192.168.1.4 rport 54609	
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

Table 16: 5.2.8 SDP Offer

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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video data	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice] Bob's trickle support support is indicated at the session level
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:33333 cname:L/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]

a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:44444 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=application 49203 DTLS/SCTP 5000	[I-D.ietf-mmusic-sctp-sdp]
c=IN IP4 98.248.92.771	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-DataChannel streams=16;label="channel 1"; subprotocol="chat";	[I-D.ietf-mmusic-sctp-sdp]
a=setup:active	[RFC4145]
a=sendrecv	[RFC3264]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]

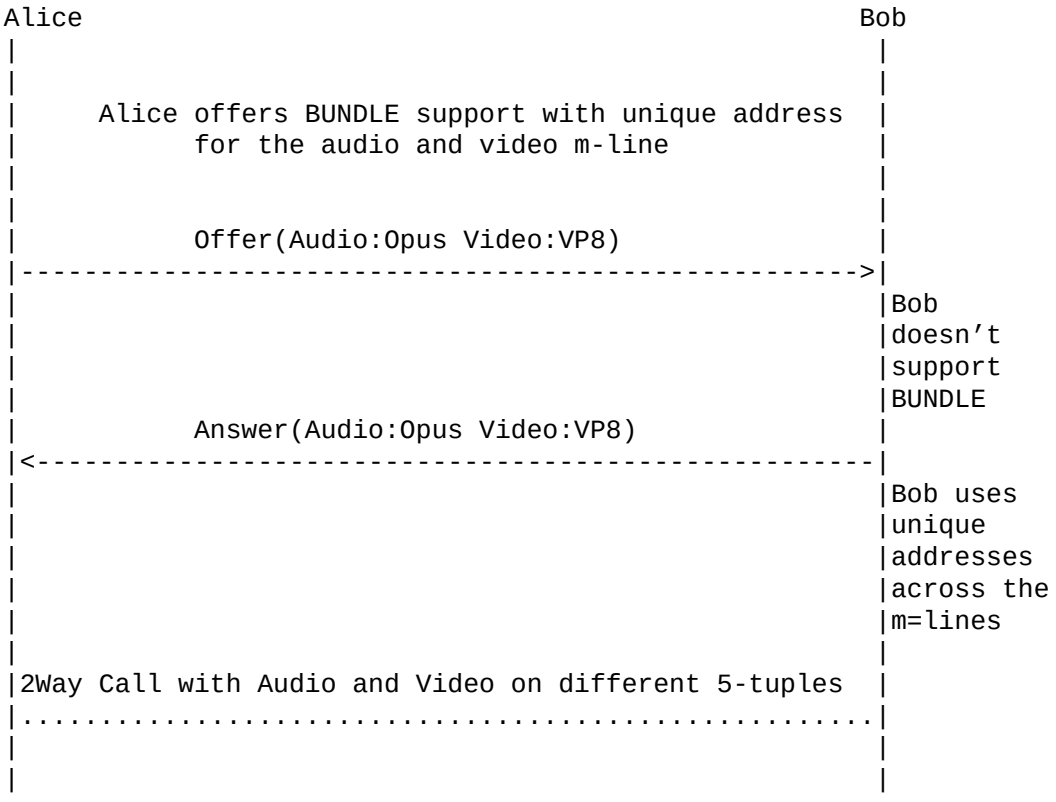
Table 17: 5.2.8 SDP Answer

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.

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



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]

a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 55232 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=rtcp:55232 IN IP4 24.23.204.141	[RFC3605]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=setup:actpass	[RFC4145] - Alice can perform DTLS before Answer arrives
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111	[RFC5576]
cname:EocUG1f0fcg/yvY7	
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d : 1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 55232 typ host	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.4 55232 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 55232 typ srflx raddr 192.168.1.4 rport 55232	[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 55232 typ srflx raddr 192.168.1.4 rport 55232	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 54332 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID

		(ma) and RTCMediaStreamTrack ID (tb)
a=mid:video		[RFC5888] Video m=line part of the BUNDLE group with a unique port number
a=rtcp:54332 IN IP4 24.23.204.141		[RFC3605]
a=rtpmap:120 VP8/90000		[I-D.ietf-payload-vp8]
a=sendrecv		[RFC3264]
a=setup:actpass		[RFC4145] - Alice can perform DTLS before Answer arrives
a=rtcp-mux		[RFC5761]
a=ssrc:22222		[RFC5576]
cname:yvY7/EocUG1f0fcg		
a=ice-ufrag:7872093		[RFC5245]
a=ice-pwd:ee3474af08a068a28a397a 4c3f31747d1		[RFC5245]
a=fingerprint:sha-1 6d:f7:c9:c7: 70:9d:1f:66:79:a8:07:99:41: 49:83:4a:97:0e:1f:ef		[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.4 54332 typ host		[RFC5245]
a=candidate:0 2 2122194687 192.168.1.4 54332 typ host		[RFC5245]
a=candidate:1 1 UDP 1685987071 24.23.204.141 54332 typ srflx raddr 192.168.1.4 rport 54332		[RFC5245]
a=candidate:1 2 UDP 1685987071 24.23.204.141 54332 typ srflx raddr 192.168.1.4 rport 54332		[RFC5245]
a=rtcp-fb:120 nack		[RFC5104]
a=rtcp-fb:120 nack pli		[RFC5104]
a=rtcp-fb:120 ccm fir		[RFC5104]
a=rtcp-rsize		[RFC5506]

Table 18: 5.2.9 SDP Offer w/BUNDLE

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

m=audio 53214 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext :ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=sendrecv	[RFC3264]
a=rtcp-fb:109 nack	[RFC5104]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97 :0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 53214 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 53214 typ srflx raddr 192.168.1.7 rport 53214	[RFC5245]
a=candidate:0 2 UDP 2122194687 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1685987071 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 58679 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:56507 IN IP4 98.248.92.77	[RFC3605]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=setup:active	[RFC4145] - Bob carries out DTLS Handshake in parallel
a=sendrecv	[RFC3264]
a=ice-ufrag:85bC300	[RFC5245]

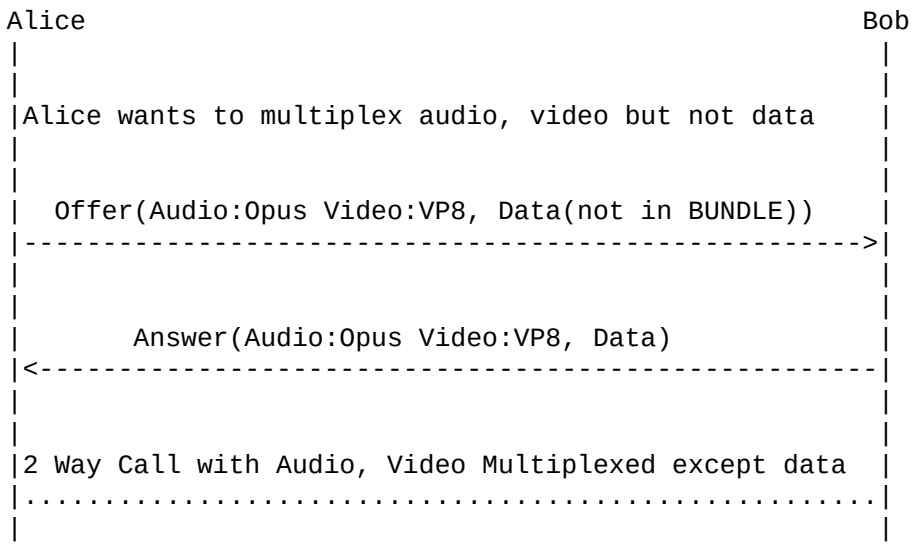
a=ice-pwd:325921d5d47efbabd9a2de4e99bd291c	[RFC5245]
a=fingerprint:sha-1 9d:1f:66:79:a8:07 :99:41:49:83:4a:97:0e:1f: ef:6d:f7:c9:c7:70	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 58679 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 58679 typ srflx raddr 192.168.1.7 rport 58679	[RFC5245]
a=candidate:0 1 UDP 2122194687 192.168.1.7 56507 typ host	[RFC5245]
a=candidate:1 1 UDP 1685987071 98.248.92.77 56507 typ srflx raddr 192.168.1.7 rport 58679	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 19: 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 sections.

Audio, Video, with Data (Not in BUNDLE)



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice wants to BUNDLE only audio and video media.
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605]
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]

a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 54609 typ host	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=video 54609 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:54609 IN IP4 24.23.204.141	[RFC3605]
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 54609 typ host	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:22222 cname:Q/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=application 10000 DTLS/SCTP 5000	[I-D.ietf-rtcweb-data-channel]

c=IN IP4 24.23.204.141	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-DataChannel streams=16;label="channel 1"; subprotocol="chat";	[I-D.ietf-mmusic-sctp-sdp]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=ice-ufrag:89819013	[RFC5245]
a=ice-pwd:1747d1ee3474af08a068a28a397a4c3f3	[RFC5245]
a=fingerprint:sha-1 0e:1f:ef:6d:f7:c9:c7:70:99:41:49:83:4a:97:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 10000 typ host	[RFC5245]

Table 20: 5.2.10 SDP Offer

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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ice-ufrag:c300d85b	[RFC5245]

a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7: 70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=ssrc:33333 cname:L/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 98.248.92.771	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:44444 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=application 20000 DTLS/SCTP 5000	[I-D.ietf-mmusic-sctp-sdp]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:data	[RFC5888]
a=sctpmap:5000 webrtc-DataChannel streams=1;label="channel 1"; subprotocol="chat";	[I-D.ietf-mmusic-sctp-sdp]
a=setup:active	[RFC4145]
a=sendrecv	[RFC3264]
a=ice-ufrag:991Ca2a5e	[RFC5245]
a=ice-pwd:921d5d47efbabd9a2de4e9 9bd291c325	[RFC5245]

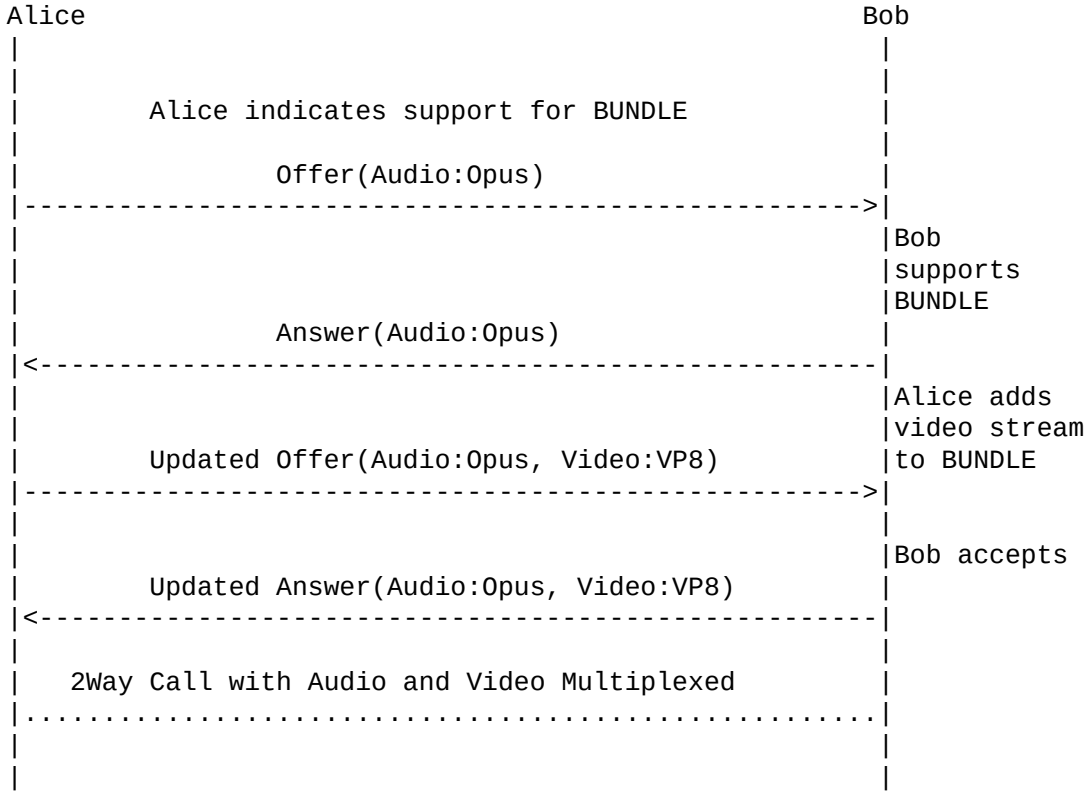
a=fingerprint:sha-1 6d:f7:c9:c7:	[RFC5245]
70:9d:1f:66:79:a8:07:99:41:49:	
83:4a:97:0e:1f:ef	
a=candidate:0 1 UDP 2113667327	[RFC5245]
192.168.1.7 20000 typ host	

Table 21: 5.2.10 SDP Answer

5.2.11. Audio Only, Add Video to BUNDLE

This example involves 2 Offer/Answer exchanges. First one setting up 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



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice wants to BUNDLE only audio and video media.
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]

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

Table 22: 5.2.11 SDP Offer

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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:33333 cname:L/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 23: 5.2.10 SDP Answer

SDP Contents	RFC#/Notes

v=1	Version number incremented [RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice wants to BUNDLE only audio and video media.
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d: 1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]

m=video 54609 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:22222 cname:Q/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 24: 5.2.11 SDP Updated Offer

SDP Contents	RFC#/Notes
v=1	[RFC4566] Version number incremented
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]

a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio video	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:audio	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:33333 cname:L/aoNWs11HmN4Xa5	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:video	[RFC5888]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4	[RFC5245]

7efbabd9a2	
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=rtcp-fb:120 nack	[RFC5104]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
a=ssrc:44444 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 25: 5.2.11 SDP Updated Answer

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.

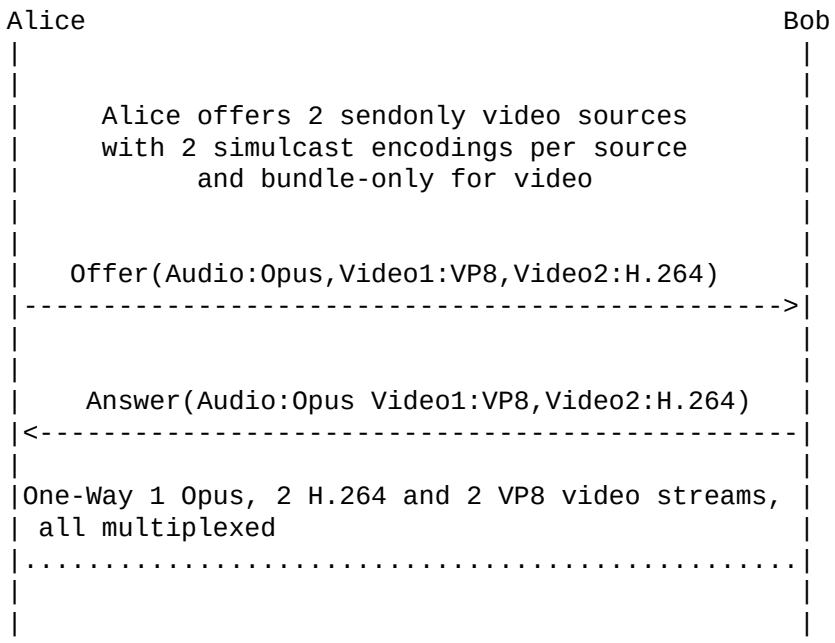
5.3.1. Sendonly Simulcast Session with 2 cameras and 2 encodings per camera

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.

bundle-only framework is used along with BUNDLE grouping framework to enable multiplexing of all the 5 streams (1 audio stream + 4 video streams) over a single RTP Session.

1 Way Successful Simulcast w/BUNDLE



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m0	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendonly	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=rtcp-fb:109 nack	[RFC5104]
a=ssrc:11111 C90alEocUG1f0fcg	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 98 100	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=imageattr:98 [x=1280,y=720]	[RFC6236]Camera-1,Encoding-1 Resolution
a=fmtp:98 max-fr=30	[RFC4566]
a=imageattr:100 [x=640,y=480]	[RFC6236] Camera-1,Encoding-2 Resolution
a=fmtp:100 max-fr=15	[RFC4566]
a=simulcast: send 98;100	[I-D.ietf-mmusic-sdp-simulcast] Alice can send 2 resolutions
a=ssrc:12345 cname:axzo1278npDlAzM73	[RFC5576] [RFC7022] Camera-1,Encoding-1 SSRC

	with Session CNAME
a=ssrc:45678	[RFC5576] [RFC7022]
cname:axzo1278npDlAzM73	Camera-1,Encoding-2 SSRC with Session CNAME
a=sendonly	[RFC3264] - Send only video stream
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:98 nack	[RFC5104]
a=rtcp-fb:98 nack pli	[RFC5104]
a=rtcp-fb:98 ccm fir	[RFC5104]
a=rtcp-fb:100 nack	[RFC5104]
a=rtcp-fb:100 nack pli	[RFC5104]
a=rtcp-fb:100 ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 101 102	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tc	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tc)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m2	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:101 H264/90000	[RFC3984]
a=rtpmap:102 H264/90000	[RFC3984]
a=fmtp:101 profile-level-id=4d0028 ;packetization-mode=1;max-fr=30	[RFC3984]Camera-2,Encoding-1 Resolution
a=fmtp:102 profile-level-id=4d0028 ;packetization-mode=1;max-fr=15	[RFC3984]Camera-2,Encoding-2 Resolution
a=simulcast: send 101;102	[I-D.ietf-mmusic-sdp-simulcast]
a=ssrc:67890	[RFC5576] [RFC7022]
cname:axzo1278npDlAzM73	Camera-2,Encoding-1 SSRC with Session CNAME
a=ssrc:56789	[RFC5576] [RFC7022]
cname:axzo1278npDlAzM73	Camera-2,Encoding-2 SSRC with Session CNAME
a=sendonly	[RFC3264] - Send only video stream
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:101 nack	[RFC5104]
a=rtcp-fb:101 nack pli	[RFC5104]
a=rtcp-fb:101 ccm fir	[RFC5104]
a=rtcp-fb:102 nack	[RFC5104]
a=rtcp-fb:102 nack pli	[RFC5104]
a=rtcp-fb:102 ccm fir	[RFC5104]

a=rtcp-rsize	[RFC5506]

Table 26: 5.3.1 SDP 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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m0	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=rtcp-fb:109 nack	[RFC5104]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:22222	[RFC5576]
cname:y8/C90alEocUG1f0fcg	
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47ef babd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a: 97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 2 UDP 694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.4 rport 49203	[RFC5245]

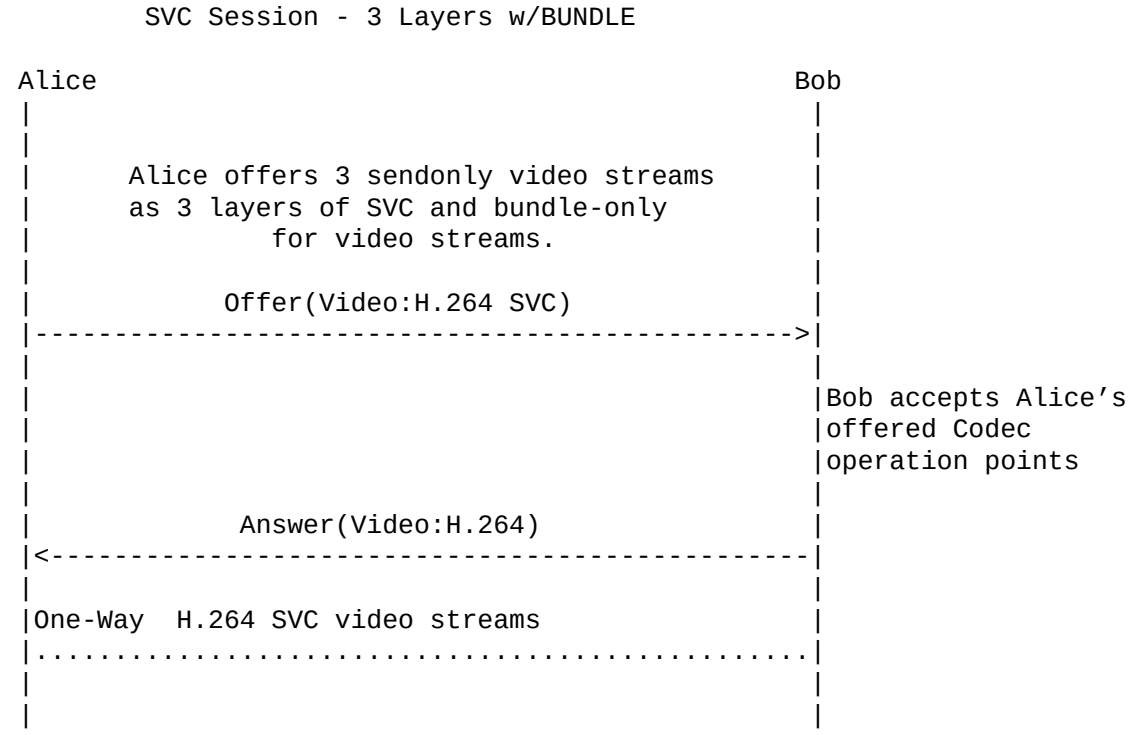
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 98 100	BUNDLE accepted with port repeated from the audio port
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=imageattr:98 [x=1280,y=720]	[RFC6236]Camera-1,Encoding-1 Resolution
a=fmtp:98 max-fr=30	[RFC4566]
a=imageattr:100 [x=640,y=480]	[RFC6236] Camera-1,Encoding-2 Resolution
a=fmtp:100 max-fr=15	[RFC4566]
a=recvonly	[RFC3264] - receive only video stream
a=simulcast: recv 98;100	[I-D.ietf-mmusic-sdp-simulcast]
a=ssrc:54321 cname:y8/C90alEocUG1f0fcg	[RFC5576]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47ef babd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.4 rport 60065	[RFC5245]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5576]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-rsize	[RFC5506]
m=video 54609 UDP/TLS/RTP/SAVPF 101 102	BUNDLE accepted with port repeated from the audio port
c=IN IP4 98.248.92.77	[RFC4566]
a=rtcp:56503 IN IP4 98.248.92.77	[RFC3605]
a=msid:ma tc	Identifies RTCMediaStream ID (ma) and

	RTCMediaStreamTrack ID (tc)
a=mid:m2	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:101 H264/90000	[RFC3984]
a=rtpmap:102 H264/90000	[RFC3984]
a=recvonly	[RFC3264]
a=fmtp:101 profile-level-id=4d0028 ;packetization-mode=1;max-fr=30	[RFC3984]
a=fmtp:102 profile-level-id=4d0028 ;packetization-mode=1;max-fr=15	[RFC3984]
a=simulcast: recv 101;102	[I-D.ietf-mmusic-sdp-simulcast] Bob accepts to receieve the offered simulcast streams
a=ssrc:90876 cname:axzo1278npDlAzM73	[RFC5576]
a=ice-ufrag:ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47ef babd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a: 97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5576]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-rsize	[RFC5506]

Table 27: 5.3.1 SDP Anwer

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.



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m0	[RFC5888] Audio m=line part of

	BUNDLE group with a unique port number
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=sendonly	[RFC3264]
a=rtcp-fb:109 nack	[RFC5104]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=ssrc:67890 cname:axzo1278npDlAzM73	[RFC5576]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 96 97 100	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tc)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m1	[RFC5888] Audio m=line part of BUNDLE group
a=msid:ma tb	
a=rtpmap:96 H264/90000	[RFC3984]
a=fmtp:96 profile-level-id=4d0028; packetization-mode=1 ;max-fr=30;max-fs=8040	[RFC3984]H.264 Layer 1
a=rtpmap:97 H264/90000	[RFC3984]
a=fmtp:97 profile-level-id=4d0028;packetization-mode=1; max-fr=15;max-fs=1200	[RFC3984] H.264 Layer 2

a=rtpmap:100 H264-SVC/90000	[RFC3984]
a=fmtp:100 profile-level-id=4d0028;packetization-mode=1; max-fr=30;max-fs=8040	[RFC3984]
a=depend:100 lay m1:96,97;	[RFC5583]Layer 3 dependent on layers 1 and 2
a=sendonly	[RFC3264] - Send only video stream
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=ssrc:1732846380 cname:axzo1278npDlAzM73	[RFC5576]
a=ssrc:1732846381 cname:axzo1278npDlAzM73	[RFC5576]
a=ssrc:1732846382 cname:axzo1278npDlAzM73	[RFC5576]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 28: 5.3.2 SDP Offer with SVC

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m0	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]

a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.5 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 54609 UDP/TLS/RTP/SAVPF 96 100	BUNDLE accepted Bundle address same as audio m=line.
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:56503 IN IP4 98.248.92.77	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:96 H264/90000	[RFC3984]
a=fmtp:96 profile-level-id=4d0028;packetization-mode=1; max-fr=30;max-fs=8040	[RFC3984]H.264 Layer 1
a=rtpmap:100 H264-SVC/90000	[RFC3984]
a=fmtp:100 profile-level-id=4d0028;packetization-mode=1; max-fr=30;max-fs=8040	[RFC3984]
a=depend:100 lay m1:96;	[RFC5583] Bob chooses 2 Codec Operation points
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.5 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.142 64678 typ srflx raddr 192.168.1.5 rport 64678	[RFC5245]
a=recvonly	[RFC3264] - Receive only video stream
a=setup:active	[RFC4145]

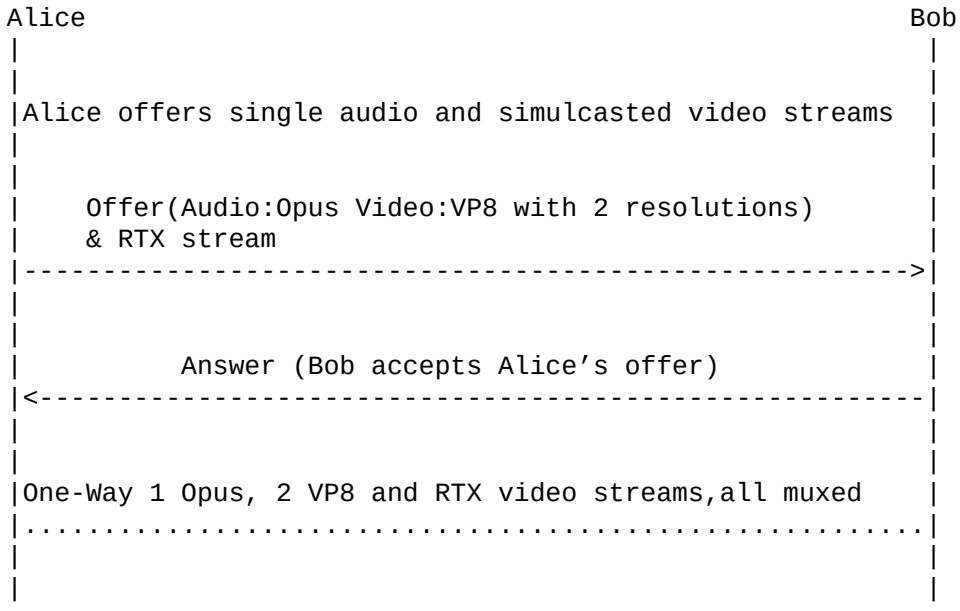
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=ssrc:4638117328	[RFC5576]
cname:axzo1278npDlAzM73	
a=rtcp-rsize	[RFC5506]

Table 29: 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 2 two resolutions and has [RFC4588] style re-transmission flows.

Simulcast Streams with Retransmission



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]

a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m0	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=sendonly	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:11111 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack

	ID (tb)
a=rtcp:64678 IN IP4	[RFC3605]
24.23.204.141	
a=mid:m1	[RFC5888]
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:103 VP8/90000	[I-D.ietf-payload-vp8]
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=3000	[RFC4588]
a=fmtp:103 apt=100;rtx-time=3000	[RFC4588]
a=simulast: send 98;100	[I-D.ietf-mmusic-sdp-simulcast]
	]
a=ssrc-group:FID 12345 34567	[RFC5888]
a=ssrc-group:FID 78990 90887	[RFC5888]
a=ssrc:12345	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:78990	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:34567	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:90887	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=sendonly	[RFC3264]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 30: 5.3.3 SDP Offer w/Simulcast, RTX

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-ne
	gotiation] Alice supports
	grouping of m=lines under
	BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]

m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m0	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:33333 cname:L/HmN4Xa5NWs1ao1	[RFC5576]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 64678 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 98 100 101 103	BUNDLE accepted with Bundle address identical to audio m-line
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:103 VP8/90000	[I-D.ietf-payload-vp8]
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=3000	[RFC4588]
a=fmtp:103 apt=100;rtx-time=3000	[RFC4588]

a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7: 70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.772 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=simulcast: recv 98;100	[I-D.ietf-mmusic-sdp-simulcast]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

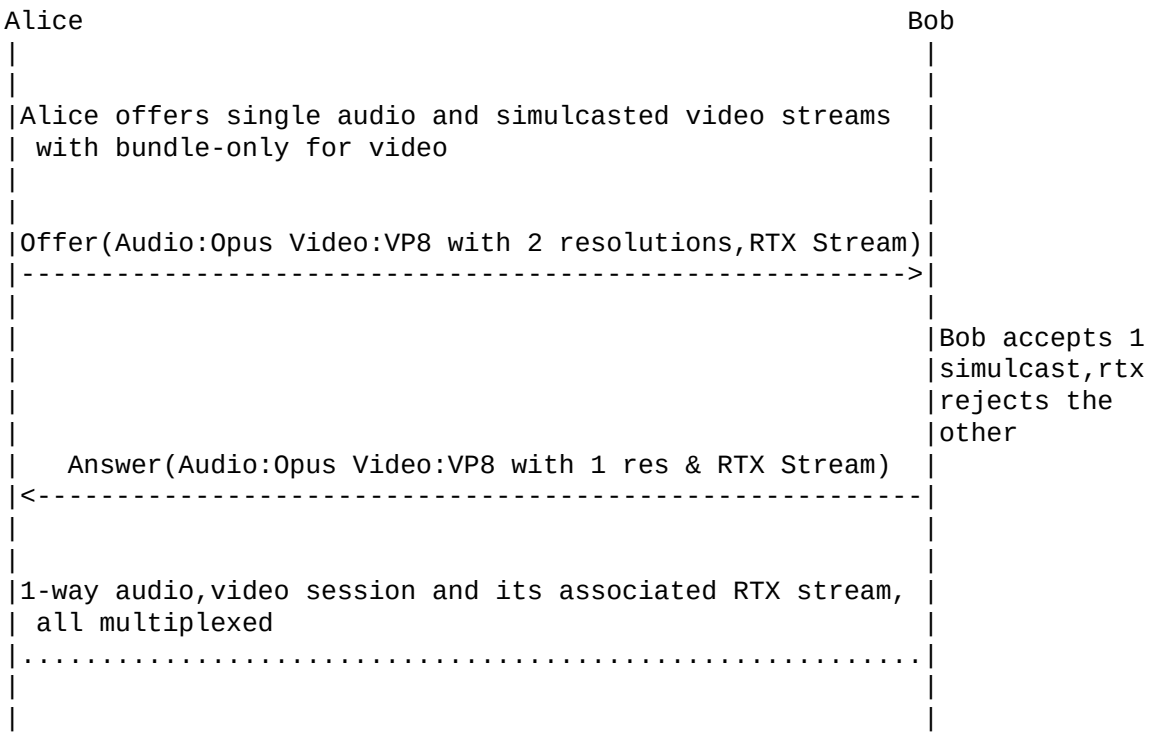
Table 31: 5.3.3 SDP Answer w/Simulcast, RTX

5.3.4. Successful 1-way Simulcast Sessio 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 when Bob rejects one of the Simulcast Video Stream which results in the rejection of the associated repair stream implicitly.

Simulcast Streams with Retransmission Rejected



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4	[RFC3605]

24.23.204.141	
a=mid:m0	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=sendonly	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:11111	[RFC5576]
cname:LP/NWs1ao1HmN4Xa5	
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m1	[RFC5888]
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:103 VP8/90000	[I-D.ietf-payload-vp8]
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=3000	[RFC4588]
a=fmtp:103 apt=100;rtx-time=3000	[RFC4588]
a=simulcast: send 98;100	[I-D.ietf-mmusic-sdp-simulcast]

a=ssrc-group:FID 12345 34567	[RFC5888]
a=ssrc-group:FID 78990 90887	[RFC5888]
a=ssrc:12345	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:78990	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:34567	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=ssrc:90887	[RFC5576]
cname:Q/NWs1ao1HmN4Xa5	
a=sendonly	[RFC3264]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 32: 5.3.4 SDP Offer w/Simulcast, RTX

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:49203 IN IP4 98.248.92.77	[RFC3605]
a=mid:m0	[RFC5888]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]

a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 98 101	BUNDLE accepted with Bundle address identical to audio m-line
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m1	[RFC5888]
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 VP8/90000	[I-D.ietf-payload-vp8]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:101 apt=98;rtx-time=3000	[RFC4588]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3 474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.5 rport 60065	[RFC5245]
a=simulcast: recv 98	[I-D.ietf-mmusic-sdp-simulcast] Bob accepts only one simulcast resolution
a=ssrc:54321 cname:NWs1ao1HmN4Xa5	[RFC5576]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-rsize	[RFC5506]

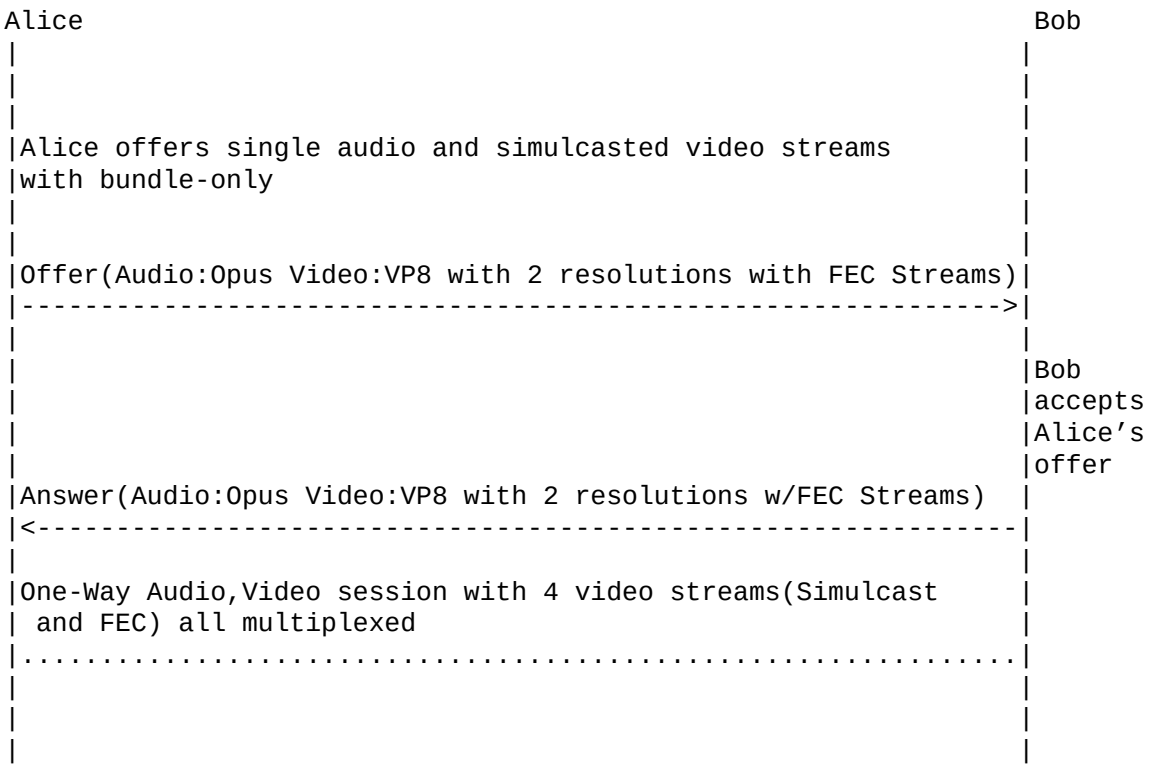
Table 33: 5.3.4 SDP Answer no Simulcast

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 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



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]

a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation]	Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]	
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]	
c=IN IP4 24.23.204.141	[RFC4566]	
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)	
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]	
a=mid:m0	[RFC5888]	
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]	
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]	
a=ptime:20	[I-D.ietf-payload-rtp-opus]	
a=rtcp-fb:109 nack	[RFC5104]	
a=sendonly	[RFC3264]	
a=setup:actpass	[RFC4145]	
a=rtcp-mux	[RFC5761]	
a=ssrc:11111	[RFC5576]	
cname:Q/NWs1ao1HmN4Xa5		
a=ice-ufrag:074c6550	[RFC5245]	
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]	
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]	
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]	
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]	
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]	
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]	
a=rtcp-rsize	[RFC5506]	
m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103	bundle-only video line with port number set to zero	
c=IN IP4 24.23.204.141	[RFC4566]	
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)	
a=rtcp:64678 IN IP4	[RFC3605]	

24.23.204.141	
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 1d-interleaved-parityfec/90000	[RFC5956]
a=rtpmap:103 1d-interleaved-parityfec/90000	[RFC5956]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:100 max-fr=15;max-fs=1200	[RFC4566]
a=fmtp:101 L=5; D=10; repair-window=200000	[RFC5956]
a=fmtp:103 L=5; D=10; repair-window=200000	[RFC5956]
a=simulcast: send 98;100	[I-D.ietf-mmusic-sdp-simulcast]
a=depend:98 fec m1:101	TBD
a=depend:100 fec m1:103	TBD
a=ssrc-group:FEC-FR 12345 34567	[RFC5888]
a=ssrc-group:FEC-FR 78990 90887	[RFC5888]
a=ssrc:12345 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=ssrc:78990 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=ssrc:34567 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=ssrc:90887 cname:Q/NWs1ao1HmN4Xa5	[RFC5576]
a=sendonly	[RFC3264]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 34: 5.3.5 SDP 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=msid-semantic:WMS m0	[I-D.ietf-mmusic-msid]

a=group:BUNDLE m0 m1	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m0	[RFC5888] Audio m=line part of BUNDLE group with a unique port number
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ssrc:33333	[RFC5576]
cname:Y9/cZke09JAtpl98	
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d: 1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 49203 UDP/TLS/RTP/SAVPF 98 100 101 103	BUNDLE accepted with Bundle Address identical to audio m=line.
c=IN IP4 98.248.92.77	[RFC4566]
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:101 1d-interleaved-	[RFC5956]

parityfec/90000	
a=rtpmap:103 1d-interleaved-parityfec/90000	[RFC5956]
a=fmtp:98 max-fr=30;max-fs=8040	[RFC4566]
a=fmtp:100 max-fr=15;max-fs=1200	[RFC4566]
a=fmtp:101 L=5; D=10; repair-window=200000	[RFC5956]
a=fmtp:103 L=5; D=10; repair-window=200000	[RFC5956]
a=simulcast: recv 98;100	[I-D.ietf-mmusic-sdp-simulcast]
a=depend:98 fec m1:101	TBD
a=depend:100 fec m1:103	TBD
a=recvonly	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=bundle-only	[UNIFIED-PLAN]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-fb:* nack	[RFC5104]
a=rtcp-fb:* nack pli	[RFC5104]
a=rtcp-fb:* ccm fir	[RFC5104]
a=rtcp-rsize	[RFC5506]

Table 35: 5.3.5 SDP Answer

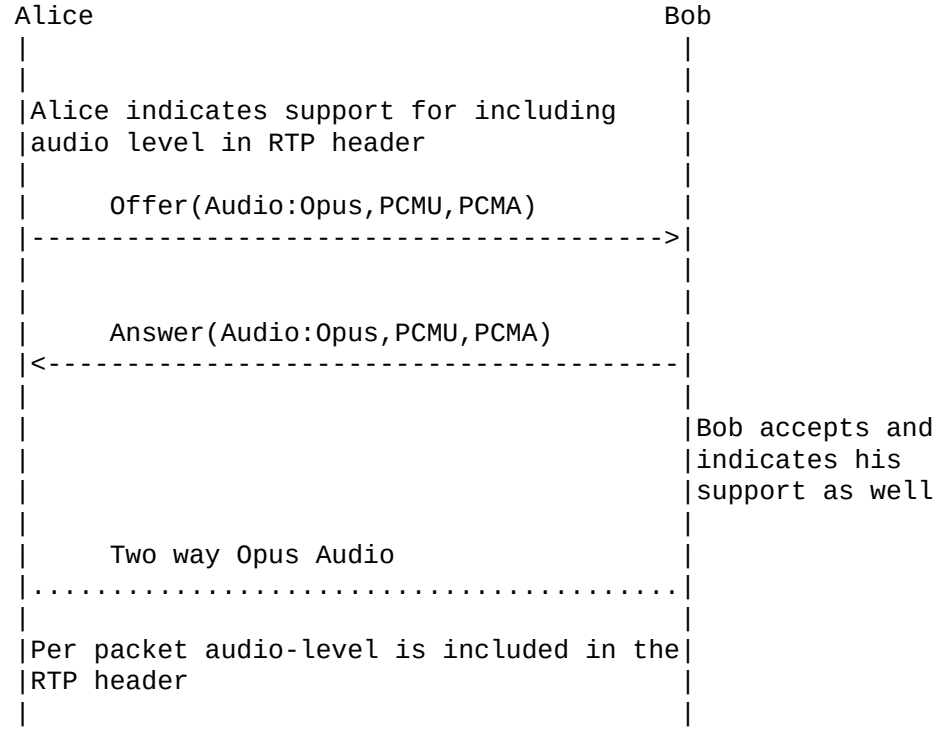
5.4. Others

The examples in the section provide SDP for a variety of scenarios related to RTP Header extension, 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



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20518 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]

a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtpmap:0 PCMU/8000	[RFC3551]
a=rtpmap:0 PCMA/8000	[RFC3551]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:* nack	[RFC5104]
a=ssrc:11111	[RFC5576]
cname:QCL/1HmN4Xa5CClapa	
a=rtcp-rsize	[RFC5506]

Table 36: 5.4.1 SDP Offer

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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 98	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]

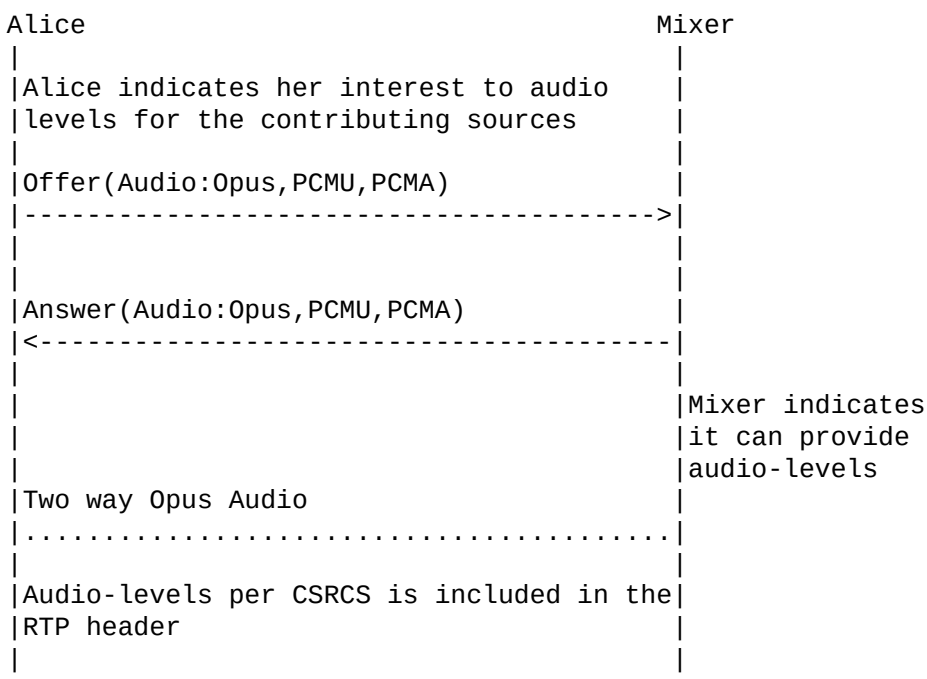
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus] - Bob accepts only Opus Codec
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:0 PCMA/8000	[RFC3551] PCMA Audio Codec
a=rtcp-fb:* nack	[RFC5104]
a=sendrecv	[RFC3264] - Bob can send and recv audio
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761] - Bob can perform RTP/RTCP Muxing on port 49203
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d4 7efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83: 4a:97:0e:1f:ef:6d:f7:c9:c7:70: 9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:1732846380 cname:EocUG1f0fcg/yvY7	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 37: 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



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=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=extmap:1/recvonly	[RFC6465]

urn:ietf:params:rtp-hdrext:csrc-audio-level	
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:0 PCMA/8000	[RFC3551] PCMA Audio Codec
a=rtcp-fb:* nack	[RFC5104]
a=sendrecv	[RFC3264] - Alice can send and recv audio
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=ssrc:11111 cname:QCL/1HmN4Xa5CClapa	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 38: 5.4.2 SDP Offer

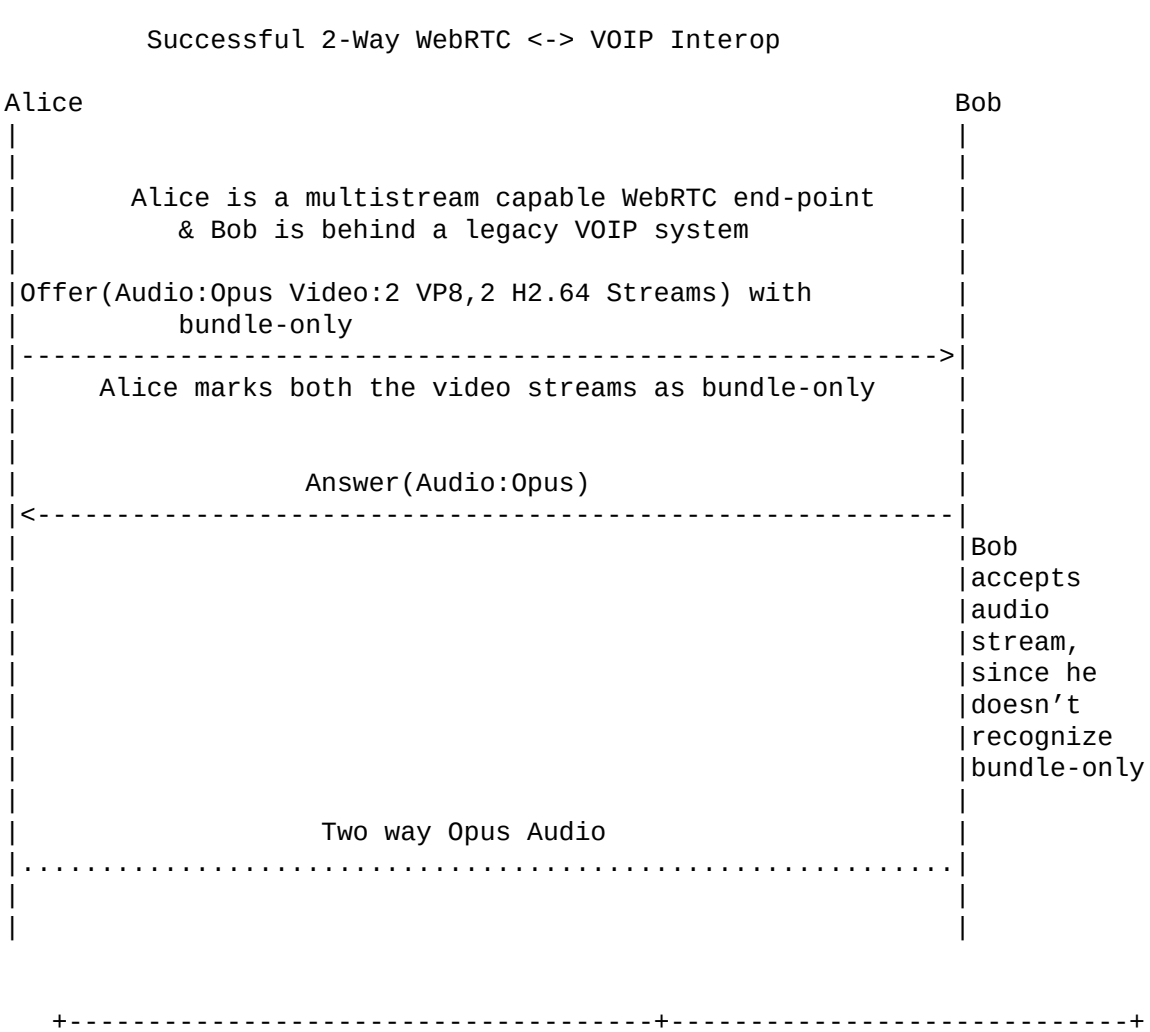
SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566] - Session Origin Information
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE audio	[I-D.ietf-mmusic-sdp-bundle-negotiation]
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 98	[RFC4566]
c=IN IP4 98.248.92.77	[RFC4566]
a=mid:audio	[RFC5888]
a=msid:ma ta	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (ta)
a=rtcp:60065 IN IP4 98.248.92.77	[RFC3605]
a=extmap:1/sendonly urn:ietf:params:rtp-hdrext:csrc-audio-level	[RFC6465]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtpmap:0 PCMU/8000	[RFC3551] PCMU Audio Codec
a=rtpmap:0 PCMA/8000	[RFC3551] PCMA Audio Codec
a=rtcp-fb:* nack	[RFC5104]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=ssrc:2222 cname:HmN4Xa5CC/lapa	[RFC5576]
a=rtcp-rsize	[RFC5506]

Table 39: 5.4.2 SDP Answer

5.4.3. Successful legacy Interop Fallaback 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,

- Offer from Alice describes 2 cameras via 2 video m=lines with both marked as bundle-only.
- Since Bob doesnot recognize either the BUNDLE mechanism or the bundle-only attribute, he accepts only the audio stream from Alice.



SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 20519 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=msid-semantic:WMS ma	[I-D.ietf-mmusic-msid]
a=group:BUNDLE m0 m1 m2	[I-D.ietf-mmusic-sdp-bundle-negotiation] Alice supports grouping of m=lines under BUNDLE semantics
a=ice-options:trickle	[I-D.ietf-mmusic-trickle-ice]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
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=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=sendrecv	[RFC3264]
a=setup:actpass	[RFC4145]
a=rtcp-mux	[RFC5761]
a=ice-ufrag:074c6550	[RFC5245]
a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=ssrc:11111	[RFC5576]E

cname:axzo1278npDlAzM73	
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 98 100	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m1	[RFC5888] Video m=line part of BUNDLE group
a=msid:ma tb	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tb)
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=imageattr:98 [x=1280,y=720]	[RFC6236]
a=fmtp:98 max-fr=30	[RFC4566]
a=ssrc:12345	[RFC5576]
cname:axzo1278npDlAzM73	
a=bundle-only	[UNIFIED-PLAN]
a=sendrecv	[RFC3264]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 101 103	bundle-only video line with port number set to zero
c=IN IP4 24.23.204.141	[RFC4566]
a=rtcp:64678 IN IP4 24.23.204.141	[RFC3605]
a=mid:m2	[RFC5888] Video m=line part of BUNDLE group
a=msid:ma tc	Identifies RTCMediaStream ID (ma) and RTCMediaStreamTrack ID (tc)
a=rtpmap:101 H264/90000	[RFC3984]
a=rtpmap:103 H264/90000	[RFC3984]
a=fmtp:101 profile-level-id=4d0028 ;packetization-mode=1;max-fr=30	[RFC3984]Camera-2,Encoding-1 Resolution
a=ssrc:67890	[RFC5576]
cname:axzo1278npDlAzM73	
a=bundle-only	[UNIFIED-PLAN]
a=sendrecv	[RFC3264]
a=rtcp-rsize	[RFC5506]

Table 40: 5.4.3 SDP Simulcast bundle-only

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

m=audio 49203 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=rtcp:60065 IN IP4 24.23.204.141	[RFC3605]
a=rtpmap:109 opus/48000/2	[I-D.ietf-payload-rtp-opus]
a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level	[RFC6464]
a=ptime:20	[I-D.ietf-payload-rtp-opus]
a=rtcp-fb:109 nack	[RFC5104]
a=sendrecv	[RFC3264]
a=setup:active	[RFC4145]
a=ice-ufrag:ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
a=rtcp-rsize	[RFC5506]
m=video 0 UDP/TLS/RTP/SAVPF 98 100	Bob doesn't recognize bundle-only and hence rejects the video stream
c=IN IP4 98.248.92.77	[RFC4566]
a=rtpmap:98 VP8/90000	[I-D.ietf-payload-vp8]
a=rtpmap:100 VP8/90000	[I-D.ietf-payload-vp8]
a=imageattr:98 [x=1280,y=720]	[RFC6236]
a=fmtp:98 max-fr=30	[RFC4566]
m=video 0 UDP/TLS/RTP/SAVPF 98 100	Bob doesn't recognize bundle-only and hence rejects the video stream
c=IN IP4 98.248.92.77	[RFC4566]
a=rtpmap:101 H264/90000	[RFC3984]
a=fmtp:101 profile-level-id=4d0028;packetization-mode=1;max-fr=30	[RFC3984]Camera-2,Encoding-1 Resolution

Table 41: 5.4.3 SDP Anwer

5.4.4. Legacy Interop with RTP/AVP profile

In this section, we attempt to provide session descriptions showcasing inter-operability between a WebRTC end-point and a Legacy VOIP end-point. The ideas included in here are not fully baked into the standards and might be controversial in nature. The hope here is to demonstrate a plausible SDP composition to enchance seamless inter-operability between the aforementioned communication systems.

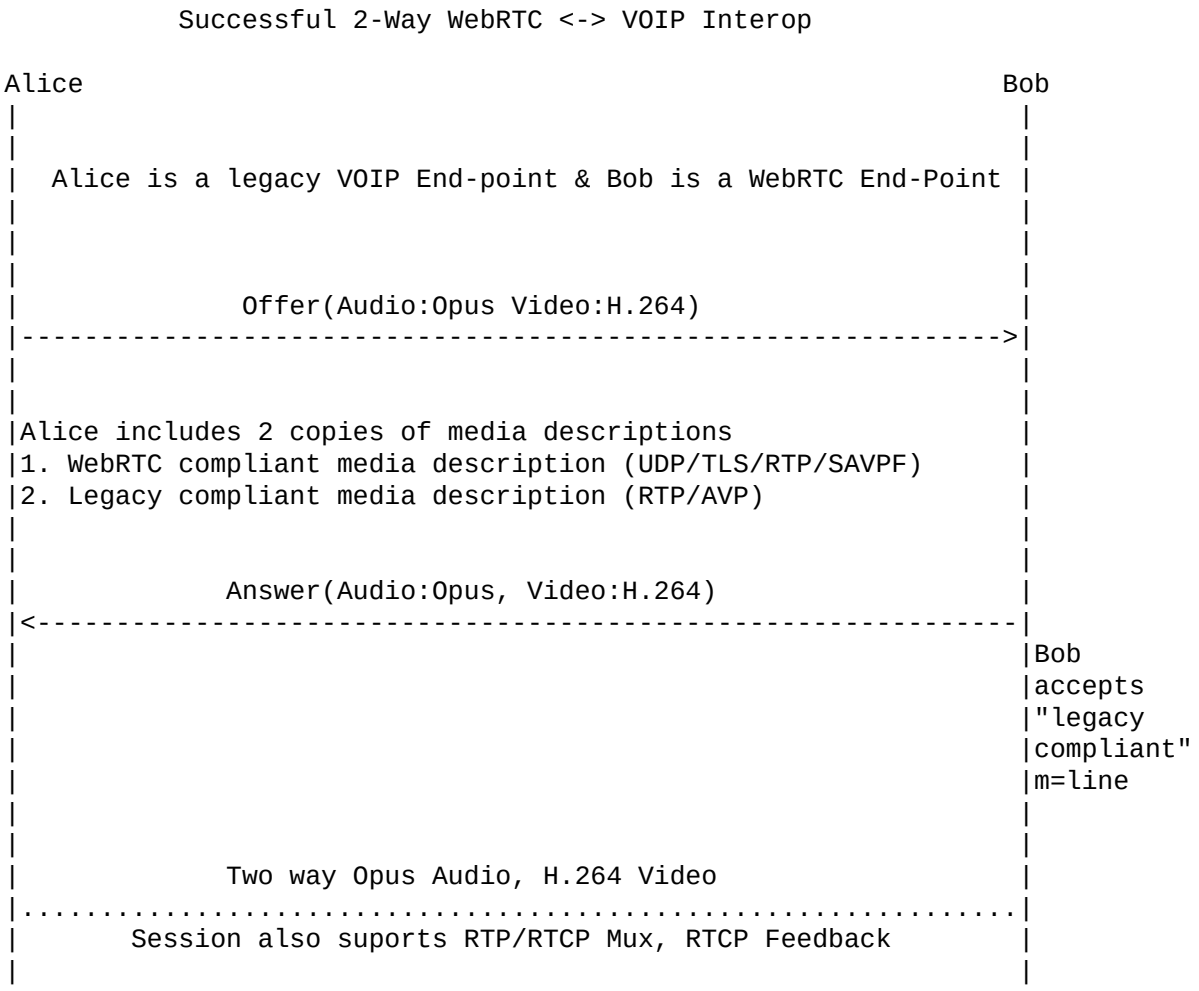
In the scenario desribed below, Alice is a legacy end-point which sends [RFC3264] Offer with two sets of media descriptions per media type.

One set that correponds to [WebRTC] compliant UDP/TLS/RTP/SAVPF based audio and video descriptions.

Another set with RTP/AVP based audio and video descriptions for the legacy Interop purposes.

Also to note, Alice includes session level DTLS information and media level RTCP feedback information as applicable to both the sets of media descriptions

On the other hand, Bob being a WebRTC end-point, recognizes accepts the media descriptions with RTP/AVP profile. The security and feedback requirements for the session are either handled by a intermediate gateway or with some combination of Alice’s capabilities and the intermediate gateway.



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=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:e	[RFC5245]
f:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	
a=rtcp-rsize	[RFC5506]
m=audio 54609 UDP/TLS/RTP/SAVPF 109	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=rtpmap:109 opus/48000	

a=ptime:20	
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761]
a=candidate:0 1 UDP 2113667327 192.168.1.4 54609 typ host	[RFC5245]
a=candidate:1 1 UDP 694302207 24.23.204.141 54609 typ srflx raddr 192.168.1.4 rport 54609	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]
m=video 62537 UDP/TLS/RTP/SAVPF 120	[RFC4566]
c=IN IP4 24.23.204.141	[RFC4566]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761]
a=candidate:0 1 UDP 2113667327 192.168.1.4 62537 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 24.23.204.141 62537 typ srflx raddr 192.168.1.4 rport 62537	[RFC5245]
a=candidate:0 2 2113667326 192.168.1.4 54721 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 24.23.204.141 54721 typ srflx raddr 192.168.1.4 rport 54721	[RFC5245]
a=rtcp-fb:120 nack pli	[RFC5104]
a=rtcp-fb:120 ccm fir	[RFC5104]
---	These set of media descriptions are for Legacy Inter-op purposes
m=audio 54732 RTP/AVP 109	[RFC4566]Alice includes RTP/AVP audio stream description
c=IN IP4 24.23.204.141	[RFC4566]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:7f:7d:f9:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=rtpmap:109 opus/48000	
a=ptime:20	
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761]Alice still includes RTP/RTCP Mux support
a=candidate:0 1 UDP 2113667327 192.168.1.4	[RFC5245]

54732 typ host a=candidate:1 1 UDP 694302207 24.23.204.141 54732 typ srflx raddr 192.168.1.4 rport 54732 a=candidate:0 2 UDP 2113667326 192.168.1.4 64678 typ host a=candidate:1 2 UDP 1694302206 24.23.204.141 64678 typ srflx raddr 192.168.1.4 rport 64678	[RFC5245]
a=rtcp-fb:109 nack	[RFC5104]She adds her intent for NACK RTCP feedback support
m=video 62445 RTP/AVP 120	[RFC4566]Alice includes RTP/AVP video stream description
c=IN IP4 24.23.204.141	[RFC4566]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:ef:7d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload-vp8]
a=sendrecv	[RFC3264]
a=rtcp-mux	[RFC5761]Alice intends to perform RTP/RTCP Mux
a=candidate:0 1 UDP 2113667327 192.168.1.4 62445 typ host a=candidate:1 1 UDP 1694302207 24.23.204.141 62537 typ srflx raddr 192.168.1.4 rport 62445 a=candidate:0 2 2113667326 192.168.1.4 54721 typ host a=candidate:1 2 UDP 1694302206 24.23.204.141 54721 typ srflx raddr 192.168.1.4 rport 54721	[RFC5245]
a=rtcp-fb:120 nack pli	[RFC5104] Alice indicates support for Picture loss Indication and NACK RTCP feedback
a=rtcp-fb:120 ccm fir	[RFC5104]

Table 42: 5.4.5 SDP Offer

SDP Contents	RFC#/Notes
v=0	[RFC4566]
o=- 16833 0 IN IP4 0.0.0.0	[RFC4566]
s=-	[RFC4566]
t=0 0	[RFC4566]
a=ice-ufrag:c300d85b	[RFC5245]
a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2	[RFC5245]
a=fingerprint:sha-1 99:41:49:83:4a:97:0e:1f:e f:6d:f7:c9:c7:70:9d:1f:66:79:a8:07	[RFC5245]
m=audio 49203 RTP/AVP 109	[RFC4566] Bob accepts RTP/AVP based audio stream
c=IN IP4 98.248.92.77	[RFC4566]
a=rtpmap:109 opus/48000	
a=ptime:20	
a=sendrecv	[RFC3264]
a=candidate:0 1 UDP 2113667327 192.168.1.7 49203 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 49203 typ srflx raddr 192.168.1.7 rport 49203	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 60065 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 60065 typ srflx raddr 192.168.1.7 rport 60065	[RFC5245]
m=video 63130 RTP/SAVP 120	[RFC4566] Bob accepts RTP/AVP based video stram
c=IN IP4 98.248.92.771	[RFC4566]
a=rtpmap:120 VP8/90000	[I-D.ietf-payload -vp8]
a=sendrecv	[RFC3264]
a=candidate:0 1 UDP 2113667327 192.168.1.7 63130 typ host	[RFC5245]
a=candidate:1 1 UDP 1694302207 98.248.92.77 63130 typ srflx raddr 192.168.1.7 rport 63130	[RFC5245]
a=candidate:0 2 UDP 2113667326 192.168.1.7 56607 typ host	[RFC5245]
a=candidate:1 2 UDP 1694302206 98.248.92.77 56607 typ srflx raddr 192.168.1.7 rport 56607	[RFC5245]

Table 43: 5.4.5 SDP Answer

6. IANA Considerations

This document requires no actions from IANA.

7. Acknowledgments

We would like to thanks Justin Uberti, Chris Flo for their detailed review and inputs.

8. Change Log

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

Changes from draft-nandakumar-rtcweb-sdp-06 and draft-nandakumar-rtcweb-sdp-07

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

Changes from draft-nandakumar-rtcweb-sdp-05

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

Changes from draft-nandakumar-rtcweb-sdp-04

- Interim version of the draft to avert expiry
- Corrected placement of c= line as per RFC4566
- Updated simulcast SDP to reflect draft-westerlund-avtcore-rtp-simulcast-04

Changes from draft-nandakumar-rtcweb-sdp-03

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

Changes from draft-nandakumar-rtcweb-sdp-02

- Major refactoring was done to group the examples in to categories

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

Changes from draft-nandakumar-rtcweb-sdp-01

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

Changes from draft-nandakumar-rtcweb-sdp-00

- Fixed editorial comments on the mailing list.
- Updated Data-channel SDP information based on draft-ietf-mmusic-sctp-sdp.
- Updated BUNDLE examples based on draft-ietf-mmusic-sdp-bundle-negotiation.
- Added examples for few more BUNDLE variants
- Added new examples for Simulcast and SVC

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