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## Annotated Example SDP for WebRTC draft-ietf-rtcweb-sdp-14

### Abstract

The Web Real Time Communications (WebRTC) family of protocols defines mechanism for direct interactive rich communication using audio, video, and data between two peers' web browsers. With in the WebRTC framework, the Session Description Protocol (SDP) is used for negotiating session capabilities between the peers. Such a negotiation happens based on the SDP offer/answer exchange mechanism

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

This document makes no changes to the SDP offer/answer exchange mechanism.

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Internet-Draft

SDP4WebRTC

December 2020

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## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction</a>	<a href="#">3</a>
<a href="#">2.</a>	<a href="#">Terminology</a>	<a href="#">3</a>
<a href="#">3.</a>	<a href="#">SDP and WebRTC</a>	<a href="#">3</a>
<a href="#">4.</a>	<a href="#">Offer/Answer and the WebRTC</a>	<a href="#">6</a>
<a href="#">5.</a>	<a href="#">WebRTC Session Description Examples</a>	<a href="#">6</a>
<a href="#">5.1.</a>	<a href="#">Some Conventions</a>	<a href="#">7</a>
<a href="#">5.2.</a>	<a href="#">Basic Examples</a>	<a href="#">9</a>
<a href="#">5.2.1.</a>	<a href="#">Audio Only Session</a>	<a href="#">9</a>
<a href="#">5.2.2.</a>	<a href="#">Audio/Video Session</a>	<a href="#">13</a>
<a href="#">5.2.2.1.</a>	<a href="#">IPv4 Audio/Video Session</a>	<a href="#">14</a>
<a href="#">5.2.2.2.</a>	<a href="#">Dual Stack Audio/Video Session</a>	<a href="#">19</a>
<a href="#">5.2.3.</a>	<a href="#">Data-only Session</a>	<a href="#">24</a>
<a href="#">5.2.4.</a>	<a href="#">Audio Call On Hold</a>	<a href="#">26</a>
<a href="#">5.2.5.</a>	<a href="#">Audio with DTMF Session</a>	<a href="#">30</a>
<a href="#">5.2.6.</a>	<a href="#">One-way Audio/Video Session - Document Camera</a>	<a href="#">34</a>
<a href="#">5.2.7.</a>	<a href="#">Audio, Video Session with BUNDLE Support Unknown</a>	<a href="#">39</a>
<a href="#">5.2.8.</a>	<a href="#">Audio, Video, and Data Session</a>	<a href="#">45</a>
<a href="#">5.2.9.</a>	<a href="#">Audio and Video Session with BUNDLE Unsupported</a>	<a href="#">50</a>
<a href="#">5.2.10.</a>	<a href="#">Audio, Video BUNDLED, but Data Not BUNDLED</a>	<a href="#">56</a>
<a href="#">5.2.11.</a>	<a href="#">Audio Only, Add Video to BUNDLE</a>	<a href="#">62</a>
<a href="#">5.3.</a>	<a href="#">MultiResolution, RTX, FEC Examples</a>	<a href="#">70</a>
<a href="#">5.3.1.</a>	<a href="#">Send-only Simulcast Session with 2 Cameras and 2 Encodings per Camera</a>	<a href="#">70</a>
<a href="#">5.3.2.</a>	<a href="#">Successful SVC Video Session</a>	<a href="#">78</a>
<a href="#">5.3.3.</a>	<a href="#">Successful Simulcast Video Session with Retransmission</a>	<a href="#">82</a>
<a href="#">5.3.4.</a>	<a href="#">Successful One-way Simulcast Session with 2 resolutions and RTX - One resolution rejected</a>	<a href="#">88</a>
<a href="#">5.3.5.</a>	<a href="#">Simulcast Video Session with Forward Error Correction</a>	<a href="#">93</a>
<a href="#">5.4.</a>	<a href="#">Others</a>	<a href="#">99</a>
<a href="#">5.4.1.</a>	<a href="#">Audio Session - Voice Activity Detection</a>	<a href="#">99</a>

5.4.2.	Audio Conference – Voice Activity Detection . . . . .	<a href="#">103</a>
5.4.3.	Successful Legacy Interop Fallback with bundle-only . . . . .	<a href="#">107</a>
5.4.4.	Legacy Interop with RTP/AVP profile . . . . .	<a href="#">112</a>
6.	IANA Considerations . . . . .	<a href="#">116</a>

7.	Security Considerations . . . . .	<a href="#">117</a>
8.	Acknowledgments . . . . .	<a href="#">117</a>
9.	Change Log . . . . .	<a href="#">117</a>
10.	Informative References . . . . .	<a href="#">121</a>
Appendix A.	Appendix . . . . .	<a href="#">126</a>
A.1.	JSEP SDP Attributes Checklist . . . . .	<a href="#">126</a>
A.1.1.	Common Checklist . . . . .	<a href="#">126</a>
A.1.2.	RTP Media Description Checklist . . . . .	<a href="#">127</a>
A.1.3.	Data Channel Media Description checklist . . . . .	<a href="#">129</a>
Authors' Addresses	. . . . .	<a href="#">129</a>

## [1.](#) Introduction

JavaScript Session Establishment Protocol (JSEP)

[[I-D.ietf-rtcweb-jsep](#)] specifies a generic protocol needed to generate [[RFC3264](#)] SDP offers and answers negotiated between the [[WebRTC](#)] peers for setting up, updating, and tearing down a WebRTC session. For this purpose, SDP is used 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 provide 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", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

Readers should be familiar with the terminology defined in [[RFC3264](#)] and in [[RFC7656](#)].

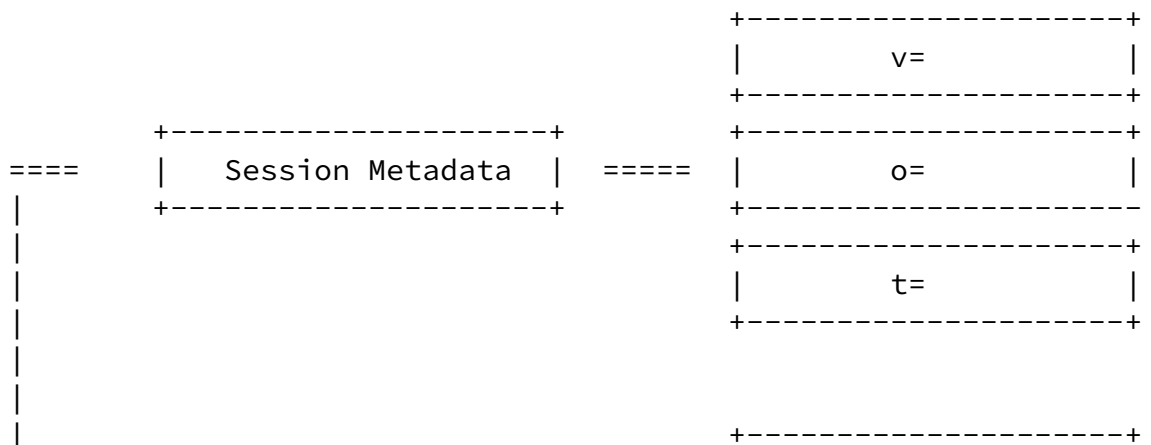
### 3. SDP and WebRTC

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 a multimedia session, which can contain audio, video, whiteboard, fax, modem, and other streams. SDP provides a general purpose, standard representation to describe various aspects of multimedia sessions 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.

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

Figure 1 introduces a 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.





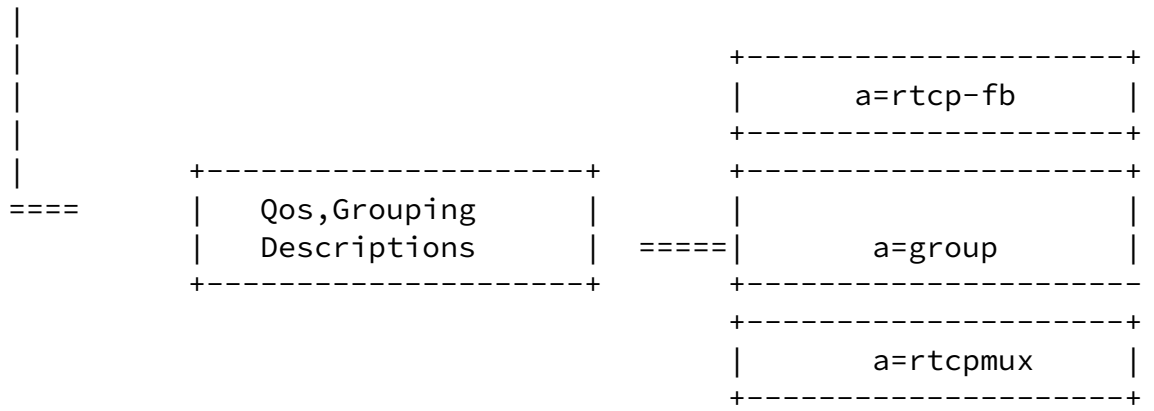


Figure 1: Semantic Components of SDP

[WebRTC] is architected in such a way that the design of the control plane is specified and implemented by the JavaScript application, 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 a participant's intention and capabilities required to successfully negotiate a session.

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

This section introduces the 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 to [[RFC3264](#)] for specific details on the protocol operations.

The offer/answer [[RFC3264](#)] model specifies rules for the bilateral

exchange of Session Description Protocol (SDP) messages for creation of multimedia streams. It defines a protocol with the involved participants exchanging desired session characteristics with each other constructed as SDP messages 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 provides a common view of the multimedia session between the participants.

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

## 5. WebRTC Session Description Examples

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

- \* 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 the ICE mechanism,
- \* Provides RTCP-based feedback mechanisms,
- \* Sessions can be over IPv4-only or IPv6-only or dual-stack based clients,

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

## [5.1.](#) Some Conventions

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

- \* In all the examples, Alice and Bob are assumed to be the WebRTC peers.
- \* It is assumed that for most of the examples, the support for [\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#) is established a priori either out-of-band or as a consequence of a successful offer/answer negotiation between Alice and Bob, unless explicitly stated otherwise.
- \* Call-flow diagrams that accompany the use cases capture only the prominent aspects of the system behavior and intentionally are not detailed, to improve readability.
- \* Even though the call-flow diagrams show 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 conform 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.
  - Visual markers/Empty lines in any SDP example are inserted to make functional divisions in the SDP clearer, and are not actually part of the SDP syntax.
  - Excepting the above two conventions, line endings are to be interpreted as <CR><LF> pairs (that is, a US-ASCII 13 followed by a US-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.

- \* The 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)
  - DTLS-SRTP Setup framework parameters (a=setup)
  - RTCP attribute (a=rtcp)
  - RTP header extension indicating audio-levels from client to the mixer

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

- \* The term "session" is used rather loosely in this document to refer to either a "communication session" or an "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.
- \* The IP Address:Port combinations '192.0.2.4:61665' (host) and '203.0.113.141:54609' (Server Reflexive) are typically used for Alice.
- \* The IP Address:Port combinations '198.51.100.7:51556' (host) and '203.0.113.77:49203' (Server Reflexive) are typically used for Bob.
- \* The IPv6 addresses 2001:db8:8101:3a55:4858:a2a9:22ff:99b9 and 2001:db8:30c:1266:5916:3779:22f6:77f7 are used to represent Alice and Bob's host addresses respectively.

- \* In actual use the values that represent SSRCs, ICE candidate foundations, WebRTC MediaStream, and MediaStreamTrack IDs values shall be much larger than and/or random in comparison to the ones shown in the examples.
- \* `tls-id` attribute values `89J2LRATQ3ULA24G9AHWVR31VJWSLB68` and `UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z` are used for Alice. The values `CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31` and `9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G` are used for Bob.
- \* `identity` attribute values are split across multiple lines to enhance readability, thus any line breaks and indentations in the value must be ignored.
- \* SDP attributes in the examples closely follow the checklist defined in [Appendix A.1](#).

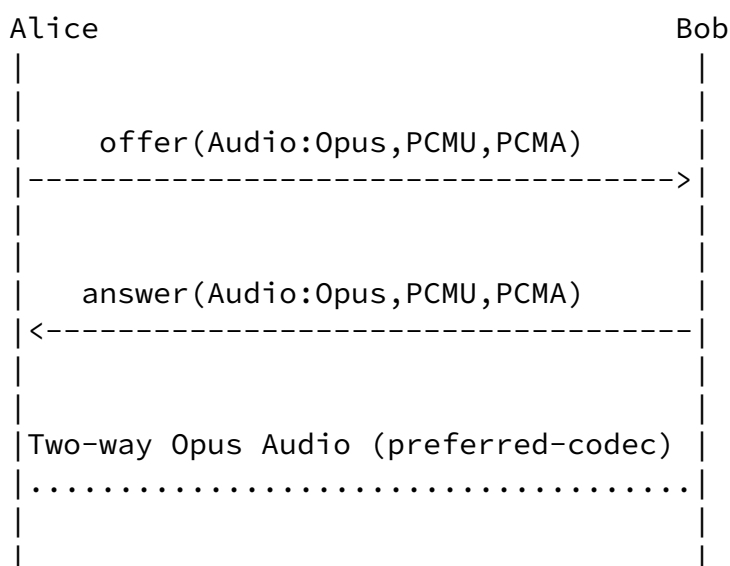
## [5.2](#). Basic Examples

### [5.2.1](#). Audio Only Session

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

This example also shows the endpoints being [\[RFC8445\]](#) compliant by including "ice2" ice-options attribute.

#### Two-way Audio Only Session



Internet-Draft

SDP4WebRTC

December 2020

```
+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|a=identity:eyJpZHAiOnsiZG9tYWluIjoibmlpZi5odSIiInByb3RvY29sIjoiaWRwLmh0bWwi
|W9uIjoizXlKaGJHY2lPaUpTVXpJMU5pSXNjb1I1Y0NjNkIrcFhVeUo5LmV5SmpiMjUwWlc1MGN5
|lpYSndjbWx1ZENJNlczc2lZV3huYjNKcGRHaHRJam9pYzJoaExUSTF0aUlzSW1ScFoyVnphQ0k2
|kl6T2pKR09rRXlPakF3T2pBd09qQkVPalV4T2tGRE9rUXlPalUwT2pZMU9rWTBPak5DT2pkRU9q
|E9qTXpPalV4T2pJek9qUXdPamN5T2preE9qZ3pPalZDT2pBeE9qSkdPalV3T2pjNE9qTkdJbjFk
|lJwZEhraU9pSnRhWE5wUUc1cGFhVhSFVpZlEuSTVQdGhKNFFDT05TOFVXd2500U3MEdaTDl3
|llmdlNVTtJ6Umd5R09WSGgzRmpnc2FPZklkRnFsNUx6azBFbndVOTNQ0ULCQ0xZWt1a3V1c0V1
|WFmdTJvZl9CTlZjUnB3MmdBdlNBbVR6Sl1tcEpqMFEtdmV0TmtVT1huZE9HLUIzT3ZGbzQwZVNE
|GduS3FSTkt0d3dacEZ1eUZZbFRodHJIdGNiT19WV3o4QnZpTThKS250dExWd1JxNUhMX2ZLTlRC
|XU1UEdwWDhXcXJMWc1ybm5YSFY3RnhoTTh5OHdrLWd5cnRZazVnbFlZeUFrcTVqZklSXzRzWER5
|XltenVGV3BQTzVFWlJYR0ZpRjFET0o4Q0Q3Z3Zta2dUdlBXSWpkemtBIn0=
+-----
|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8
+-----
|c=IN IP4 203.0.113.141
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
```

```
|a=sendrecv
|
+-----
|a=rtpmap:109 opus/48000/2
|
+-----
|a=rtpmap:0 PCMU/8000
+-----
```

```
|a=rtpmap:8 PCMA/8000
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
|
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=setup:actpass
|
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=rtcp-mux
|
+-----
|a=rtcp:60065 IN IP4 203.0.113.141
+-----
|a=rtcp-rsize
|
+-----
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
|
+-----
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
|
```

```
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.
|
+-----+
|a=candidate:0 2 UDP 2122194687 192.0.2.4 61667 typ host
|
+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.141 60065 typ srflx raddr 192.0.2.
|
+-----+
|a=end-of-candidates
+-----+
```

Table 1: 5.2.1 SDP Offer

```
+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|a=identity:ew0KICAiaWRwIjp7DQogICAgImRvbWFPbiI6ICJjaXNjb3NwYXJrLmNvbSIsDQog
|InByb3RvY29sIjogImRlZmF1bHQiDQogIH0sDQogICJhc3NlcnRpb24iOiAibEp3WkVocmFVOXB
|V0U1d1VvYzFjR0ZYV1hWaFNGVnBabEV1U1RWUWRHaEtORkZEVDAlVE9GVlhkMjVPT1VoM01FZGF
|ZDBSbGlZHUUnJUV3RGVw0KICAgICAgICAgICAgICBsbG1kbE5WVFRKNlVtZDVSMdLXU0dneJtcG5
|Wmts a1JuRnNOVXg2YXpCRmJuZFZPVE5RT1VsQ1EweFpPV3RpYTNWMMWmVjFTMjVZUkdWTkxUTkl
|ICAgICAgICAgICAgIFdGbWRUSnZabDlDVGxaaVvuQjNNbWRCZGx0QmJWUjZTbGx0Y0VvcU1GRXR
|VG10VlQxaHVartlITFVJelQzWkd iM1F3WlZORU5sWlNOVWRoYjJ3eWMNCiAgICAgICAgICAgICA
|UzNGU1RrdE9kM2RhY0VaMWVWVlpiRlJvZEHKSWRHTm lUMTlXVjNvNFFuWnBUVGhLUzI1T2RFeFd
|TlVoTVgyWkxUbFJD TnpGRFlrb3lXbWg1VyINCn0=
+=====+
```

|\*\*\*\*\* Audio m=line \*\*\*\*\*

+-----

|m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 8

+-----

|c=IN IP4 203.0.113.77

+-----

|a=mid:audio

+-----

|a=msid:ma ta

|

|

+-----

|a=sendrecv

+-----

|a=rtpmap:109 opus/48000/2

+-----

|a=rtpmap:0 PCMU/8000

+-----

|a=rtpmap:8 PCMA/8000

+-----

|a=maxptime:120

+-----

|a=ice-ufrag:05067423

|

+-----

|a=ice-pwd:1747d1ee3474a28a397a4c3f3af08a068

|

+-----

|a=fingerprint:sha-256

|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:

+-----

|a=setup:active

+-----

|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31

+-----

|a=rtcp-mux

|

+-----

|a=rtcp-rsize

|

+-----

```

|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
|
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host
|
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.10
|
+-----+
|a=end-of-candidates
+-----+

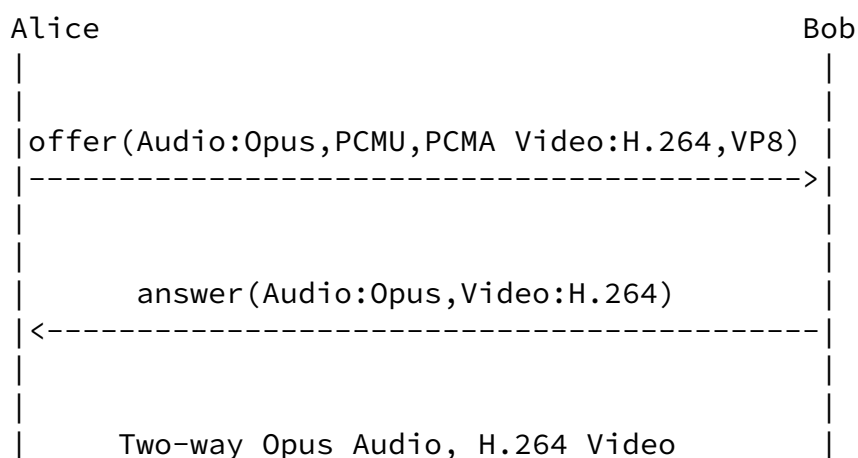
```

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.

#### Two-way Audio/Video Session



```
| ..... |
|
```

#### [5.2.2.1](#). IPv4 Audio/Video Session

This section shows the IPv4-only offer/answer exchange.

```
+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
+-----
|a=group:LS audio video
|
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8
+-----
|c=IN IP4 203.0.113.141
+-----
```

```
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
```



```

|
+-----
|a=rtpmap:109 opus/48000/2
|
+-----
|a=rtpmap:0 PCMU/8000
+-----
|a=rtpmap:8 PCMA/8000
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
|
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=setup:actpass
|
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=rtcp-mux
|
+-----
|a=rtcp-mux-only
+-----
|a=rtcp-rsize
|
+-----
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
|
+-----
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.

```

```

|
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 99 120
+-----
|c=IN IP4 203.0.113.141
+-----
|a=bundle-only
+-----
|a=mid:video
+-----
|a=msid:ma tb
|
+-----
|a=sendrecv
|
+-----
|a=rtpmap:99 H264/90000
+-----
|a=fmtp:99 profile-level-id=4d0028;packetization-mode=1
+-----
|a=rtpmap:120 VP8/90000
+-----
|a=rtcp-fb:99 nack
|
+-----
|a=rtcp-fb:99 nack pli
|
+-----
|a=rtcp-fb:99 ccm fir
|
+-----
|a=rtcp-fb:120 nack
|
+-----
|a=rtcp-fb:120 nack pli
|
+-----
|a=rtcp-fb:120 ccm fir
|
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----

```

Table 3: 5.2.2.1 SDP Offer

Internet-Draft

SDP4WebRTC

December 2020

```
+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
+-----
|a=group:LS audio video
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
|
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
|
+-----
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
```

```
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
```

```
+-----+
|a=rtcp-mux
|
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
|
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 3618095783 198.51.100.7 49203 typ host
|
+-----+
|a=candidate:1 1 UDP 565689203 203.0.113.77 49203 typ srflx raddr 198.51.100
|
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 99
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:99 H264/90000
```

```

|
+-----
|a=fmtp:99 profile-level-id=4d0028;packetization-mode=1
+-----
|a=rtcp-fb:99 nack
|
+-----
|a=rtcp-fb:99 nack pli
|
+-----
|a=rtcp-fb:99 ccm fir

```

```

|
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----

```

Table 4: 5.2.2.1 SDP Answer

#### [5.2.2.2.](#) Dual Stack Audio/Video Session

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

```

=====
|Offer SDP Contents
=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
+-----
|a=group:LS audio video
|
+-----
|a=ice-options:trickle
+-----

```

```

|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
|
+-----+
|a=rtpmap:109 opus/48000/2

```

```

|
+-----+
|a=rtpmap:0 PCMU/8000
+-----+
|a=rtpmap:8 PCMA/8000
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
|
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
|

```

```

+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
|
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
|
+-----+
|a=candidate:0 1 UDP 2122194687 2001:db8:8101:3a55:4858:a2a9:22ff:99b9 61665
|
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 99 120
+-----+
|c=IN IP4 203.0.113.141
+-----+

```

```

|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
|
+-----+
|a=rtpmap:99 H264/90000
+-----+
|a=fmtp:99 profile-level-id=4d0028;packetization-mode=1
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:99 nack
|

```

```

+-----+
|a=rtcp-fb:99 nack pli
|
+-----+
|a=rtcp-fb:99 ccm fir
|
+-----+
|a=rtcp-fb:120 nack
|
+-----+
|a=rtcp-fb:120 nack pli
|
+-----+
|a=rtcp-fb:120 ccm fir
|
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

```

Table 5: 5.2.2.2 SDP Offer

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-

```

```

+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio video
+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+

```



```

|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
|
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
|
+-----
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
|a=setup:active
+-----
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----
|a=rtcp-mux
|
+-----
|a=rtcp-mux-only
+-----
|a=rtcp-rsize
|

```

```

+-----
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

```

```

+-----+
|a=candidate:0 1 UDP 3618095783 198.51.100.7 49203 typ host
|
+-----+
|a=candidate:0 1 UDP 3618095783 2001:db8:30c:1266:5916:3779:22f6:77f7 49203
|
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 99
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:99 H264/90000
|
+-----+
|a=fmtp:99 profile-level-id=4d0028;packetization-mode=1
+-----+
|a=rtcp-fb:99 nack
|
+-----+
|a=rtcp-fb:99 nack pli
|
+-----+
|a=rtcp-fb:99 ccm fir
|
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

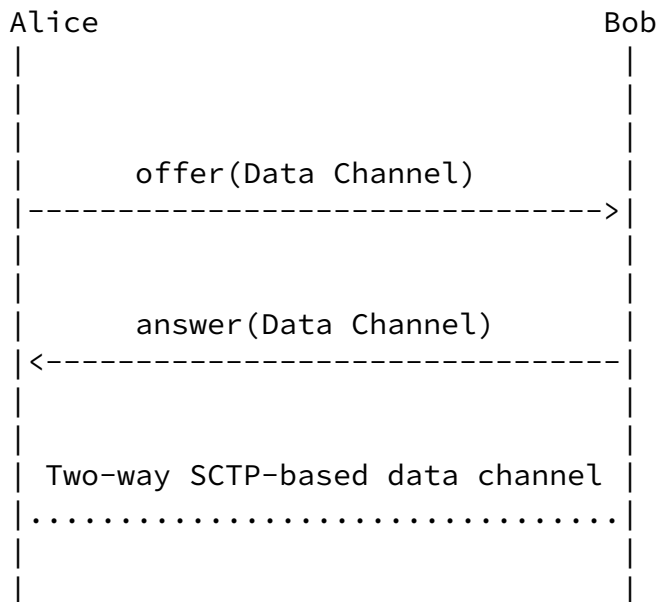
```

Table 6: 5.2.2.2 SDP Answer

### 5.2.3. Data-only Session

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

#### Two-way Data channel Session



```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE data
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Application m=line *****
+-----
|m=application 54609 UDP/DTLS/SCTP webrtc-datachannel
+-----
|c=IN IP4 203.0.113.141
+-----
  
```

Internet-Draft

SDP4WebRTC

December 2020

```

|a=mid:data
+-----
|a=sendrecv
|
+-----
|a=sctp-port:5000
+-----
|a=max-message-size:100000
+-----
|a=setup:actpass
|
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=ice-ufrag:074c6550
|
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----
|a=candidate:1 1 UDP 1694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.
+-----
|a=end-of-candidates
+-----

```

Table 7: 5.2.3 SDP Offer

```

+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----
|s=-
+-----

```

```

|t=0 0
+-----+
|a=group:BUNDLE data
+-----+
|***** Application m=line *****
+-----+

```

```

|m=application 49203 UDP/DTLS/SCTP webrtc-datachannel
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:data
+-----+
|a=sendrecv
|
+-----+
|a=sctp-port:5000
+-----+
|a=max-message-size:100000
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=ice-ufrag:c300d85b
|
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
|
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+

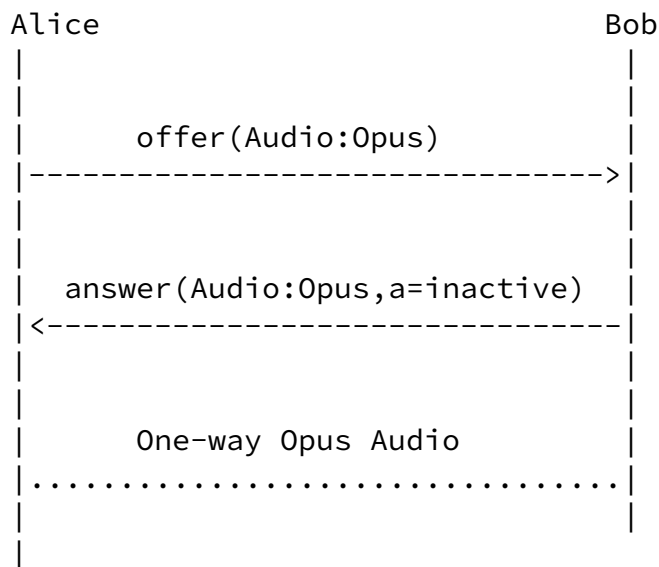
```

Table 8: 5.2.3 SDP Answer

#### [5.2.4.](#) Audio Call On Hold

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

#### Audio On Hold



```
+=====
|Offer SDP Contents
+-----+
|v=0
+-----+
|o=- 20518 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
```

```

|a=group:BUNDLE audio
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
|

```

```

+-----+
|a=rtpmap:109 opus/48000/2
|
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
|
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
|
+-----+

```

```

|a=rtcp-mux-only
+-----
|a=rtcp-rsize
+-----
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.
+-----
|a=end-of-candidates
+-----

```

Table 9: 5.2.4 SDP Offer

```

+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----

```

```

|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|

```



```

+-----+
|a=inactive
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:c300d85b
|
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
|
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
|
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host

```

```

|
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 49203 typ srflx raddr 198.51.1
|
+-----+
|a=end-of-candidates
+-----+

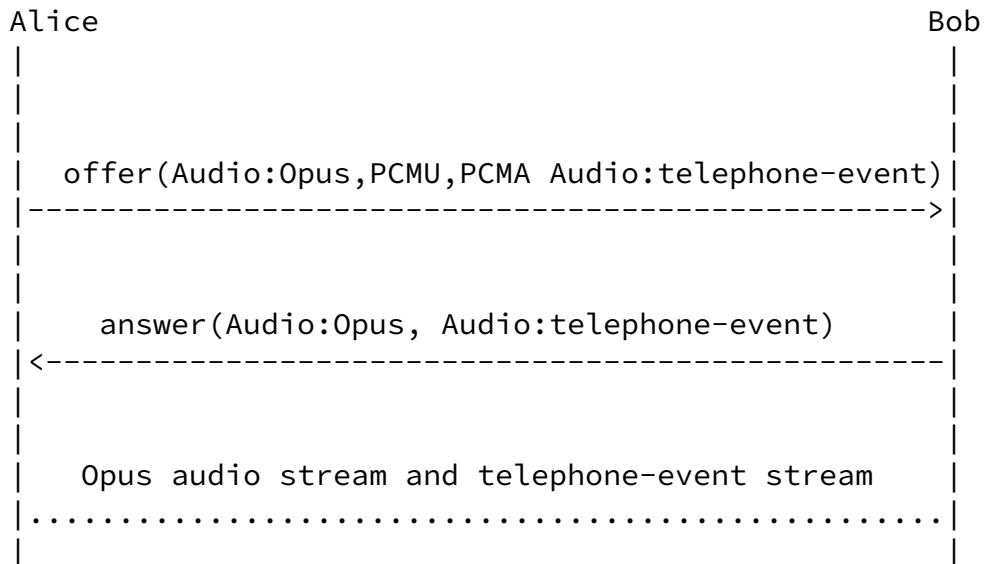
```

Table 10: 5.2.4 SDP Answer

### 5.2.5. Audio with DTMF Session

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

#### Audio Session with DTMF



```
+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
```

```
+-----
|a=group:BUNDLE audio dtmf
+-----
```

```

|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8
+-----
|c=IN IP4 203.0.113.141
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
|
+-----
|a=rtpmap:109 opus/48000/2
|
+-----
|a=rtpmap:0 PCMU/8000
+-----
|a=rtpmap:8 PCMA/8000
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
|
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
|
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=setup:actpass
|
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=rtcp-mux
|
+-----
|a=rtcp-mux-only

```

```

+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.
+-----+
|a=end-of-candidates
+-----+
|***** DTMF m=line *****
+-----+
|m=audio 0 UDP/TLS/RTP/SAVPF 126
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:dtmf
+-----+
|a=msid:ma tb
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:126 telephone-event/8000
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+

```

Table 11: 5.2.5 SDP Offer

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio dtmf

```

Internet-Draft

SDP4WebRTC

December 2020

```
+-----+
|***** Audio m=line *****|
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109|
+-----+
|c=IN IP4 203.0.113.77|
+-----+
|a=mid:audio|
+-----+
|a=msid:ma ta|
|
+-----+
|a=sendrecv|
|
+-----+
|a=rtpmap:109 opus/48000/2|
+-----+
|a=maxptime:120|
+-----+
|a=ice-ufrag:c300d85b|
|
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2|
|
+-----+
|a=fingerprint:sha-256|
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:|
+-----+
|a=setup:active|
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31|
+-----+
|a=rtcp-mux|
|
+-----+
|a=rtcp-mux-only|
+-----+
|a=rtcp-rsize|
|
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level|
```

```

+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+

```

```

|a=end-of-candidates
+-----+
|***** DTMF m=line *****
+-----+
|m=audio 0 UDP/TLS/RTP/SAVPF 126
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:dtmf
+-----+
|a=msid:ma tb
|
+-----+
|a=recvonly
|
+-----+
|a=rtpmap:126 telephone-event/8000
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

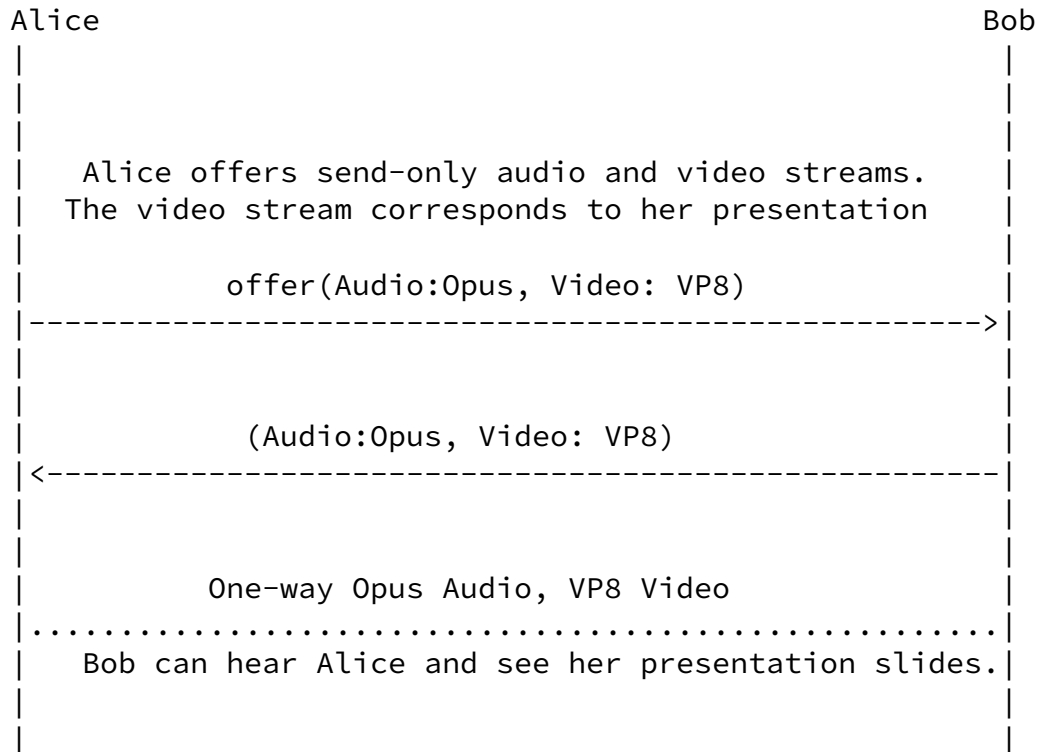
```

Table 12: 5.2.5 SDP Answer

#### [5.2.6.](#) One-way Audio/Video Session - Document Camera

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

## One-way Audio &amp; Video Session - Document Camera



```
+=====
| Offer SDP Contents
+=====
| v=0
```

```
+-----  
|o=- 20519 0 IN IP4 0.0.0.0  
+-----
```

```
|s=-  
+-----
```

```
|t=0 0  
+-----
```

```
|a=group:BUNDLE audio video  
+-----
```

```
|a=group:LS audio video  
+-----
```

```
|a=ice-options:trickle  
+-----
```

```
|a=ice-options:ice2  
+-----
```

```
|***** Audio m=line *****  
+-----
```

```
|m=audio 54609 UDP/TLS/RTP/SAVPF 109  
+-----
```

```
|c=IN IP4 203.0.113.141  
+-----
```

```
+-----  
|a=mid:audio  
+-----
```

```
|a=msid:ma ta  
|  
+-----
```

```
|a=sendonly  
+-----
```

```
|a=rtpmap:109 opus/48000/2  
+-----
```

```
|a=maxptime:120  
+-----
```

```
|a=ice-ufrag:074c6550  
+-----
```

```
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068  
+-----
```

```
|a=fingerprint:sha-256  
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:  
+-----
```

```
|a=setup:actpass  
|  
+-----
```



```

+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 203.0.113.141 54609 typ host
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+

```

```

|a=msid:ma tb
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=content:slides
|
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir

```

```
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
```

Table 13: 5.2.6 SDP Offer

```
+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio video
+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:audio
```

```
+-----+
|a=msid:ma ta
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
```

```

|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
|a=setup:active
+-----
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----
|a=rtcp-mux
+-----
|a=rtcp-mux-only
+-----
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 203.0.113.77 49203 typ host
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----
|c=IN IP4 203.0.113.77
+-----
|a=bundle-only
+-----
|a=mid:video
+-----
|a=msid:ma tb
|
+-----
|a=recvonly
+-----

```

```

|a=rtpmap:120 VP8/90000

```

```

+-----+
|a=content:slides
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

```

Table 14: 5.2.6 SDP Answer

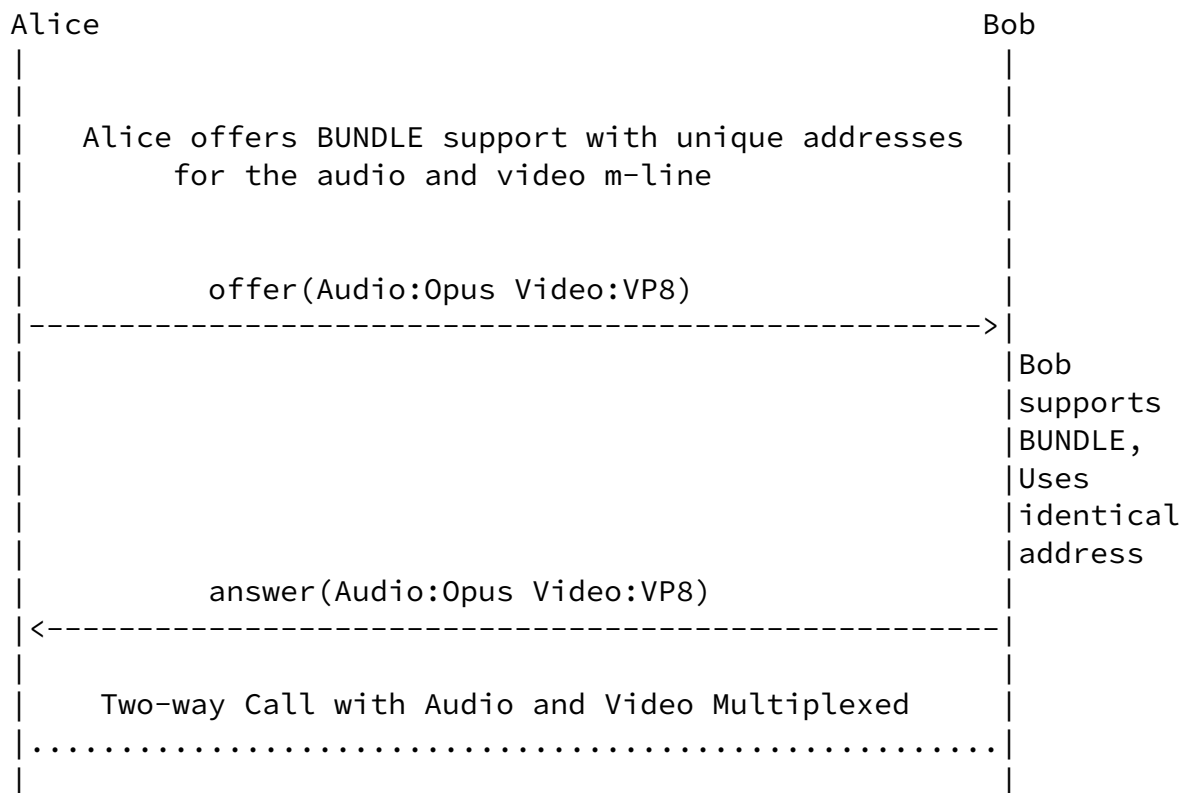
#### [5.2.7.](#) Audio, Video Session with BUNDLE Support Unknown

In this example, since Alice is unsure of the Bob's support of the BUNDLE framework, the following steps are performed in order to negotiate and set up a BUNDLE Address for the session.

- \* An SDP offer, in which 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 Bob indicates support for BUNDLE, selects the offerer's BUNDLE address, selects its own BUNDLE address and associates it with each BUNDLED m=line within the BUNDLE group.

Once the offer/answer exchange completes, both Alice and Bob each end up using a single RTP session for both of the media streams.

Two-way Secure Audio and Video with BUNDLE support unknown



```
+=====+
|Offer SDP Contents
+=====+
|v=0
+-----+
|o=- 20518 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio video
|
+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
```

|m=audio 54609 UDP/TLS/RTP/SAVPF 109

Internet-Draft

SDP4WebRTC

December 2020

```
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio
|
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp:54610 IN IP4 203.0.113.141
|
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
|
```

```

+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.
|
+-----+
|a=candidate:0 2 UDP 2122194687 192.0.2.4 61666 typ host
|
+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.141 54610 typ srflx raddr 192.0.2.

```

```

|
+-----+
|***** Video m=line *****
+-----+
|m=video 62537 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:video
|
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=ice-ufrag:6550074c
+-----+
|a=ice-pwd:74af08a068a28a397a4c3f31747d1ee34
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z
+-----+
|a=rtcp-mux
+-----+
|a=rtcp:62538 IN IP4 203.0.113.141

```

```

+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61886 typ host
|
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 62537 typ srflx raddr 192.0.2.

```

```

|
+-----+
|a=candidate:0 2 UDP 2122194687 192.0.2.4 61888 typ host
|
+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.141 62538 typ srflx raddr 192.0.2.
|
+-----+

```

Table 15: 5.2.7 SDP Offer w/BUNDLE

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio video
|
+-----+
|a=group:LS audio video

```



```

+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:audio
|
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+

```

```

|a=maxptime:120
+-----+
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

```

```

+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 49203 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 51556 typ srflx raddr 198.51.10
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:video
|
|
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+

```

```

|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

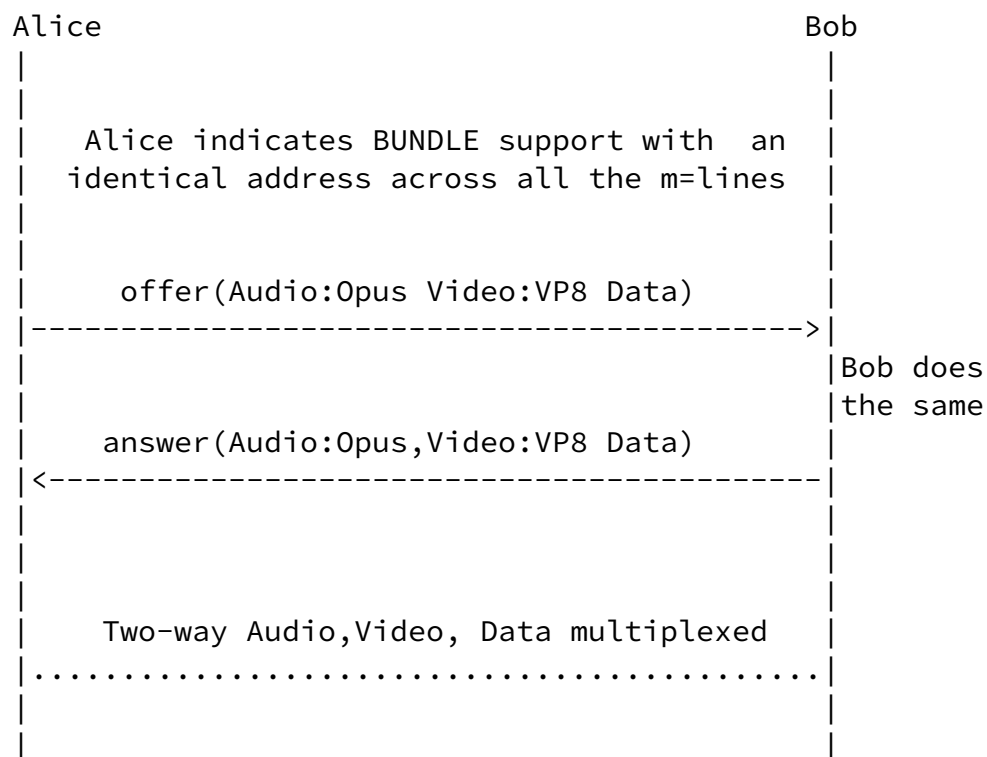
```

Table 16: 5.2.7 SDP Answer w/BUNDLE

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

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

Audio, Video, and Data with BUNDLE support known



```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video data

```

```

+-----
|a=group:LS audio video
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----

```

```

|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.141
+-----
|a=msid:ma ta
|
+-----
|a=mid:audio
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=setup:actpass
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=rtcp-mux
+-----
|a=rtcp-mux-only
+-----
|a=rtcp-rsize
+-----
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
+-----
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.

```

```

+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|***** Application m=line *****
+-----+
|m=application 0 UDP/DTLS/SCTP webrtc-datachannel
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:data
+-----+
|a=sctp-port:5000
+-----+
|a=max-message-size:100000
+-----+
|a=sendrecv
+-----+

```

Table 17: 5.2.8 SDP Offer

Internet-Draft

SDP4WebRTC

December 2020

```
+=====
| Answer SDP Contents
+=====
| v=0
+-----
| o=- 16833 0 IN IP4 0.0.0.0
+-----
| s=-
+-----
| t=0 0
+-----
| a=group:BUNDLE audio video data
+-----
| a=group:LS audio video
+-----
| a=ice-options:trickle
+-----
| a=ice-options:ice2
+-----
| ***** Audio m=line *****
+-----
| m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
| c=IN IP4 203.0.113.77
+-----
| a=msid:ma ta
|
+-----
| a=mid:audio
+-----
| a=sendrecv
+-----
| a=rtpmap:109 opus/48000/2
+-----
| a=maxptime:120
+-----
| a=ice-ufrag:c300d85b
+-----
| a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----
| a=fingerprint:sha-256
| 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
| a=setup:active
```

```
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
```

```
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
```

```

+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|***** Application m=line *****
+-----+
|m=application 0 UDP/DTLS/SCTP webrtc-datachannel
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+

```

```

|a=mid:data
+-----+
|a=sctp-port:5000
+-----+
|a=max-message-size:100000
+-----+
|a=sendrecv
+-----+

```

Table 18: 5.2.8 SDP Answer

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

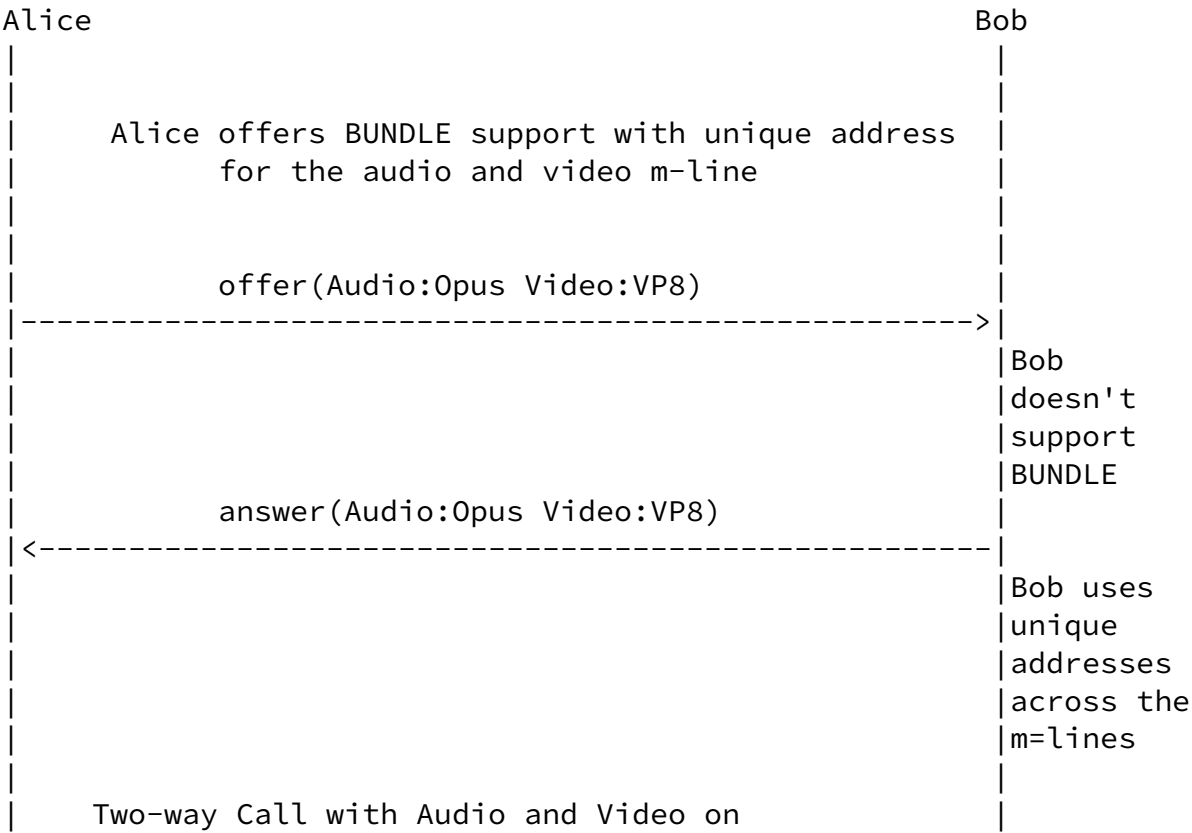
This use case illustrates SDP offer/answer exchange where the far-end (Bob) either doesn't support media bundling or doesn't want to group m=lines over a single 5-tuple.

This is indicated by dropping the "a=group:BUNDLE" line and BUNDLE RTP header extension in the answer SDP.

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



Two-way Secure Audio and Video with BUNDLE Unsupported



```
|      different 5-tuples      |
| .....                      |
|                               |
```

```
+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
|
+-----
|a=group:LS audio video
+-----
|a=ice-options:trickle
+-----
```

```
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.141
+-----
|a=mid:audio
|
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
```

```

+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp:55232 IN IP4 203.0.113.141
|
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54609 typ srflx raddr 192.0.2.
+-----+
|a=candidate:0 2 UDP 2122194687 192.0.2.4 61666 typ host

```

```

+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.141 55232 typ srflx raddr 192.0.2.
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 54332 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.141

```

```

+-----+
|a=mid:video
|
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=ice-ufrag:7872093
+-----+
|a=ice-pwd:ee3474af08a068a28a397a4c3f31747d1
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
|
+-----+
|a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z
+-----+
|a=rtcp-mux
+-----+
|a=rtcp:60052 IN IP4 203.0.113.141
+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2122194687 192.0.2.4 71775 typ host

```

```

+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.141 54332 typ srflx raddr 192.0.2.
+-----+
|a=candidate:0 2 UDP 2122194687 192.0.2.4 71776 typ host

```

```

+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.141 60052 typ srflx raddr 192.0.2.
+-----+
|a=end-of-candidates
+-----+

```

Table 19: 5.2.9 SDP Offer w/BUNDLE

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 53214 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+

```

```
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
|
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 53214 typ srflx raddr 198.51.10
+-----+
|a=candidate:0 2 UDP 2122194687 198.51.100.7 51558 typ host
+-----+
|a=candidate:1 2 UDP 1685987071 203.0.113.77 60065 typ srflx raddr 198.51.10
+-----+
|***** Video m=line *****
+-----+
|m=video 58679 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=ice-ufrag:85bC300
+-----+
|a=ice-pwd:325921d5d47efbabd9a2de4e99bd291c
+-----+
|a=fingerprint:sha-256 6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35
```

```

+-----+
|a=setup:active
|
+-----+
|a=tls-id:9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=candidate:0 1 UDP 2122194687 198.51.100.7 61556 typ host
+-----+
|a=candidate:1 1 UDP 1685987071 203.0.113.77 58679 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+

```

Table 20: 5.2.9 SDP Answer without BUNDLE

5.2.10. Audio, Video BUNDLED, but Data Not BUNDLED

This example showcases SDP for negotiating a session with audio, video, and the data streams between Alice and Bob with data stream not being part of the BUNDLE group. This is shown by assigning a unique port for the data media section and not adding the "mid" identification tag to the BUNDLE group.

## Audio, Video, with Data (Not in BUNDLE)

```
Alice                                                     Bob
|                                                         |
| Alice wants to multiplex audio, video but not data      |
|                                                         |
|   offer(Audio:Opus Video:VP8, Data(not in BUNDLE))      |
|----->|
|                                                         |
|   answer(Audio:Opus Video:VP8, Data)                    |
|<-----|
|                                                         |
| Two-way Call with Audio, Video Multiplexed except data |
| .....|
|                                                         |
```

```
+=====
| Offer SDP Contents
+=====
| v=0
+-----+
| o=- 20518 0 IN IP4 0.0.0.0
+-----+
| s=-
+-----+
| t=0 0
+-----+
| a=group:BUNDLE audio video
|
|
```



```

+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio

```

```

+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+

```

```

|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 54609 typ host
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----
|c=IN IP4 203.0.113.141
+-----
|a=bundle-only
+-----
|a=mid:video
+-----
|a=msid:ma tb
|
+-----

```

```

|a=sendrecv
+-----
|a=rtpmap:120 VP8/90000
+-----
|a=rtcp-fb:120 nack
+-----
|a=rtcp-fb:120 nack pli
+-----
|a=rtcp-fb:120 ccm fir
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|***** Application m=line *****
+-----
|m=application 10000 UDP/DTLS/SCTP webrtc-datachannel
+-----
|c=IN IP4 203.0.113.141
+-----
|a=mid:data
+-----

```

```

|a=sctp-port:5000
+-----
|a=max-message-size:100000
+-----
|a=sendrecv
+-----
|a=setup:actpass
+-----
|a=tls-id:UKA29UQLTF690JW4WNPNU02Y0GF1FJ0Z
+-----
|a=ice-ufrag:89819013
+-----
|a=ice-pwd:1747d1ee3474af08a068a28a397a4c3f3
+-----
|a=fingerprint:sha-256
|29:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 10000 typ host
+-----
|a=end-of-candidates
+-----

```

Table 21: 5.2.10 SDP Offer

```

+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
+-----
|a=group:LS audio video

```

```

+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux

```

```

+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+

```

```

|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 198.51.100.7 49203 typ host
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----
|c=IN IP4 203.0.113.77
+-----
|a=bundle-only
+-----
|a=mid:video
+-----
|a=msid:ma tb
|
+-----
|a=sendrecv
+-----
|a=rtpmap:120 VP8/90000
+-----
|a=rtcp-fb:120 nack
+-----
|a=rtcp-fb:120 nack pli
+-----
|a=rtcp-fb:120 ccm fir
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|***** Application m=line *****
+-----
|m=application 20000 UDP/DTLS/SCTP webrtc-datachannel
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:data
+-----
|a=sctp-port:5000
+-----

```

```

|a=max-message-size:100000
+-----
|a=setup:active
+-----
|a=tls-id:9AIFS8AQ009IXF5D6QQUJ7P8BXPEZJ8G
+-----
|a=sendrecv
+-----
|a=ice-ufrag:991Ca2a5e
+-----
|a=ice-pwd:921d5d47efbabd9a2de4e99bd291c325
+-----
|a=fingerprint:sha-256
|7B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
|a=candidate:0 1 UDP 2113667327 198.51.100.7 20000 typ host
+-----
|a=end-of-candidates
+-----

```

Table 22: 5.2.10 SDP Answer

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

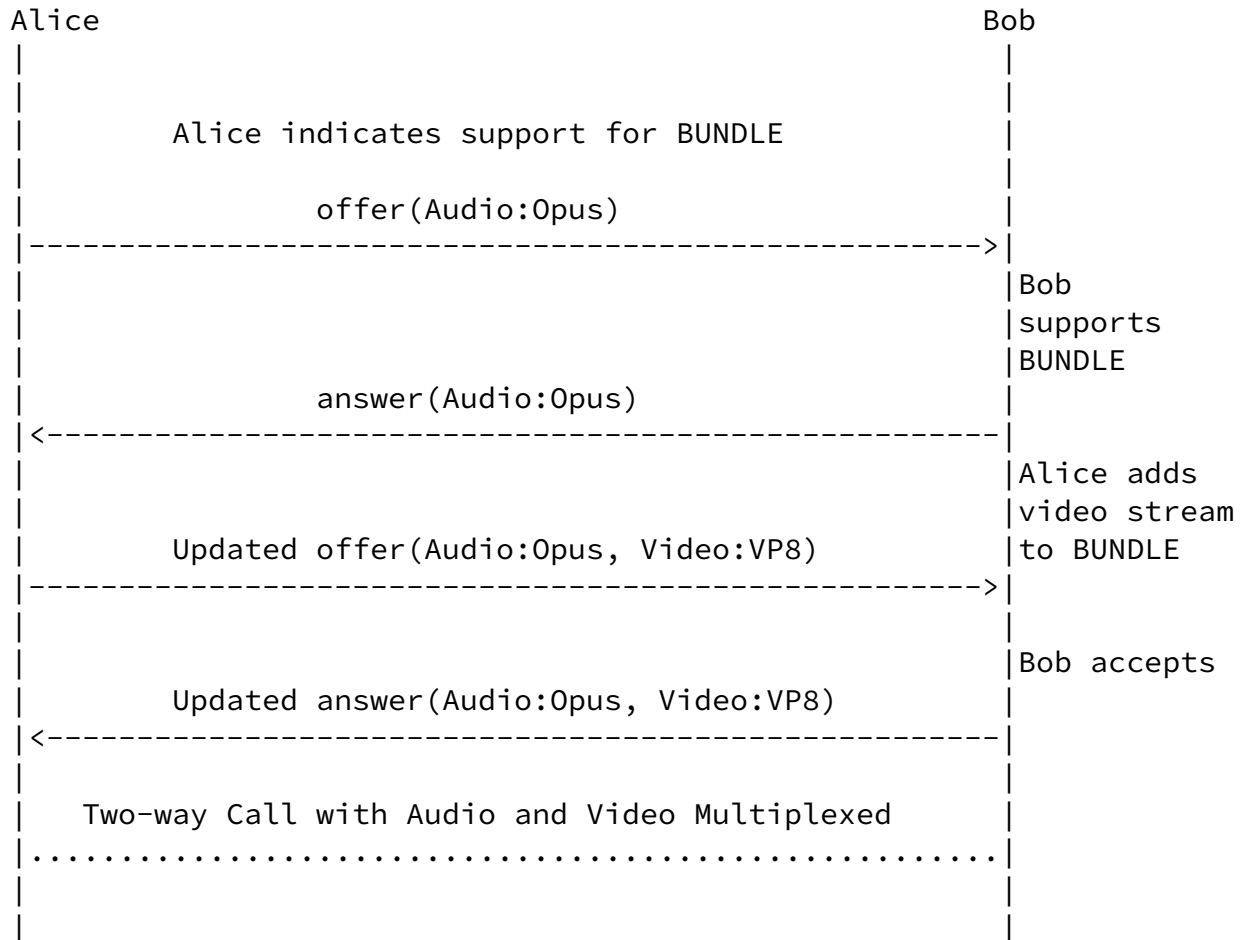
This example involves 2 offer/answer exchanges. The first one is used to negotiate and set up BUNDLE support for audio-only session followed by an updated offer/answer exchange to add video stream to the ongoing session. Also the newly added video stream is BUNDLED with the audio stream.

Internet-Draft

SDP4WebRTC

December 2020

## Audio, Add Video and BUNDLE



```
+=====
|Offer SDP Contents
+=====
|v=0
+-----+
|o=- 20518 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio
|
+-----+
|a=ice-options:trickle
```

```
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
```

```
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
```



```

|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----
|a=end-of-candidates
+-----

```

Table 23: 5.2.11 SDP Offer

```

+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2

```

```

+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-mux-only

```

```

+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+

```

Table 24: 5.2.10 SDP Answer

```

+=====+
|Updated Offer SDP Contents
+=====+
|v=0
+-----+
|o=- 20518 1 IN IP4 0.0.0.0
+-----+
|s=-

```

```

+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio video
+-----+
|a=group:LS audio video
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv

```

```

+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
|
+-----+
|a=rtcp-mux

```

```

+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+

```

```

|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:120 nack
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+

```

Table 25: 5.2.11 SDP Updated Offer

```

+=====
|Updated Answer SDP Contents
+-----
|v=0
+-----
|o=- 16833 1 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio video
+-----
|a=group:LS audio video
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----

```

```

|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2

```

```

+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
|
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-mux-only
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 120
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:video
+-----+
|a=msid:ma tb
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=rtcp-fb:120 nack

```

```

+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

```

Table 26: 5.2.11 SDP Updated Answer

### 5.3. MultiResolution, RTX, FEC Examples

This section provides examples related to multi-source, multi-stream negotiation such as layered coding and simulcast. Further included are a few examples that cover techniques to deal with providing robustness against transmission errors such as FEC and RTX. Also, mechanisms such as FEC and RTX could be envisioned in the above basic scenarios as well.

#### 5.3.1. Send-only Simulcast Session with 2 Cameras and 2 Encodings per Camera

The SDP example below shows an offer/answer exchange with one audio and two video sources (say 2 video cameras). Each of the video sources can be sent at two different resolutions.

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

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

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

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

The BUNDLE grouping framework enables multiplexing of all 5 Source RTP Streams (1 audio stream + 4 video streams) over a single RTP session.

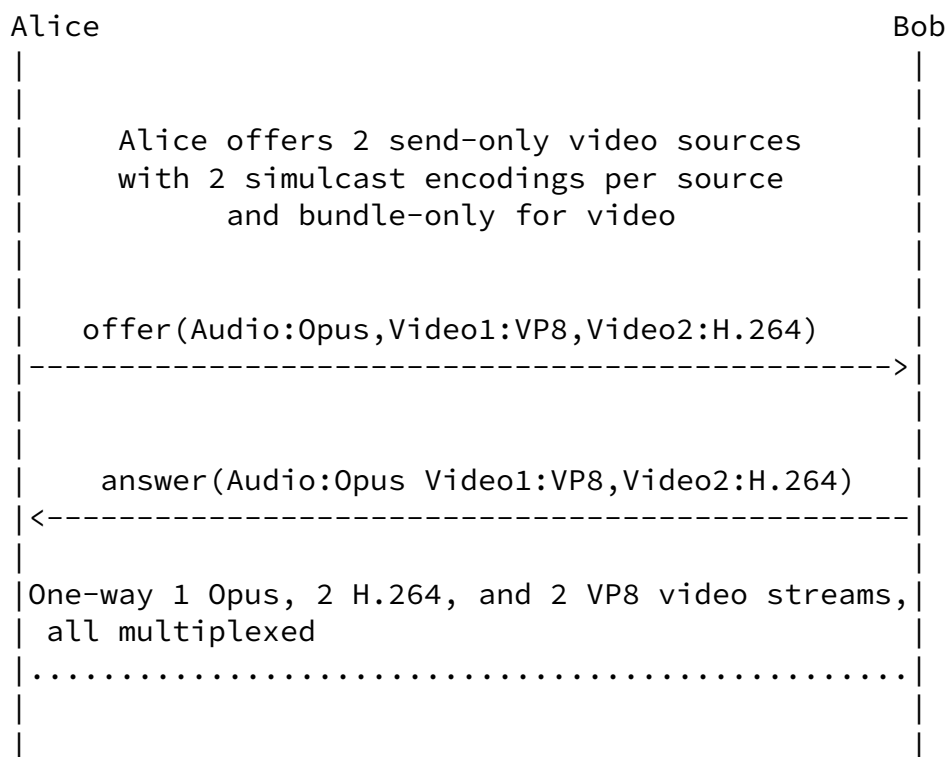
Also, the audio and one video source RTP stream form a lip sync group while the other video source RTP stream represents non-interactive media data.

Internet-Draft

SDP4WebRTC

December 2020

## One-way Successful Simulcast w/BUNDLE



```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE m0 m1 m2
|
+-----
|a=group:LS m0 m1
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
  
```



```
+-----+
|***** Audio m=line *****|
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109|
+-----+
```

```
|c=IN IP4 203.0.113.141|
+-----+
|a=mid:m0|
+-----+
|a=msid:ma ta|
|a=|
+-----+
|a=sendonly|
+-----+
|a=rtpmap:109 opus/48000/2|
+-----+
|a=maxptime:120|
+-----+
|a=ice-ufrag:074c6550|
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068|
+-----+
|a=fingerprint:sha-256|
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:|
+-----+
|a=setup:actpass|
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68|
+-----+
|a=rtcp-mux|
+-----+
|a=rtcp-rsize|
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level|
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid|
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host|
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4|
+-----+
```

```

|a=end-of-candidates
+-----+
|***** Video-1 m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 100
|
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=bundle-only
+-----+
|a=mid:m1

```

```

|
+-----+
|a=msid:ma tb
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=fmtp:98 max-fr=30
+-----+
|a=rtpmap:100 VP8/90000
+-----+
|a=fmtp:100 max-fr=15
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id
+-----+
|a=rid:1 send pt=98;max-width=1280;max-height=720
|
|
+-----+

```

|a=rid:2 send pt=100;max-width=640;max-height=480

|

+-----  
|a=simulcast:send 1;~2

|

+-----  
|\*\*\*\*\* Video-2 m=line \*\*\*\*\*

+-----  
|m=video 0 UDP/TLS/RTP/SAVPF 101 102

|

+-----  
|c=IN IP4 203.0.113.141

+-----  
|a=bundle-only

+-----  
|a=mid:m2

|

+-----  
|a=msid:ma tc

|

+-----  
|a=sendonly

+-----  
|a=rtpmap:101 H264/90000

+-----  
|a=rtpmap:102 H264/90000

+-----  
|a=fmtp:101 profile-level-id=42401f;packetization-mode=0

+-----  
|a=fmtp:102 profile-level-id=42401f;packetization-mode=1

+-----  
|a=rtcp-fb:\* nack

+-----  
|a=rtcp-fb:\* nack pli

+-----  
|a=rtcp-fb:\* ccm fir

+-----  
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

+-----

```

|a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id
+-----+
|a=rid:3 send pt=101;max-width=1280;max-height=720;max-fr=30
|
|
+-----+
|a=rid:4 send pt=102;max-width=640;max-height=360;max-fr=15
|
|
+-----+
|a=simulcast:send 3;4
|
|
+-----+

```

Table 27: 5.3.1 SDP Offer

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 20519 0 IN IP4 0.0.0.0
+-----+

```

```

|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE m0 m1 m2
|
|
+-----+
|a=group:LS m0 m1
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+

```

```

|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:m0
+-----+
|a=msid:ma ta
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+

```

```

|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.77 49203 typ srflx raddr 198.51.100
+-----+
|a=end-of-candidates
+-----+
|***** Video-1 m=line *****

```

```

+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 100
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:m1
|
+-----+
|a=msid:ma tb
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=rtpmap:100 VP8/90000
+-----+
|a=fmtp:98 max-fr=30
+-----+
|a=fmtp:100 max-fr=15
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id
+-----+
|a=rid:1 recv pt=98;max-width=1280;max-height=720
|
+-----+
|a=rid:2 recv pt=100;max-width=640;max-height=480
|
+-----+

```

```

|a=simulcast:recv 1;2
|

```

```

|
|
+-----+
|***** Video-2 m=line *****|
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 101 102|
+-----+
|c=IN IP4 203.0.113.77|
+-----+
|a=bundle-only|
+-----+
|a=mid:m2|
|
+-----+
|a=msid:ma tc|
|
+-----+
|a=recvonly|
+-----+
|a=rtpmap:101 H264/90000|
+-----+
|a=rtpmap:102 H264/90000|
+-----+
|a=fmtp:101 profile-level-id=42401f;packetization-mode=1|
+-----+
|a=fmtp:102 profile-level-id=42401f;packetization-mode=1|
+-----+
|a=rtcp-fb:* nack|
+-----+
|a=rtcp-fb:* nack pli|
+-----+
|a=rtcp-fb:* ccm fir|
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid|
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id|
+-----+
|a=rid:3 recv pt=101;max-width=1280;max-height=720;max-fr=30|
|
+-----+
|a=rid:4 recv pt=102;max-width=640;max-height=360;max-fr=15|
|
+-----+
|a=simulcast:recv 3;4|
|
+-----+

```

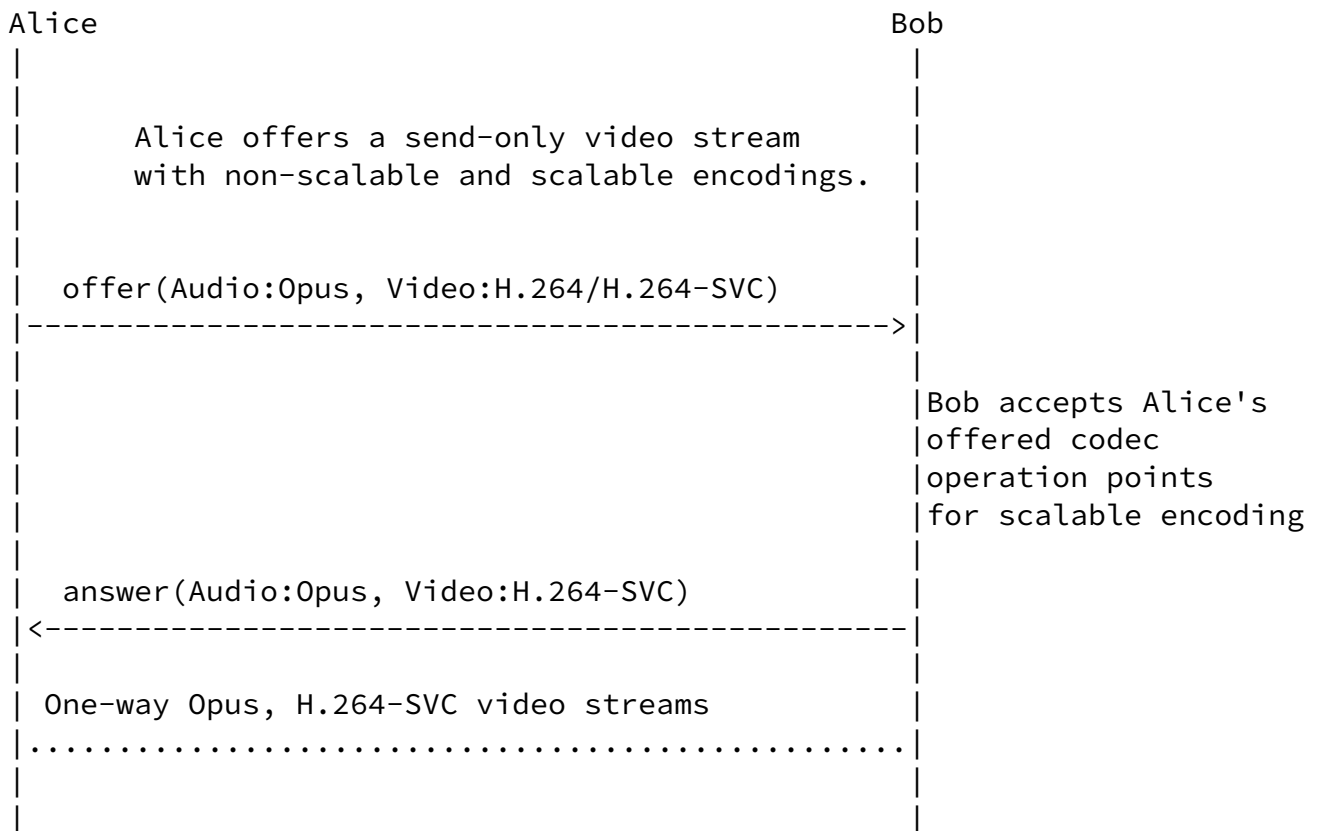
Table 28: 5.3.1 SDP Answer

[5.3.2.](#) Successful SVC Video Session

This section shows an SDP offer/answer for a session with an audio and a single video source. The video source is being encoded both as non-scalable and scalable H.264-SVC RTP streams (in the SST mode).

The answerer picks the payload type corresponding to scalable encoding.

## SVC Session - 3 Layers w/BUNDLE



```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----

```



Internet-Draft

SDP4WebRTC

December 2020

```
|a=group:BUNDLE m0 m1
|
|
+-----+
|a=group:LS m0 m1
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:m0
|
+-----+
|a=msid:ma ta
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
```

```
|a=rtcp-rsize
+-----
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
```

```
+-----
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 96 100
|
+-----
|c=IN IP4 203.0.113.141
+-----
|a=bundle-only
+-----
|a=mid:m1
|
+-----
|a=msid:ma tb
|
+-----
|a=sendonly
+-----
|a=rtpmap:96 H264/90000
+-----
|a=fmtp:96 profile-level-id=4d0028; packetization-mode=1;max-fs=8040
+-----
|a=rtpmap:100 H264-SVC/90000
+-----
|a=fmtp:100 profile-level-id=53001f;packetization-mode=0
+-----
|a=rtcp-fb:* nack
+-----
|a=rtcp-fb:* nack pli
+-----
|a=rtcp-fb:* ccm fir
```

```
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
```

Table 29: 5.3.2 SDP Offer with SVC

```
+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 20519 0 IN IP4 0.0.0.0
```

```
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE m0 m1
+-----+
|a=group:LS m0 m1
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:m0
+-----+
|a=msid:ma ta
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
```

```

|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
|a=setup:active
+-----
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----
|a=rtcp-mux
+-----
|a=rtcp-rsize
+-----
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid

```

```

+-----
|a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host
+-----
|a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 100
+-----
|c=IN IP4 203.0.113.77
+-----
|a=bundle-only
+-----
|a=mid:m1
|
+-----
|a=msid:ma tb
|
+-----

```

```

|a=recvonly
+-----+
|a=rtpmap:100 H264-SVC/90000
+-----+
|a=fmtp:100 profile-level-id=53001f;packetization-mode=0
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

```

Table 30: 5.3.2 SDP Answer with SVC

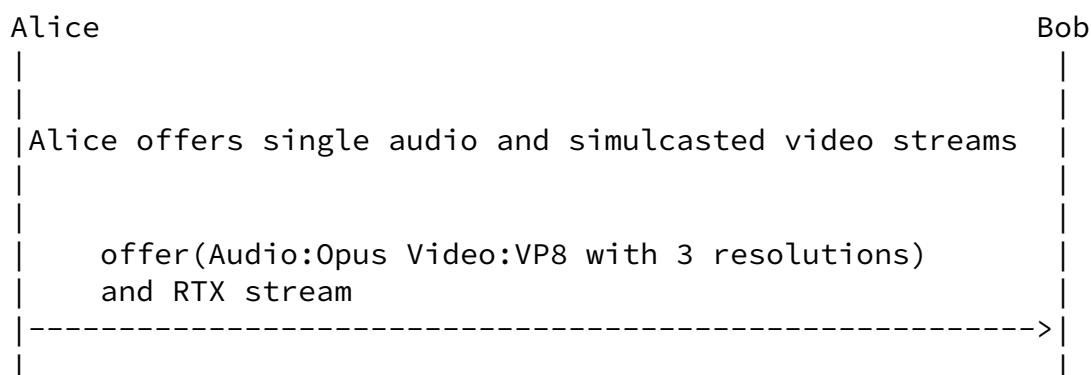
### 5.3.3. Successful Simulcast Video Session with Retransmission

This section shows an SDP offer/answer exchange for a simulcast scenario with 3 resolutions and has [\[RFC4588\]](#)-style retransmission flows.

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

The [\[I-D.ietf-mmusic-sdp-simulcast\]](#) framework identifies the simulcast streams via their 'rid' identifiers.

#### Simulcast Streams with Retransmission



```

|
|               answer (Bob accepts Alice's offer)
|<-----
|
| One-way 1 Opus, 3 VP8 and RTX video streams, all muxed
| .....
|
|

```

```

+=====
| Offer SDP Contents
+=====
| v=0
+-----
| o=- 20519 0 IN IP4 0.0.0.0
+-----
| s=-
+-----
| t=0 0
+-----
| a=group:BUNDLE m0 m1
|
|
+-----
| a=group:LS m0 m1
+-----
| a=ice-options:trickle
+-----
| a=ice-options:ice2
+-----
| ***** Audio m=line *****
+-----

```

```

|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----
| c=IN IP4 203.0.113.141
+-----
| a=mid:m0
|
+-----
| a=msid:ma ta

```

```

|
+-----
|a=sendonly
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:074c6550
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=setup:actpass
+-----
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----
|a=rtcp-mux
+-----
|a=rtcp-rsize
+-----
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----
|a=end-of-candidates
+-----
|***** Video m=line *****
+-----
|m=video 0 UDP/TLS/RTP/SAVPF 98 103
|
+-----
|c=IN IP4 203.0.113.141
+-----

```

```

|a=bundle-only
+-----

```

```

|a=mid:m1
+-----+
|a=msid:ma tb
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=fmtp:98 max-fr=30
+-----+
|a=rtpmap:103 rtx/90000
+-----+
|a=fmtp:103 apt=98;rtx-time=200
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id
+-----+
|a=extmap:4 urn:ietf:params:rtp-hdext:sdes:repaired-rtp-stream-id
+-----+
|a=rid:1 send pt=98;max-fs=921600;max-fr=30
+-----+
|a=rid:2 send pt=98;max-fs=614400;max-fr=15
+-----+
|a=rid:3 send pt=98;max-fs=230400;max-fr=30
+-----+
|a=simulcast:send 1;2;3
|
+-----+

```

Table 31: 5.3.3 SDP Offer w/Simulcast, RTX

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 20519 0 IN IP4 0.0.0.0

```



```
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE m0 m1
|
|
+-----+
|a=group:LS m0 m1
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=mid:m0
+-----+
|a=msid:ma ta
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
```

|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level

Internet-Draft

SDP4WebRTC

December 2020

```
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 103
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:m1
|
+-----+
|a=msid:ma tb
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=fmtp:98 max-fr=30
+-----+
|a=rtpmap:103 rtx/90000
+-----+
|a=fmtp:103 apt=98;rtx-time=200
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
```

```

+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id
+-----+
|a=extmap:4 urn:ietf:params:rtp-hdext:sdes:repaired-rtp-stream-id
+-----+
|a=rid:1 recv pt=98;max-fs=921600;max-fr=30
+-----+
|a=rid:2 recv pt=98;max-fs=614400;max-fr=15

```

```

+-----+
|a=rid:3 recv pt=98;max-fs=230400;max-fr=30
+-----+
|a=simulcast:recv 1;2;3
|
+-----+

```

Table 32: 5.3.3 SDP Answer w/Simulcast, RTX

#### 5.3.4. Successful One-way Simulcast Session with 2 resolutions and RTX - One resolution rejected

This section shows an SDP offer/answer exchange for a simulcast scenario with two resolutions.

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

##### Simulcast Streams with Retransmission Rejected

Alice	Bob
Alice offers single audio and simulcasted video streams	
with bundle-only for video	
offer(Audio:Opus Video:VP8 with 2 resolutions, RTX Stream)	
----->	
	Bob accepts 1

<pre> answer(Audio:Opus Video:VP8 with 1 res &amp; RTX Stream) &lt;----- One-way audio and video session and its associated RTX stream, all multiplexed ..... </pre>	<pre> simulcast,rtx rejects the other </pre>
--	--

```

=====
|Offer SDP Contents
=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE m0 m1
|
|
+-----
|a=group:LS m0 m1
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----
|c=IN IP4 203.0.113.141
+-----

```

```

|a=mid:m0
+-----+
|a=msid:ma ta
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68

```

```

+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 100 101 103
|
+-----+

```

|c=IN IP4 203.0.113.141

+-----

|a=bundle-only

+-----

|a=mid:m1

+-----

|a=msid:ma tb

|

+-----

|a=sendonly

+-----

|a=rtpmap:98 VP8/90000

+-----

|a=rtpmap:100 VP8/90000

+-----

|a=rtpmap:101 rtx/90000

+-----

|a=rtpmap:103 rtx/90000

+-----

|a=fmtp:98 max-fr=30;max-fs=8040

+-----

|a=fmtp:100 max-fr=15;max-fs=1200

+-----

|a=fmtp:101 apt=98;rtx-time=200

+-----

|a=fmtp:103 apt=100;rtx-time=200

+-----

|a=rtcp-fb:\* nack

+-----

|a=rtcp-fb:\* nack pli

+-----

|a=rtcp-fb:\* ccm fir

+-----

|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

+-----

|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id

+-----

|a=extmap:4 urn:ietf:params:rtp-hdext:sdes:repaired-rtp-stream-id

+-----

|a=rid:1 send pt=98

|

+-----

```
|a=rid:2 send pt=100
|
+-----
|a=simulcast:send 1;2
+-----
```

Table 33: 5.3.4 SDP Offer w/Simulcast, RTX

```
+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE m0 m1
|
|
+-----
|a=group:LS m0 m1
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----
```

```
|c=IN IP4 203.0.113.77
+-----
|a=mid:m0
+-----
|a=msid:ma ta
|
+-----
```

```

|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 101
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:m1
+-----+

```



```

|a=msid:ma tb
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=rtpmap:101 rtx/90000
+-----+
|a=fmtp:101 apt=98;rtx-time=200
+-----+
|a=rtcp-fb:* nack
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id
+-----+
|a=extmap:4 urn:ietf:params:rtp-hdext:sdes:repaired-rtp-stream-id
+-----+
|a=rid:1 recv pt=98
+-----+
|a=simulcast:recv 1
|
|
+-----+

```

Table 34: 5.3.4 SDP Answer (one Simulcast Rejected)

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

This section shows an SDP offer/answer exchange for a simulcast video stream at two resolutions with [\[RFC8627\]](#) based forward error correction mechanisms.

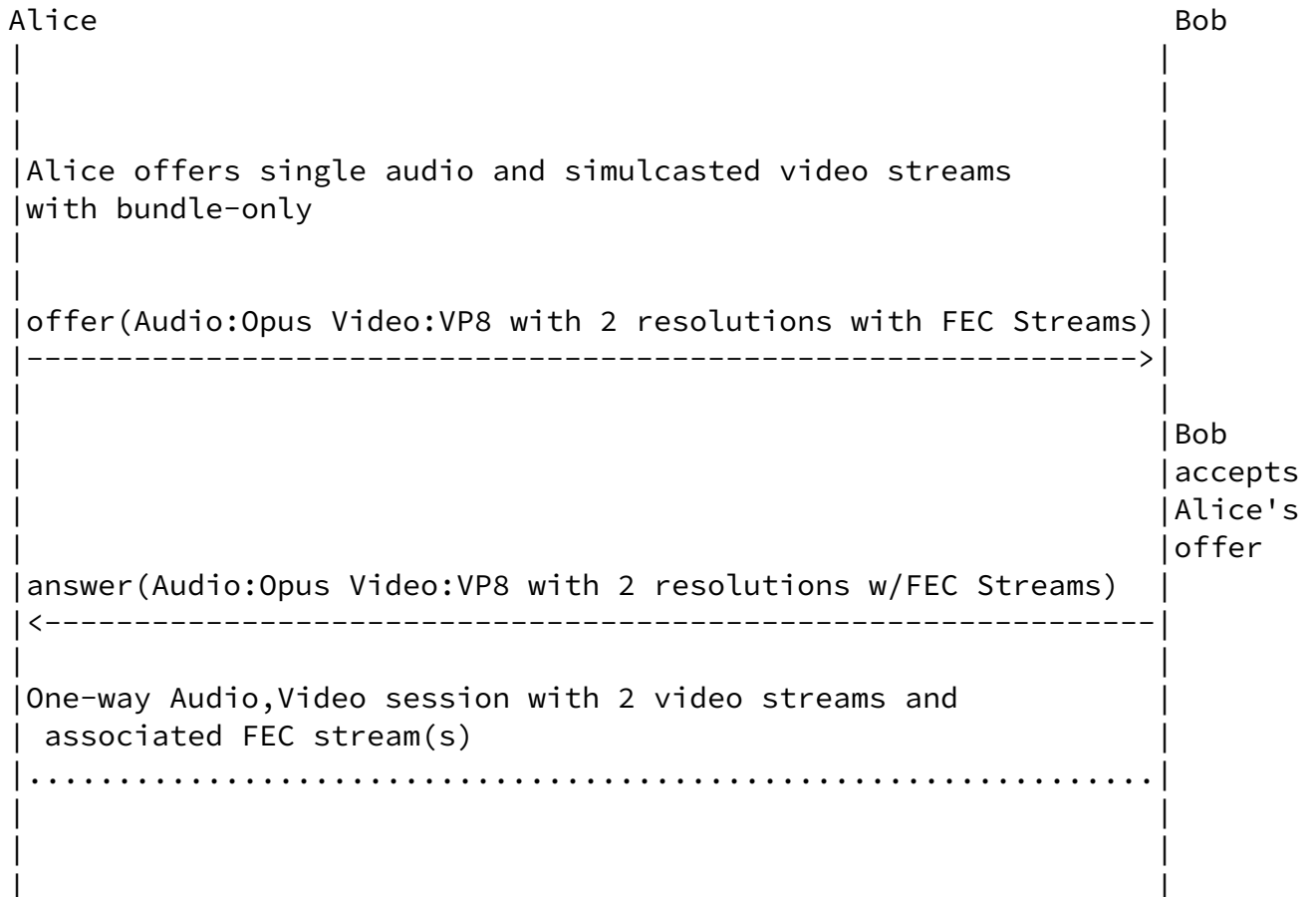
On completion of the offer/answer exchange mechanism, we end up with one audio stream, 2 simulcast video streams, and associated FEC stream(s), all of which are sent over a single 5-tuple.

Internet-Draft

SDP4WebRTC

December 2020

## Simulcast Streams with Forward Error Correction



```
+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE m0 m1
|
|
+-----
|a=group:LS m0 m1
+-----
```

|a=ice-options:trickle

+-----

|a=ice-options:ice2

+-----

|\*\*\*\*\* Audio m=line \*\*\*\*\*

+-----

|m=audio 54609 UDP/TLS/RTP/SAVPF 109

+-----

|c=IN IP4 203.0.113.141

+-----

|a=mid:m0

+-----

|a=msid:ma ta

|

+-----

|a=sendonly

+-----

|a=rtpmap:109 opus/48000/2

+-----

|a=maxptime:120

+-----

|a=ice-ufrag:074c6550

+-----

|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068

+-----

|a=fingerprint:sha-256

|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:

+-----

|a=setup:actpass

+-----

|a=rtcp-mux

+-----

|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68

+-----

|a=rtcp-rsize

+-----

|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level

+-----

|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

+-----

|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host

```

+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 100 101
|
+-----+
|c=IN IP4 203.0.113.141

```

```

+-----+
|a=bundle-only
+-----+
|a=mid:m1
|
+-----+
|a=msid:ma tb
|
+-----+
|a=sendonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=rtpmap:100 VP8/90000
+-----+
|a=rtpmap:101 flexfec/90000
+-----+
|a=fmtp:98 max-fr=30;max-fs=8040
+-----+
|a=fmtp:100 max-fr=15;max-fs=1200
+-----+
|a=fmtp:101 repair-window=200000
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdext:sdes:rtp-stream-id

```

```

+-----+
|a=extmap:4 urn:ietf:params:rtp-hdrext:sdes:repaired-rtp-stream-id
+-----+
|a=rid:1 send pt=98
|
+-----+
|a=rid:2 send pt=100
|
+-----+
|a=simulcast:send 1;2
+-----+

```

Table 35: 5.3.5 SDP Offer

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 20519 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE m0 m1
+-----+
|a=group:LS m0 m1
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.77

```

```

+-----+
|a=mid:m0
|
+-----+
|a=msid:ma ta
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31
+-----+

```

```

|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667326 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302206 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+
|***** Video m=line *****
+-----+
|m=video 0 UDP/TLS/RTP/SAVPF 98 100 101

```

```

+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=bundle-only
+-----+
|a=mid:m1
|
+-----+
|a=msid:ma tb
|
+-----+
|a=recvonly
+-----+
|a=rtpmap:98 VP8/90000
+-----+
|a=rtpmap:100 VP8/90000
+-----+
|a=rtpmap:101 flexfec/90000
+-----+
|a=fmtp:98 max-fr=30;max-fs=8040
+-----+
|a=fmtp:100 max-fr=15;max-fs=1200
+-----+
|a=fmtp:101 repair-window=200000
+-----+
|a=rtcp-fb:* nack pli
+-----+
|a=rtcp-fb:* ccm fir
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+

```

```

|a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:rtp-stream-id
+-----+
|a=extmap:4 urn:ietf:params:rtp-hdrext:sdes:repaired-rtp-stream-id
+-----+
|a=rid:1 recv pt=98
+-----+
|a=rid:2 recv pt=100
+-----+
|a=simulcast:recv 1;2
+-----+

```

#### 5.4. Others

The examples in this section provide SDP offer/answer exchanges for a variety of scenarios related to RTP Header extensions for conference usages, Legacy Interop scenarios, and more.

##### 5.4.1. Audio Session - Voice Activity Detection

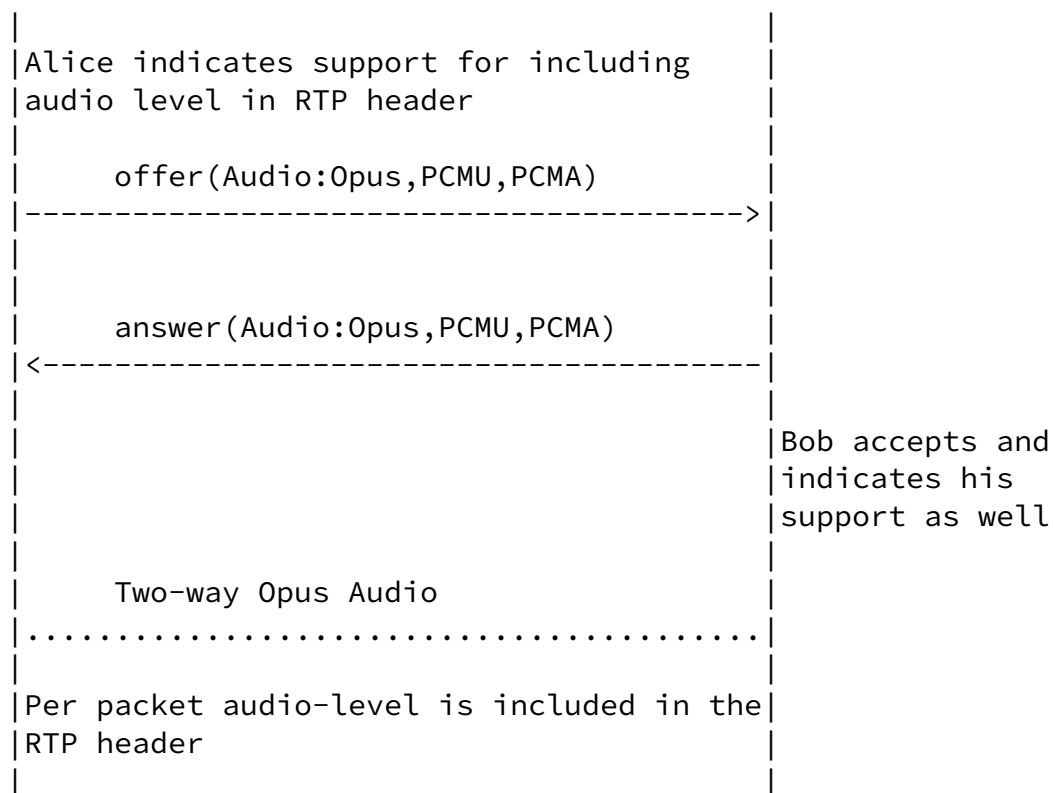
This example shows Alice indicating the support of the RTP header extension to include the audio level of the audio sample carried in the RTP packet.

#### Two-way Audio with VAD

Alice  
|

Bob  
|





```

=====
|Offer SDP Contents
=====
|v=0
+-----+
|o=- 20518 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio
+-----+
|a=ice-options:trickle
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8
+-----+
|c=IN IP4 203.0.113.141
  
```

```

+-----+
|a=mid:audio
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=rtpmap:0 PCMU/8000
+-----+
|a=rtpmap:8 PCMA/8000
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:* nack
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=end-of-candidates
+-----+

```

Table 37: 5.4.1 SDP Offer

Internet-Draft

SDP4WebRTC

December 2020

```
+=====
|Answer SDP Contents
+=====
|v=0
+-----
|o=- 16833 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE audio
+-----
|a=ice-options:trickle
+-----
|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 8
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=rtpmap:0 PCMU/8000
+-----
|a=rtpmap:8 PCMA/8000
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
```

```

+-----+
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----+
|a=setup:active
+-----+
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31

```

```

+-----+
|a=rtcp-mux
|
+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:* nack
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+

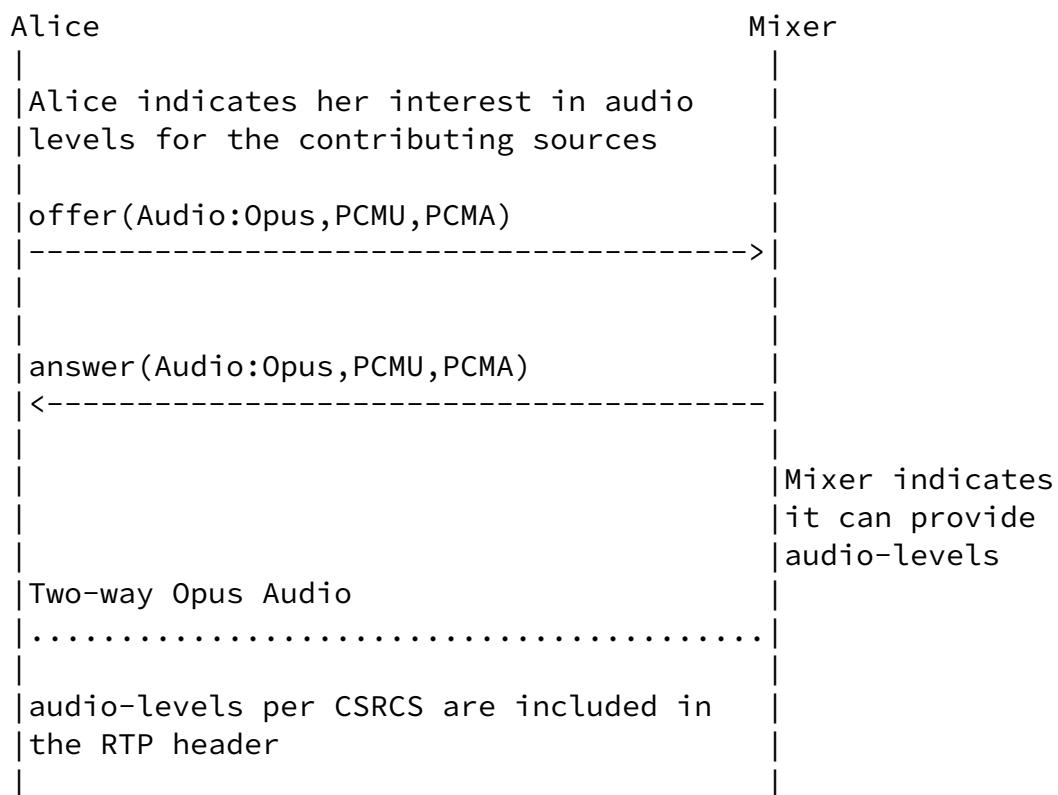
```

Table 38: 5.4.1 SDP Answer

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

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

## Audio Conference with VAD Support



=====

| Offer SDP Contents

=====

| v=0

```
+-----  
|o=- 20518 0 IN IP4 0.0.0.0  
+-----
```

```
|s=-  
+-----
```

```
|t=0 0  
+-----
```

```
|a=group:BUNDLE audio  
+-----
```

```
|a=ice-options:trickle  
+-----
```

```
|a=ice-options:ice2  
+-----
```

```
|***** Audio m=line *****  
+-----
```

```
|m=audio 54609 UDP/TLS/RTP/SAVPF 109 0 8  
+-----
```

```
|c=IN IP4 203.0.113.141  
+-----
```

```
|a=mid:audio
```

```
+-----  
|a=msid:ma ta  
|  
+-----
```

```
|a=sendrecv  
|  
+-----
```

```
|a=rtpmap:109 opus/48000/2  
+-----
```

```
|a=rtpmap:0 PCMU/8000  
+-----
```

```
|a=rtpmap:8 PCMA/8000  
+-----
```

```
|a=maxptime:120  
+-----
```

```
|a=ice-ufrag:074c6550  
+-----
```

```
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068  
+-----
```

```
|a=fingerprint:sha-256
```

```
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
```

```

+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp-rsize
+-----+
|a=rtcp-fb:* nack
+-----+
|a=extmap:1/recvonly urn:ietf:params:rtp-hdrext:csrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:ssrc-audio-level
+-----+
|a=extmap:3 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=end-of-candidates
+-----+

```

Table 39: 5.4.2 SDP Offer

```

+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|a=group:BUNDLE audio
+-----+
|a=ice-options:trickle
+-----+

```

```

|a=ice-options:ice2
+-----
|***** Audio m=line *****
+-----
|m=audio 49203 UDP/TLS/RTP/SAVPF 109 0 8
+-----
|c=IN IP4 203.0.113.77
+-----
|a=mid:audio
+-----
|a=msid:ma ta
|
+-----
|a=sendrecv
+-----
|a=rtpmap:109 opus/48000/2
+-----
|a=rtpmap:0 PCMU/8000
+-----
|a=rtpmap:8 PCMA/8000
+-----
|a=maxptime:120
+-----
|a=ice-ufrag:c300d85b
+-----
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----
|a=fingerprint:sha-256
|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:
+-----
|a=setup:active
+-----
|a=tls-id:CJ6FF9ZZMJW7MDRJIR7XVIQM48GE1G31

```

```

+-----
|a=rtcp-mux
+-----
|a=rtcp-rsize
+-----
|a=rtcp-fb:* nack
+-----
|a=extmap:1/sendonly urn:ietf:params:rtp-hdext:csrc-audio-level

```



```

+-----+
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|a=end-of-candidates
+-----+

```

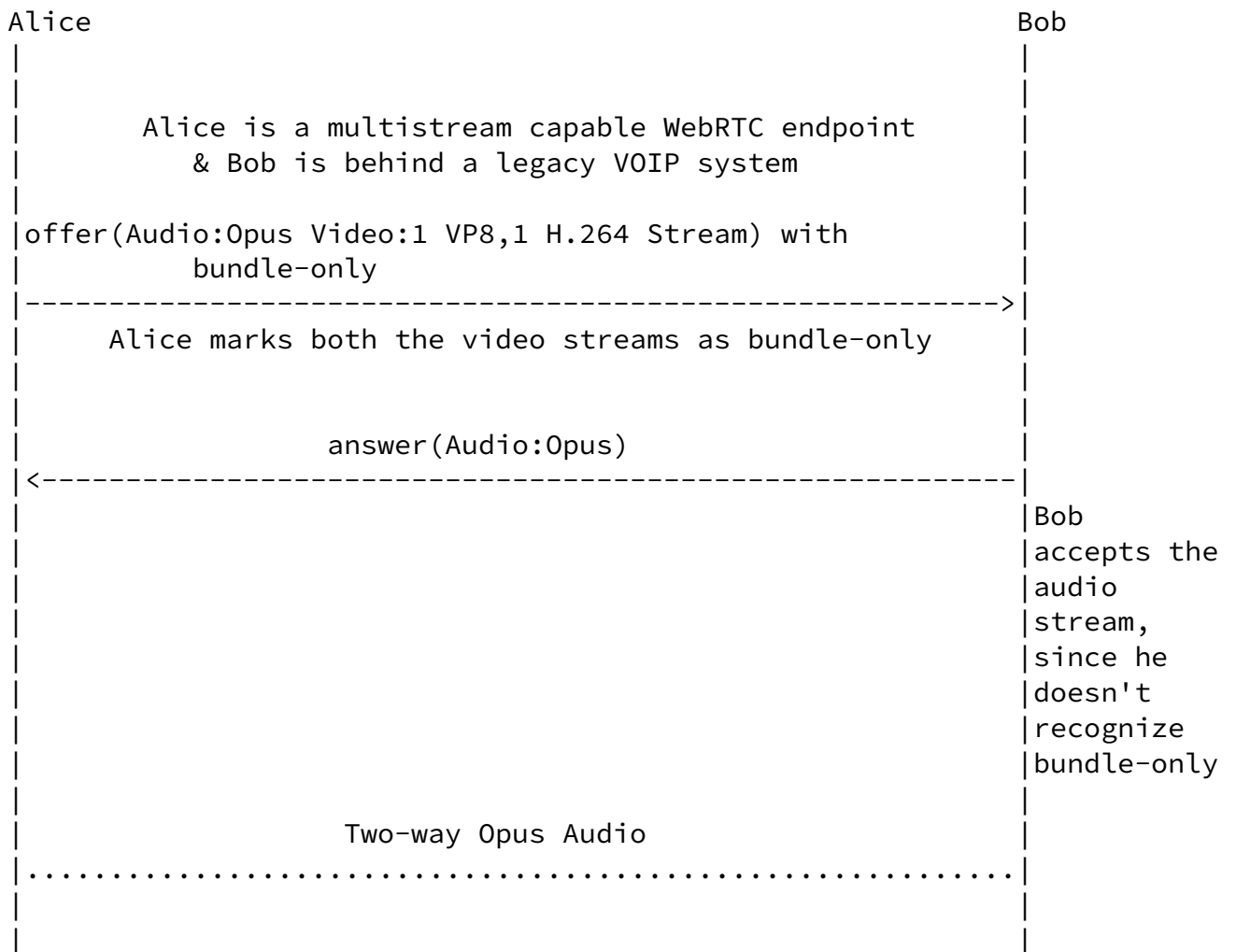
Table 40: 5.4.2 SDP Answer

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

In the scenario described below, Alice is a multi-stream capable WebRTC endpoint, while Bob is a legacy VOIP endpoint. The SDP offer/answer exchange demonstrates successful session setup with fallback to an audio-only stream negotiated via the bundle-only framework between the endpoints. Specifically:

- \* The offer from Alice describes 2 cameras via 2 video m=lines with both marked as bundle-only.
- \* Bob doesn't recognize the BUNDLE mechanism and since Alice has marked both the video m=lines with port 0, Bob accepts just the audio stream from Alice.

NOTE: Alice is unaware of whether Bob supports the BUNDLE framework. Alice includes separate RTP/RTCP ports and candidate information.



```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20519 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=group:BUNDLE m0 m1 m2
|
+-----
|a=group:LS m0 m1
+-----
|a=ice-options:trickle

```

```
+-----+
|a=ice-options:ice2
+-----+
|***** Audio m=line *****
+-----+
|m=audio 54609 UDP/TLS/RTP/SAVPF 109
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=mid:m0
|
+-----+
|a=msid:ma ta
|
+-----+
|a=sendrecv
+-----+
|a=rtpmap:109 opus/48000/2
+-----+
|a=maxptime:120
+-----+
|a=ice-ufrag:074c6550
+-----+
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----+
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----+
|a=setup:actpass
+-----+
|a=tls-id:89J2LRATQ3ULA24G9AHWVR31VJWSLB68
+-----+
|a=rtcp-mux
+-----+
|a=rtcp:64678 IN IP4 203.0.113.141
+-----+
|a=rtcp-rsize
+-----+
|a=extmap:1 urn:ietf:params:rtp-hdext:ssrc-audio-level
+-----+
|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 61665 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54609 typ srflx raddr 192.0.2.4
+-----+
|a=candidate:0 1 UDP 2113667326 192.0.2.4 61667 typ host
```

+-----

Internet-Draft

SDP4WebRTC

December 2020

|a=candidate:1 1 UDP 1694302206 203.0.113.141 64678 typ srflx raddr 192.0.2.

+-----

|\*\*\*\*\* Video-1 m=line \*\*\*\*\*

+-----

|m=video 0 UDP/TLS/RTP/SAVPF 98

|

+-----

|c=IN IP4 203.0.113.141

+-----

|a=bundle-only

+-----

|a=mid:m1

|

+-----

|a=msid:ma tb

|

+-----

|a=sendrecv

+-----

|a=rtpmap:98 VP8/90000

+-----

|a=imageattr:98 [x=1280,y=720]

+-----

|a=fmtp:98 max-fr=30

+-----

|a=rtcp-fb:\* nack

+-----

|a=rtcp-fb:\* nack pli

+-----

|a=rtcp-fb:\* ccm fir

+-----

|a=extmap:2 urn:ietf:params:rtp-hdext:sdes:mid

+-----

|\*\*\*\*\* Video-2 m=line \*\*\*\*\*

+-----

|m=video 0 UDP/TLS/RTP/SAVPF 101

|

+-----

|c=IN IP4 203.0.113.141

+-----

```
|a=bundle-only
```

```
+-----
```

```
|a=mid:m2
```

```
|
```

```
+-----
```

```
|a=msid:ma tc
```

```
|
```

```
+-----
```

```
|a=sendrecv
```

```
+-----
```

```
|a=rtpmap:101 H264/90000
```

```
+-----
```

```
|a=fmtp:101 profile-level-id=4d0028;packetization-mode=1
```

```
+-----
```

```
|a=rtcp-fb:* nack
```

```
+-----
```

```
|a=rtcp-fb:* nack pli
```

```
+-----
```

```
|a=rtcp-fb:* ccm fir
```

```
+-----
```

```
|a=extmap:2 urn:ietf:params:rtp-hdrext:sdes:mid
```

```
+-----
```

Table 41: 5.4.3 SDP Simulcast bundle-only

```
+=====
```

```
|Answer SDP Contents
```

```
+=====
```

```
|v=0
```

```
+-----
```

```
|o=- 20519 0 IN IP4 0.0.0.0
```

```
+-----
```

```
|s=-
```

```
+-----
```

```
|t=0 0
```

```
+-----
```

```
|***** Audio m=line *****
```

```
+-----
```

```
|m=audio 49203 UDP/TLS/RTP/SAVPF 109
```

```
+-----
```

```
|c=IN IP4 203.0.113.141
```

+-----  
|a=rtcp:60065 IN IP4 203.0.113.141  
+-----

|a=sendrecv  
+-----

|a=rtpmap:109 opus/48000/2  
+-----

|a=maxptime:120  
+-----

|a=ice-ufrag:c300d85b  
+-----

|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2  
+-----

|a=fingerprint:sha-256

|6B:8B:F0:65:5F:78:E2:51:3B:AC:6F:F3:3F:46:1B:35:DC:B8:5F:64:1A:24:C2:43:F0:  
+-----

|a=setup:active  
+-----

|a=rtcp-rsize  
+-----

|a=extmap:1 urn:ietf:params:rtp-hdrext:ssrc-audio-level  
+-----

|a=candidate:0 1 UDP 2113667327 198.51.100.7 51556 typ host  
+-----

|a=candidate:1 1 UDP 694302207 203.0.113.77 49203 typ srflx raddr 198.51.100.7  
+-----

|a=candidate:0 2 UDP 2113667326 198.51.100.7 51558 typ host  
+-----

|a=candidate:1 2 UDP 1694302206 203.0.113.77 60065 typ srflx raddr 198.51.100.7  
+-----

|\*\*\*\*\* Video m=line \*\*\*\*\*  
+-----

|m=video 0 UDP/TLS/RTP/SAVPF 98  
|  
|  
|  
+-----

|\*\*\*\*\* Video m=line \*\*\*\*\*  
+-----

|m=video 0 UDP/TLS/RTP/SAVPF 101  
|

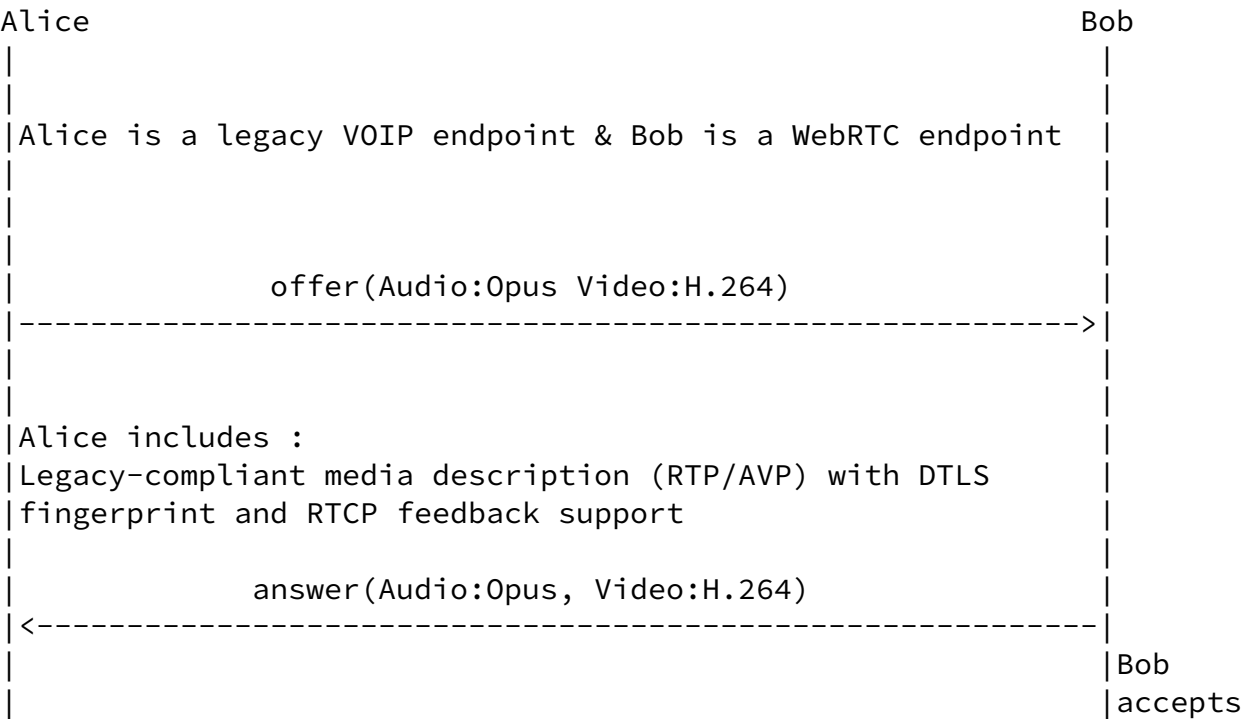
Table 42: 5.4.3 SDP Answer

5.4.4. Legacy Interop with RTP/AVP profile

In the scenario described below, Alice is a legacy endpoint that sends an [RFC3264] offer with RTP/AVP-based audio and video descriptions along with a DTLS fingerprint and RTCP feedback information.

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

Successful Two-way WebRTC <-> VOIP Interop



	"legacy -compliant" m=line
Two-way Opus Audio, H.264 Video	
.....	
Session also supports RTP/RTCP Mux, RTCP Feedback	

```

+=====
|Offer SDP Contents
+=====
|v=0
+-----
|o=- 20518 0 IN IP4 0.0.0.0
+-----
|s=-
+-----
|t=0 0
+-----
|a=ice-ufrag:074c6550
+-----
|a=ice-pwd:a28a397a4c3f31747d1ee3474af08a068
+-----
|a=rtcp-rsize
+-----

```

```

|***** Audio m=line *****
+-----
|m=audio 54732 RTP/AVP 109
|
+-----
|c=IN IP4 203.0.113.141
+-----
|a=fingerprint:sha-256
|19:E2:1C:3B:4B:9F:81:E6:B8:5C:F4:A5:A8:D8:73:04:BB:05:2F:70:9F:04:A9:0E:05:
+-----
|a=rtptime:109 opus/48000
+-----
|a=ptime:20
+-----

```



```

|a=sendrecv
+-----+
|a=rtcp-mux
|
+-----+
|a=rtcp:64678 IN IP4 203.0.113.141
+-----+
|a=candidate:0 1 UDP 2113667327 192.0.2.4 54732 typ host
+-----+
|a=candidate:1 1 UDP 694302207 203.0.113.141 54732 typ srflx raddr 192.0.2.4
+-----+
|a=candidate:0 2 UDP 2113667326 192.0.2.4 64678 typ host
+-----+
|a=candidate:1 2 UDP 1694302206 203.0.113.141 64678 typ srflx raddr 192.0.2.4
+-----+
|***** Video m=line *****
+-----+
|m=video 62445 RTP/AVP 120
|
+-----+
|c=IN IP4 203.0.113.141
+-----+
|a=fingerprint:sha-256
|DC:B8:5F:64:1A:24:C2:43:F0:A1:58:D0:A1:2C:19:08:6B:8B:F0:65:5F:78:E2:51:3B:
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=sendrecv
+-----+
|a=rtcp-mux
|
+-----+
|a=rtcp:54721 IN IP4 203.0.113.141
+-----+

```

```

|a=candidate:0 1 UDP 2113667327 192.0.2.4 62445 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.141 62537 typ srflx raddr 192.0.2.4
+-----+
|a=candidate:0 2 UDP 2113667326 192.0.2.4 54721 typ host
+-----+
|a=candidate:1 2 UDP 1694302206 203.0.113.141 54721 typ srflx raddr 192.0.2.4
+-----+

```

```
|a=rtcp-fb:120 nack pli
|
|
```

```
+-----+
|a=rtcp-fb:120 ccm fir
+-----+
```

Table 43: 5.4.5 SDP Offer

```
+=====+
|Answer SDP Contents
+=====+
|v=0
+-----+
|o=- 16833 0 IN IP4 0.0.0.0
+-----+
|s=-
+-----+
|t=0 0
+-----+
|***** Audio m=line *****
+-----+
|m=audio 49203 RTP/AVP 109
|
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=rtpmap:109 opus/48000
+-----+
|a=ptime:20
+-----+
|a=sendrecv
+-----+
|a=ice-ufrag:c300d85b
+-----+
|a=ice-pwd:de4e99bd291c325921d5d47efbabd9a2
+-----+
|a=fingerprint:sha-256
```

```

+-----+
|a=rtcp-mux
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 49203 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 49203 typ srflx raddr 198.51.10
+-----+
|***** Video m=line *****
+-----+
|m=video 63130 RTP/AVP 120
|
+-----+
|c=IN IP4 203.0.113.77
+-----+
|a=rtpmap:120 VP8/90000
+-----+
|a=sendrecv
+-----+
|a=ice-ufrag:e39091na
+-----+
|a=ice-pwd:dbc325921d5dd29e4e99147efbabd9a2
+-----+
|a=fingerprint:sha-256
|BB:0A:0E:05:E9:26:33:E8:70:88:A2:2F:70:9F:04:19:E2:1C:3B:4B:9F:81:56:2F:70:
+-----+
|a=rtcp-mux
+-----+
|a=candidate:0 1 UDP 2113667327 198.51.100.7 63130 typ host
+-----+
|a=candidate:1 1 UDP 1694302207 203.0.113.77 63130 typ srflx raddr 198.51.10
+-----+
|a=rtcp-fb:120 nack pli
+-----+
|a=rtcp-fb:120 ccm fir
+-----+

```

Table 44: 5.4.5 SDP Answer

## 6. IANA Considerations

This document requires no actions from IANA.

## [7.](#) Security Considerations

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

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

## [8.](#) Acknowledgments

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

Thanks to experts at IESG for careful review and feedback.

Thanks to Peter Yee for a detailed Genart review and suggestions.

## [9.](#) Change Log

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

Changes from [draft-ietf-rtcweb-sdp-11](#)

- \* Address Magnus Westerlund Review comments.
- \* Remove reference to [RFC5245](#) and use ice-sip-sdp instead.
- \* Add an ice2 example for [RFC8445](#).

Changes from [draft-ietf-rtcweb-sdp-09](#)

- \* Review feedback incorporated from Flemming Andreason in [Section 5.4](#)

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

- \* Fixed formatting and syntax issues pointed out by Adam Roach's validator script. List of issues are here: <https://github.com/fluffy/ietf/issues?q=is%3Aissue+is%3Aclosed>

- \* Align examples to match latest bundle specification as pointed by Christer Holmberg

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

- \* Incorporate review from Nils.

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

- \* Keep Alive Version.

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

- \* Title change.

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

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

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

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

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

- \* Version increment to avoid expiry

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

- \* Complete face-lift

Nandakumar & Jennings

Expires 20 June 2021

[Page 118]

---

Internet-Draft

SDP4WebRTC

December 2020

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

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

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

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

- \* Fixed typos
- \* Moved to a WG version

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 Examples
- \* 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](#)

Nandakumar & Jennings

Expires 20 June 2021

[Page 119]

---

Internet-Draft

SDP4WebRTC

December 2020

- \* 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

## [10](#). Informative References

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## [Appendix A](#). Appendix

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

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

### [A.1.1.](#) Common Checklist

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

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

- \* t= line MUST follow with the values for 'start-time' and 'stop-time' set to zeroes.
- \* a=identity line MUST be included at the session level if WebRTC Identity mechanism is being used.
- \* a=ice-options:trickle MUST be present at the session level in all offers and answers when supported.
- \* a=ice-options:ice3 MUST be present at the session level in all offers and answers when supported.

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

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

- \* The media description's port value MUST either be set to the dummy value of '9' or MUST use the port from the default candidate, if available.
- \* The media description's proto value MUST be 'UDP/TLS/RTP/SAVPF' for JSEP offers.
- \* The JSEP answerer MUST support any combination of "RTP/[S]AVP[F]" for interoperability scenarios as defined in section 5 of

- \* c= line MUST be the first line in a media description. A dummy value of 'IN IP 0.0.0.0' is set if there are no candidates gathered or its value MUST match the default candidate.
- \* a=mid attribute MUST be included.
- \* One of a=sendrecv/a=sendonly/a=recvonly/a=inactive SDP direction attributes MUST be present.
- \* a=rtpmap and a=fmtp attributes per primary, retransmission, and forward error correction media format MUST be included.
- \* a=rtcp-fb lines for each supported feedback mechanism MUST be included when using RTP with feedback.
- \* a=imageattr can be optionally present for video media descriptions.

- \* a=msid line MUST be included for all the media senders identifying the MediaStreamTrack (i.e., when a=sendonly/a=sendrecv attribute is present).
- \* a=extmap line identifying the RTP MID header extension" MUST be present.
- \* a=extmap line for other supported RTP header extensions MUST be included.
- \* a=rid line 'per encoding' with the direction of 'send' MUST be included when further constraining the media format or multiple encodings per media format is needed.
- \* a=simulcast line MUST be present if there exists more than one 'a=rid' lines for the media senders.
- \* a=bundle-only attribute MUST be present for media descriptions that are impacted by various bundle policies (such as max-bundle/



balanced)

- \* For media descriptions that aren't "a=bundle-only" and that have unique address, the following attributes MUST be present:
  - a=ice-ufrag and a=ice-pwd
  - a=fingerprint
  - a=setup with value 'actpass' in the offers and a value of 'active'/'passive' in the answerer.
  - a=tls-id
  - a=rtcp
  - a=rtcp-mux
  - For offerers requiring RTCP to be multiplexed, 'a=rtcp-mux-only' line
  - a=rtcp-rsize
- \* a=group:BUNDLE line with all the 'mid' identifiers part of the BUNDLE group is included at the session-level.
- \* a=group:LS session level attribute MUST be included with the 'mid' identifiers that are part of the same lip sync group.

#### [A.1.3.](#) Data Channel Media Description checklist

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

- \* Media description's proto value MUST be 'UDP/DTLS/SCTP' in the JSEP offers.
- \* A JSEP answerer MUST support reception of 'UDP/DTLS/SCTP'/'TCP/DTLS/SCTP'/'DTLS/SCTP' for backward compatibility reasons.

- \* A value of 'webrtc-datachannel' MUST be used for the media description 'fmt' value.
- \* a=mid line MUST be present.
- \* a=sctp-port with an SCTP port number MUST be included.
- \* a=max-message-size MAY be included, if appropriate.

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