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RTP/SDP for Opus Multistream
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Abstract

This document specifies RTP/SDP signaling for Opus multistream (multi-channel) operation, enabling negotiation of layouts such as 5.1 and 7.1 in real-time communications. It defines an SDP encoding name and format parameters to describe multistream configurations, and specifies Offer/Answer procedures for interoperable negotiation. This document does not define new Opus codec behavior. It extends the the SDP signaling defined in [RFC7587] and reuses the channel-mapping semantics defined in [RFC7845].

Status of This Memo

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

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This Internet-Draft will expire on 18 October 2026.

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1. Introduction

Opus ([RFC6716]) supports up to 255 channels via multistream encoding with explicit channel mapping. The RTP payload format for Opus ([RFC7587]), however, standardizes only mono and stereo signaling and does not dfeind for RTP/SDP for multistream operation.

[RFC7845] defines channel-mapping families for Opus carried in the Ogg container, assigning semantic meaning to decoded output channels (e.g., speaker positions or spherical harmonics). Theses mapping families do not alter the Opus bitstream or RTP payload format, but define how decoded channels are to be interpreted.

This document fills that gap by specifying interoperable SDP signaling and Offer/Answer procedures for multistream operations in RTP sessions, while reusing the channel mapping semantics defined in [RFC7845].

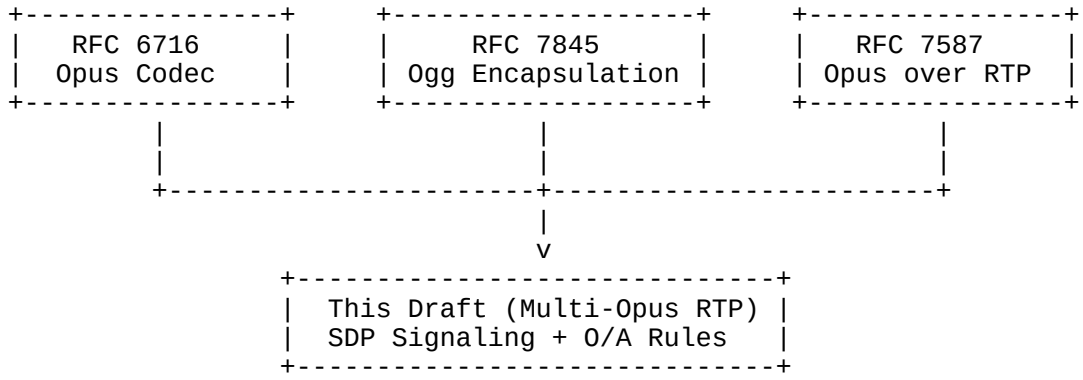
This document is limited to RTP/SDP signaling for Opus multistream configurations already defined in [RFC6716], [RFC7587], and [RFC7845]. It does not define new Opus codec features, bitstream formats, or decoding behavior.

The MLCODEC Working Group is defining extensions to the Opus codec that may introduce new codec capabilities. Such extensions are out of scope for this document. Future Opus codec extensions may reuse the SDP signaling framework defined here, subject to the constraints of the extension specification.

2. Relationship to Existing RFCs

This section summarizes the scope and relationship between [RFC6716] (Opus codec), [RFC7587] (Opus over RTP), [RFC7845] (Ogg encapsulation of Opus), and this draft. While [RFC7845] defines channel mapping families for multistream Opus in the Ogg container, it does not define SDP signaling or RTP usage. [RFC7587] defines the RTP payload format for Opus but only covers mono/stereo signaling. This draft extends [RFC7587] to define SDP signaling for multistream Opus in RTP sessions and reuses the mapping semantics from [RFC7845].

3. Relationship of RFCs and This Draft:



4. Summary of RFCs and This Draft:

RFC/Draft	Scope	Defines Channel Map?	Defines SDP Signaling
RFC 6716	Opus codec	Yes (API level)	No
RFC 7845	Ogg encapsulation	Yes (families)	No
RFC 7587	RTP payload format	No (mono/stereo only)	Yes (mono/stereo)
This Draft	RTP multistream SDP	Reuses RFC 7845	Yes (multi-channel)

5. Overview and Rationale

Deployed systems (e.g., [libwebrtc] based) interoperate using a non-standard SDP encoding name “multiopus” with fmtp parameters such as num_streams, coupled_streams, and channel_mapping. Standardizing these semantics improves interoperability and removes the need for application-level SDP text modifications.

6. SDP Signaling for Opus Multistream

6.1. SDP Syntax for Multichannel Opus

6.1.1. SDP Example for 5.1 Audio

sdp a=rtpmap:111 multiopus/48000/6 a=fmtp:111 num_streams=4;coupled_streams=2;channel_mapping=0,4,1,2,3,5

6.1.2. SDP Example for 7.1 Audio

sdp a=rtpmap:111 multiopus/48000/8 a=fmtp:111 num_streams=5;coupled_streams=3;channel_mapping=0,6,1,2,3,4,5,7

6.1.3. Mapping Families and Extensibility

Channel mapping families define the semantic interpretation of decoded output channels and do not affect the RTP payload format beyond establishing the number of streams and output channels.

This document normatively specifies SDP signaling for mapping family 1 (channel-based speaker layouts) as defined in [RFC7845]. The SDP signaling mechanism is designed to be extensible to additional mapping families (e.g., Ambisonics or externally defined mappings) without changes to the RTP payload format.

An endpoint that receives an offer specifying a mapping family it does not support MUST reject that payload type during Offer/Answer negotiation.

6.1.4. Field Descriptions

* a=rtpmap:<pt> multiopus/48000/<channel-count>
  - <pt>: Dynamic payload type (e.g., 96).
  - 48000: Fixed clock rate for Opus.
  - <channel-count>: Total number of output channels resulting from decoding.
* a=fmtp:<pt> num_streams=<N>;coupled_streams=<M>;channel_mapping=<C>
  - num_streams: Total number of Opus streams.
  - coupled_streams: Number of stereo (coupled) streams.
  - channel_mapping: Comma-separated list defining the mapping from decoded channels to semantic output positions, following the channel mapping semantics defined in [RFC7845].

6.1.5. Field Presence and Constraints

The "channel_mapping" parameter is REQUIRED for configurations with more than two output channels.

For configurations with a single stream and one or two output channels, "channel_mapping" MAY be omitted. If omitted, the receiver MUST interpret the configuration as equivalent to [RFC7845] mapping family 0 semantics for mono or stereo output.

The values of "num_streams", "coupled_streams", and each entry in "channel_mapping" MUST be integers in the range 0..255.

For mapping family 1, the number of output channels MUST NOT exceed 8.

7. Offer/Answer Procedures

An offerer willing to negotiate multichannel Opus MAY include one or more payload types using multiopus with appropriate fmtp parameters, and SHOULD include a stereo alternative using opus/48000/2 ([RFC7587]) for backward compatibility.

An answerer that supports the offered configuration if it can parse the offered paramters and decode the resulting multichannel audio without loss of the negotiated channel semantics.

If the answer supports the offered multiopus configration, it MUST select the corresponding payload type and include the selected multistream parameters in the answer.

If unsupported, the answerer MAY select a stereo opus payload or reject the m-section per [RFC3264]. An answer that supports the offered configurations SHOULD NOT silently down-convert the decoded output to streo without indicating that behavor to the application.

7.1. Examples

7.1.1. Offer: 5.1 (6 channels)

```
m=audio 9 UDP/TLS/RTP/SAVPF 111 112 a=mid:audio a=rtpmap:111
multiopus/48000/6 a=fmtp:111
num_streams=4;coupled_streams=2;channel_mapping=0,4,1,2,3,5
a=rtpmap:112 opus/48000/2 a=sendrecv
```

7.1.2. Answer: accept 5.1

```
m=audio 9 UDP/TLS/RTP/SAVPF 111 a=mid:audio a=rtpmap:111
multiopus/48000/6 a=fmtp:111
num_streams=4;coupled_streams=2;channel_mapping=0,4,1,2,3,5
a=sendrecv
```

7.2. Security Considerations

The use of the multiopus encoding in SDP does not introduce new security concerns beyond those already described in [RFC7587]. Implementers should ensure that SDP parsing and RTP payload handling are robust against malformed or malicious input. Applications using multichannel Opus streams must also consider the privacy implications of transmitting spatial audio data, which may reveal environmental context.

Transport-level security mechanisms such as DTLS-SRTP are recommended to protect RTP streams.

7.3. IANA Considerations

This document does not require any new IANA registrations. The multiopus encoding name and associated SDP attributes are used in accordance with existing conventions and do not introduce new protocol elements.

8. Informative References

[libwebrtc] WebRTC, "Opus multistream mapping", n.d., <https://webrtc-review.googlesource.com/c/src/+/129768>.

[RFC3264] Rosenberg, J. and H. Schulzrinne, "An Offer/Answer Model with Session Description Protocol (SDP)", RFC 3264, DOI 10.17487/RFC3264, June 2002, <https://www.rfc-editor.org/rfc/rfc3264>.

[RFC6716] Valin, JM., Vos, K., and T. Terriberry, "Definition of the Opus Audio Codec", RFC 6716, DOI 10.17487/RFC6716, September 2012, <https://www.rfc-editor.org/rfc/rfc6716>.

[RFC7587] Spittka, J., Vos, K., and JM. Valin, "RTP Payload Format for the Opus Speech and Audio Codec", RFC 7587, DOI 10.17487/RFC7587, June 2015, <https://www.rfc-editor.org/rfc/rfc7587>.

[RFC7845] Terriberry, T., Lee, R., and R. Giles, "Ogg Encapsulation for the Opus Audio Codec", RFC 7845, DOI 10.17487/RFC7845, April 2016, <https://www.rfc-editor.org/rfc/rfc7845>.

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