

AVTCORE Working Group
INTERNET-DRAFT
Category: Standards Track
Expires: September 3, 2026

B. Aboba
P. Hancke
Microsoft Corporation
J. Qiu
Intel Corporation
2 March 2026

H.265 Profile for WebRTC
draft-ietf-avtcore-hevc-webrtc-07.txt

Abstract

RFC 7742 defines WebRTC video processing and codec requirements, including guidance for endpoints supporting the VP8 and H.264 codecs, which are mandatory to implement. With support for H.265 under development in WebRTC browsers, similar guidance is needed for browsers considering support for the H.265 codec, whose RTP payload format is defined in RFC 7798.

Status of This Memo

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

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

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

This Internet-Draft will expire on September 3, 2026.

Copyright Notice

Copyright (c) 2026 IETF Trust and the persons identified as the document authors. All rights reserved.

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

Table of Contents

1. Introduction	3
1.1. Terminology	3
1.2. Abbreviations	3
2. H.265 Support	4
2.1. Parameters	4
2.2. Feedback	5
2.2. Packetization	5
3. Security Considerations	6
4. IANA Considerations	6
5. References	6
5.1. Normative References	6
5.2. Informative References	7
Acknowledgments	7
Authors' Addresses	7

1. Introduction

"RTP Payload Format for High Efficiency Video Coding (HEVC)" [RFC7798] defines the encapsulation of H.265 [H.265] within the Real-time Transport Protocol (RTP) [RFC3550]. While "WebRTC Video Processing and Codec Requirements" [RFC7742] provides guidance for endpoints supporting the mandatory to implement VP8 and H.264 codecs, it does not cover H.265. With H.265 support under development within browsers [HEVC-WebKit][HEVC-Chrome] there is a need to for an interoperability profile of [RFC7798] for WebRTC implementations choosing to support H.265.

1.1. 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.

1.2. Abbreviations

AP	Aggregation Packet
BLA	Broken Link Access
CRA	Clean Random Access
FU	Fragmentation Unit
IDR	Instantaneous Decoding Refresh
IRAP	Intra Random Access Point
MANE	Media-Aware Network Element
MRMT	Multiple RTP streams on Multiple media Transports
MRST	Multiple RTP streams on a Single media Transport
NAL	Network Abstraction Layer
NALU	Network Abstraction Layer Unit
PACI	PAYload Content Information
PPS	Picture Parameter Set
SEI	Supplemental Enhancement Information
SFM	Selectively Forwarding Middlebox
SPS	Sequence Parameter Set
SRST	Single RTP stream on a Single media Transport
TID	Temporal Identifier
TSCI	Temporal Scalability Control Information
VCL	Video Coding Layer
VPS	Video Parameter Set

2. H.265 Support

Support for the H.265 video codec is OPTIONAL for WebRTC browsers and non-browsers. Implementations supporting H.265 that conform to this specification MUST support receiving H.265 and MAY support sending H.265.

For the H.265 [H.265] codec, endpoints MUST support the payload formats defined in [RFC7798]. In addition, they MUST support Main Profile Level 3.1 (level-id=93) and SHOULD support Main Profile Level 4 (level-id=120).

[RFC7798] Section 4.5 defines how TSCI is communicated using PACI Extensions defined in [RFC7798] Section 4.4.4.2. A WebRTC implementation that has negotiated use of RTP header extensions containing TSCI information (such as the Dependency Descriptor [DD]) SHOULD NOT send TSCI information within the PACI. If TSCI information is being received in an RTP header extension, implementations MUST ignore TSCI information contained in the PACI.

[RFC7798] Section 4.4.2 describes how APs are carried within RTP payloads:

"An AP consists of a payload header (denoted as PayloadHdr) followed by two or more aggregation units... The value of TID MUST be the lowest value of TID of all the aggregated NAL units.

Informative note: All VCL NAL units in an AP have the same TID value since they belong to the same access unit. However, an AP may contain non-VCL NAL units for which the TID value in the NAL unit header may be different than the TID value of the VCL NAL units in the same AP."

Within an RTP payload, VCL NAL units MUST NOT be aggregated with non-VCL NAL units with a lower TID value. Instead the non-VCL NAL units with a lower TID value MUST be packetized within a distinct RTP packet. This ensures that a MANE or SFM can forward VCL and non-VCL NAL units to the correct set of participants.

2.1. Parameters

Implementations of the H.265 codec have utilized a wide variety of optional parameters. The H.265 "media format" includes the following fmp parameters: profile-id, tier-flag, and tx-mode.

To improve interoperability, the following parameter settings are specified:

level-id: Implementations SHOULD include this parameter within SDP and MUST interpret it when receiving it. If no level-id is present, a value of 93 (i.e., Level 3.1) MUST be inferred.

On a sendrecv m-line, the offered level-id represents the maximum that can be both sent and received; on a sendonly m-line, the offered level-id represents the maximum that can be sent; on a recvonly m-line, the offered level-id represents the maximum that can be received.

As noted in [RFC7798] Section 5, the "highest level indicated by the answer is either equal to or lower than that in the offer."

tx-mode: Implementations SHOULD include this parameter within SDP. If no tx-mode parameter is present, a value of "SRST" MUST be inferred. Implementations MUST support "SRST"; support for "MRST" and "MRMT" are OPTIONAL. Implementations that do not support "MRST" or "MRMT" MUST NOT include these tx-mode values in SDP.

sprop-sps, sprop-pps, sprop-vps, sprop-sei: H.265 allows sequence and picture information to be sent both in-band and out-of-band. WebRTC implementations MUST signal this information in-band. This means that WebRTC implementations MUST NOT include these parameters in the SDP they generate, and SHOULD silently ignore these parameters if they are received. An IDR/CRA/BLA sent MUST always be preceded by the relevant parameter sets sent in a packet (not necessarily a separate packet) with the same RTP timestamp as the IDR/CRA/BLA.

When the use of the video orientation (CVO) RTP header extension is not signaled as part of the SDP, H.265 implementations MAY send and SHOULD support proper interpretation of Display Orientation SEI messages.

[RFC7798] Section 8.3 specifies the use of the Reference Picture Selection Indication (RPSI) in H.265. Implementations MUST use the RPSI feedback message only as a reference picture selection request, and MUST NOT use it as positive acknowledgement. Receivers that detect that H.265 encoder-decoder synchronization has been lost SHOULD generate an RPSI feedback message if support for RPSI has been negotiated, unless the receiver has knowledge that the sender does not support RPSI. Such knowledge can be established during capability exchange or through previously sent RPSI requests that were not replied to by the sender through the use of a non-IRAP picture. An RTP packet-stream sender that receives an RPSI message MUST act on that message, and SHOULD change the reference picture.

Unless otherwise signaled, WebRTC implementations that support H.265 MUST encode and decode pixels with an implied 1:1 (square) aspect ratio.

2.2. Feedback

[RFC7798] Section 8.3 specifies the use of the Reference Picture Selection Indication (RPSI) in H.265. Implementations MUST use the RPSI feedback message only as a reference picture selection request, and MUST NOT use it as positive acknowledgement. Receivers that detect that H.265 encoder-decoder synchronization has been lost SHOULD generate an RPSI feedback message if support for RPSI has been negotiated, unless the receiver has knowledge that the sender does not support RPSI. Such knowledge can be established during capability exchange or through previously sent RPSI requests that were not replied to by the sender through the use of a non-IRAP picture. An RTP packet-stream sender that receives an RPSI message MUST act on that message, and SHOULD change the reference picture.

2.3. Packetization

[RFC7798] Section 5 specifies the packetization rules for H.265. In addition to these rules, Prefix SEI NAL units in an IRAP picture MUST NOT be packetized before any VPS, SPS and PPS NAL units. This ensures they will be assembled as part of IRAP picture without being dropped.

3. Security Considerations

This document is subject to the security considerations described in Section 7 of [RFC7742].

In addition to those security considerations, H.265 implementers are advised to take note of the "Security Considerations" Section 9 of [RFC7798], including requirements pertaining to SEI messages.

4. IANA Considerations

This document does not require actions by IANA.

5. References

5.1. Normative References

- [DD] Alliance for Open Media (AOMedia), "Dependency Descriptor RTP Header Extension", <https://aomediacodec.github.io/av1-rtp-spec/#dependency-descriptor-rtp-header-extension>, retrieved September 19, 2023.
- [H.265] ITU-T, "High efficiency video coding", ITU-T Recommendation H.265, April 2013.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC3550] Schulzrinne, H., Casner, S., Frederick, R., and V. Jacobson, "RTP: A Transport Protocol for Real-Time Applications", STD 64, RFC 3550, DOI 10.17487/RFC3550, July 2003, <<https://www.rfc-editor.org/info/rfc3550>>.
- [RFC7742] Roach, A. B., "WebRTC Video Processing and Codec Requirements", RFC 7742, DOI 10.17487/RFC7742, March 2016, <<https://www.rfc-editor.org/info/rfc7742>>.
- [RFC7798] Wang, Y.K., Sanchez, Y., Schierl, T., Wenger, S. and M. Hannuksela, "RTP Payload Format for High Efficiency Video Coding (HEVC)", RFC 7798, DOI 10.17487/RFC7798, March 2016, <<https://www.rfc-editor.org/info/rfc7798>>.
- [RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words", RFC 8174, DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

5.2. Informative References

- [HEVC-WebKit] Shin, S. Qiu, J. and J. Zhu, "WebRTC HEVC RFC 7798 RTP Payload Format Implementation", <https://github.com/WebKit/WebKit/pull/15494> (work in progress), retrieved July 9, 2023.
- [HEVC-Chrome] "Issue 13485: Need the support of H.265", <https://bugs.chromium.org/p/webrtc/issues/detail?id=13485> (work in progress), submitted December 8, 2021.

Acknowledgments

We would like to thank Stephan Wenger, Jonathan Lennox, Harald Alvestrand, Philip Eliasson and Henrik Bostrom for their discussions of this problem space.

Bernard Aboba who was the driving force behind this specification passed away on February 1st, 2025.

Authors' Addresses

Bernard Aboba
Microsoft Corporation

Email: bernard.aboba@gmail.com

Philipp Hancke
Email: philipp.hancke@googlemail.com

Jianlin Qiu
Intel Corporation

Email: jianlin.qiu@intel.com

