



XMPP

XEP-0299: Codecs for Jingle Video

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This document describes implementation considerations related to video codecs for use in Jingle RTP sessions.

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1 Introduction

[Jingle RTP Sessions \(XEP-0167\)](#)¹ defines the [Jingle \(XEP-0166\)](#)² signalling exchanges needed to establish video sessions using the Real-time Transport Protocol [RFC 3550](#)³; however, it does not say which video codecs are mandatory-to-implement, since the state of codec technologies is more fluid than the signalling interactions. This document fills that gap by providing guidance to Jingle developers regarding voice and video codecs.

Because codec technologies are typically subject to patents, the topics discussed here are controversial. This document attempts to steer a middle path between (1) specifying mandatory-to-implement technologies that realistically will not be implemented and deployed and (2) providing guidelines that, while realistic, do not encourage the implementation and deployment of patent-clear technologies.

This document does not yet provide binding recommendations to the XMPP developer community regarding mandatory-to-implement technologies; however, it provides input that the [XMPP Standards Foundation \(XSF\)](#)⁴ could use in making such recommendations.

2 Basic Considerations

The ideal codec would meet the following criteria:

Quality The encoding quality is acceptable for deployment among XMPP users.

Packetization The specification of the codec clearly defines packetization of data for sending over RTP.

Availability The codec can be implemented on a wide variety of computing platforms and is commonly used in Internet or other systems.

Patents The codec is patent-clear. The term patent-clear does not necessarily mean that no patents have ever been applied for or granted regarding a technology, or that the technology is completely free from patents (since such a judgment is nearly impossible to make, and is outside the purview of the XMPP developer community and the XMPP Standards Foundation); the term means only that those who implement the technology are generally understood to be relatively safe from the threat of patent litigation, either because any relevant patents have expired, were filed in a defensive manner, or are made available under suitable royalty-free licenses. (Although most XMPP developers would prefer to implement codecs that are patent-clear, such options are not always widely implemented and deployed.)

¹XEP-0167: Jingle RTP Sessions <<https://xmpp.org/extensions/xep-0167.html>>.

²XEP-0166: Jingle <<https://xmpp.org/extensions/xep-0166.html>>.

³RFC 3550: RTP: A Transport Protocol for Real-Time Applications <<http://tools.ietf.org/html/rfc3550>>.

⁴The XMPP Standards Foundation (XSF) is an independent, non-profit membership organization that develops open extensions to the IETF's Extensible Messaging and Presence Protocol (XMPP). For further information, see <<https://xmpp.org/about/xmpp-standards-foundation>>.

Unfortunately, not all codecs meet those criteria. In the remainder of this document we discuss the video codecs that are most appropriate for implementation in Jingle RTP applications.

3 Codecs

3.1 Dirac

Dirac is a general-purpose video compression technology developed by the BBC that has been licensed in the open. It is used for everything from Internet streaming to HDTV. To date there is no RTP packetization definition for Dirac; however, such a format is under development.

| Quality | Packetization | Availability | Patents |
|---------------|------------------|---|--|
| High quality. | Not yet defined. | Freely downloadable under both GPL and LGPL at http://diracvideo.org/ ; patents to lapse. commonly deployed but not yet in video over IP systems because of the lack of an RTP packetization format. | Dirac is patent-clear, and the BBC has allowed its related |

3.2 H.264

H.264 is a technology for video compression jointly designed by the ITU and the [International Organization for Standardization \(ISO\)](#) ⁵. The following table summarizes the available information about H.264.

⁵The International Organization for Standardization develops standards a wide variety of technical domains. For further information, see <http://www.iso.org/>.

| Quality | Packetization | Availability | Patents |
|---------------|--|--|-----------|
| High quality. | See RFC 3984: RTP Payload Format for H.264 Video http://tools.ietf.org/html/rfc3984 | Commonly deployed in commercial video systems. Not freely downloadable; both software implementations and service deployments can be subject to royalty payments for commercial use. | Patented. |

3.3 Theora

According to the theora.org website, the Theora codec is "a free and open video compression format". Theora is based on the VP3 codec originally developed by On2 Technologies and is now maintained by the [Xiph.org Foundation](http://Xiph.org). The following table summarizes the available information about Theora.

| Quality | Packetization | Availability | Patents |
|---------------------|---|---|---|
| Acceptable quality. | See RTP Payload Format for Theora Encoded Video http://tools.ietf.org/html/rfc4315 | Freely downloadable under BSD license at http://theora.org/ ; not yet commonly deployed, especially on devices that have deployed H.264 instead. | On2's patents over VP3 were contributed to the Xiph.org Foundation in 2001. |

3.4 VP8

VP8 is an open video compression format originally developed (as was Theora) by On2 Technologies and released by Google after it acquired On2 Technologies in 2010. The following table summarizes the available information about Theora.

| Quality | Packetization | Availability | Patents |
|---------------|--|---|--|
| High quality. | See RTP Payload Format for VP8 Video RTP Payload Format for VP8 Video http://tools.ietf.org/html/draft-ietf-payload-vp8 . Work in progress.. | Freely downloadable under BSD-like license at http://webmproject.org/ or commonly deployed, especially on devices that have deployed H.264 instead. | Google released the VP8 bitstream format under an irrevocable free patent license in 2010. |

4 Guidance for Implementers

The situation regarding video codecs is more murky, and implementers face difficult tradeoffs. Although Theora is patent-clear and freely implementable, it is not yet commonly deployed. Although Dirac is patent-clear and deployed fairly widely, no RTP packetization format has been defined for it. Although deployment of H.264 is fairly common, it is not patent-clear or freely implementable. For many open-source / free software projects and smaller technology vendors, implementation of H.264 is either impossible (because of patents and licensing restrictions) or prohibitively expensive (because of royalty payments). These developers are strongly encouraged to implement Theora or Dirac and also to urge wider adoption of Theora and Dirac among larger technology vendors. However, this document acknowledges that it may take some time before Theora and Dirac are commonly deployed (especially on mobile devices) and that systems based on H.264 might be dominant in the marketplace for several years. This situation is unfortunate but cannot be directly changed by the XMPP developer community.

5 Mandatory-to-Implement Codecs

Because video codecs are not as mature as audio codecs, it is not yet possible for the XSF to recommend a mandatory-to-implement technology for Jingle video. However, in the future it might be possible to recommend one of the codecs described in this document.

6 Security Considerations

For security considerations related to Jingle RTP sessions, refer to XEP-0167. This document introduces no new security considerations. See also the security considerations described in the relevant codec specifications.

7 IANA Considerations

This document requires no interaction with the [Internet Assigned Numbers Authority \(IANA\)](#)⁶.

8 XMPP Registrar Considerations

This document requires no interaction with the [XMPP Registrar](#)⁷.

9 Acknowledgements

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⁶The Internet Assigned Numbers Authority (IANA) is the central coordinator for the assignment of unique parameter values for Internet protocols, such as port numbers and URI schemes. For further information, see <http://www.iana.org/>.

⁷The XMPP Registrar maintains a list of reserved protocol namespaces as well as registries of parameters used in the context of XMPP extension protocols approved by the XMPP Standards Foundation. For further information, see <https://xmpp.org/registrar/>.