

A Framework for SDP Attributes when Multiplexing

draft-nandakumar-mmusic-sdp-mux-attributes-02

Abstract

The Session Description Protocol (SDP) provides mechanisms to describe attributes of multimedia sessions and of individual media streams (e.g., Real-time Transport Protocol (RTP) sessions) within a multimedia session. In the RTCWeb WG, there is a need to use a single 5-tuple for sending and receiving media associated with multiple media descriptions ("m=" lines). Such a requirement has raised concerns over the semantic implications of the SDP attributes associated with the RTP Sessions multiplexed over a single transport layer flow.

The scope of this specification is to provide a framework for analyzing the multiplexing characteristics of SDP attributes. The specification also categorizes existing attributes based on the framework described herein.

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1. Introduction

TOC

Real-Time Communication Web (RTCWeb) framework requires Real-time Transport Protocol as the media transport protocol and Session Description Protocol (SDP) [\[RFC4566\]](#) for describing and negotiating multi-media communication sessions.

SDP defines several attributes for capturing characteristics that apply to the

individual media descriptions (described by "m=" lines") and the overall multimedia session. Typically different media types (audio, video etc) described using different media descriptions represent separate RTP Sessions that are carried over individual transport layer flows. However, in the RTCWeb WG, a requirement has arisen to multiplex several RTP Sessions over a single transport layer flow. This in turn has made necessary to understand the interpretation and usage of the SDP attributes defined for the multiplexed media descriptions.

Given the number of SDP attributes registered with the IANA [\[IANA\]](#) and possibility of new attributes being defined in the future, there is need for generic future-proof framework to analyze these attributes for their applicability in the transport multiplexing use-cases.

The document starts with providing the motivation for requiring such a framework. This is followed by introduction to the SDP attribute analysis framework/procedures, following which several sections applies the framework to the SDP attributes registered with the IANA [\[IANA\]](#)

2. Terminology

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The key words "MUST", "MUST NOT", "REQUIRED", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [\[RFC2119\]](#).

3. Motivation

TOC

The time and complications of setting up ICE [\[RFC5245\]](#) and DTLS-SRTP [\[RFC5763\]](#) transports for use by RTP, and conservation of ports, forms an requirement to try and reduce the number of transport level flows needed. This has resulted in the definition of ways, such as, [\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#) and [\[I-D.ietf-avt-multiplexing-rtp\]](#) to multiplex RTP over a single transport flow in order to preserve network resources such as port numbers. This imposes further restrictions on applicability of these SDP attributes as they are defined today.

The specific problem is that there are attribute combinations which make sense when specified on independent m-lines -- as with classical SDP -- that do not make sense when those m-lines are then multiplexed over the same transport. To give an obvious example, ICE permits each m-line to have an independently specified ice-ufrag attribute. However, if the media from multiple m-lines is multiplexed over the same ICE component, then the meaning of media-level ice-ufrag attributes becomes muddled.

As of today there are close to 250 SDP attributes registered with the IANA [\[IANA\]](#) and more will be added in the future. There is no clearly defined procedure to establish the validity/applicability of these attribute when used with transport multiplexing.

4. SDP Attribute Analysis Framework

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Attributes in an SDP session description can be defined at the session-level and media-level. These attributes could be semantically grouped as noted below.

- Attributes related to media content such as media type, encoding schemes, payload types.
- Attributes specifying media transport characteristics like RTP/RTCP port numbers, network addresses, QOS.
- Metadata description attributes capturing session timing and origin information.
- Attributes establishing relationships between media streams such as grouping framework

With the above semantic grouping as the reference, the proposed framework classifies each attribute into one of the following categories:

NORMAL

Attributes that can be independently specified when multiplexing and retain their original semantics.

In the example given below, the direction and label attributes are independently specified for audio and video m=lines. These attributes are not impacted by multiplexing these media streams over a single transport layer flow.

```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
m=audio 49172 RTP/AVP 99
a=sendonly
a=label:1
a=rtpmap:99 iLBC/8000
m=video 49172 RTP/AVP 31
a=recvonly
a=label:2
a=rtpmap:31 H261/90000
```

NOT RECOMMENDED

Attributes where multiplexing is not recommended if these attributes are in use in the SDP since doing so MAY result in incorrect behaviors

Example: Multiplexing media descriptions having attribute zrtp-hash defined with the media descriptions lacking it, would either complicate the handling of multiplexed stream or fail multiplexing.

```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=
c=IN IP4 client.biloxi.example.com
t=0 0
m=audio 3456 RTP/AVP 97
a=rtpmap:97 iLBC/8000
```

```
<allOneLine>
a=zrtp-hash:1.10 fe30efd02423cb054e50efd0248742ac7a52c8f91bc2
df881ae642c371ba46df
</allOneLine>
m=video 34567 RTP/AVP 31
a=rtpmap:31 H261/90000
```

IDENTICAL

Attributes that **MUST** be identical across all the media descriptions being multiplexed.

Attributes such as `rtcp-mux` fall into this category. Since RTCP reporting is done per RTP Session, there is no way to receive RTCP control data for the video `m=line` in the example below. Hence `rtcp-mux` **MUST** be repeated for the video `m=line` as well, when multiplexed.

```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=
c=IN IP4 client.biloxi.example.com
t=0 0
m=audio 34567 RTP/AVP 97
a=rtcp-mux
m=video 34567 RTP/AVP 31
a=rtpmap:31 H261/90000
```

SUM

Attributes can be set as they are normally used but software using them in a multiplex case, **MUST** apply the sum of all the attributes being multiplexed instead of trying to use each one. This is typically used for bandwidth or other rate limiting attributes to the underlining transport.

The software parsing the SDP sample below, should use the aggregate Application Specific (AS) bandwidth value from the individual media descriptions to determine the AS value for the multiplexed session. Thus the calculated AS value would be 256+64 bytes for the given example.

```
v=0
o=mhandley 2890844526 2890842807 IN IP4 126.16.64.4
c=IN IP4 client.biloxi.example.com
t=0 0
m=audio 49170 RTP/AVP 0
b=AS:64
m=video 51372 RTP/AVP 31
b=AS:256
```

TRANSPORT

Attributes that can be set normally for multiple items in a multiplexed group but the software **MUST** pick just one of the attribute of the given type for use. The one chosen is the attribute associated with the "`m=`" lines that represents the information being used for the transport of the RTP.

In this example, "a=crypto" attribute is defined for both the audio and the video m=lines. The one that MUST be used for the multiplexed RTP Session is the one that corresponds to m=line with mid "two" even though the audio m=line with mid "one" occurs ahead of it. This is due to BUNDLE grouping semantics **[I-D.ietf-mmusic-sdp-bundle-negotiation]** which mandates the values from mid occurring first on the a=group:BUNDLE line to be considered for setting up the RTP Transport.

```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
a=group:BUNDLE second,first
m=audio 49172 RTP/AVP 99
a=mid:one
a=crypto:1 AES_CM_128_HMAC_SHA1_80
  inline:d0RmdmcmVCspeEc3QGZiNWpVLFJhQX1cfHAWJSoj|2^20|1:32
a=rtptime:99 iLBC/8000
m=video 51374 RTP/AVP 31
a=mid:two
a=crypto:1 AES_CM_128_HMAC_SHA1_80
  inline:EcGZiNWpFJhQXdspc1lekcmVCNWpVLcfHAWJSoj|2^20|1:32
a=rtptime:96 H261/90000
```

SPECIAL

Attributes where the text in the source draft must be consulted for further handling when multiplexed.

As an example, for the attribute extmap, the specification defining the extension MUST be referred to understand the multiplexing implications.

TBD

This category defines attributes that need more information to assign an appropriate category.

The idea behind these categories is to provide recommendations for using the attributes under RTP session multiplexing scenarios.

Section 5 analyzes attributes listed in **IANA** [IANA] grouped under the IETF document that defines them. The "Current" column indicates whether the attribute is currently specified as:

- S -- Session level
 - M -- Media level
 - B -- Both
 - SR -- Source-level (for a single SSRC)
-

5. Analysis of Existing Attributes

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5.1. RFC4566

TOC

RFC4566 [RFC4566] defines the Session Description Protocol (SDP) that is intended for describing multimedia sessions for the purposes of session announcement, session invitation, and other forms of multimedia session initiation

Attr Name	Notes	Current	Category
sendrecv	Not impacted	B	NORMAL
sendonly	Not impacted	B	NORMAL
recvonly	Not impacted	B	NORMAL
inactive	Not impacted	B	NORMAL
cat	Not impacted	S	NORMAL
ptime	Not Impacted	M	NORMAL
maxptime	Not Impacted	M	NORMAL
orient	Not Impacted	M	NORMAL
framerate	Not Impacted	M	NORMAL
quality	Not Impacted	M	NORMAL
rtpmap	Not Impacted	M	NORMAL
fntp	Not Impacted	M	NORMAL
keywds	Not impacted	S	NORMAL
type	Not Impacted	S	NORMAL
tool	Not Impacted	S	NORMAL
charset	Not Impacted	S	NORMAL

sdplang	Not Impacted	B	NORMAL
lang	Not Impacted	B	NORMAL

RFC4566 Attribute Analysis

5.2. RFC4585

TOC

RFC4585 [RFC4585] defines an extension to the Audio-visual Profile (AVP) that enables receivers to provide, statistically, more immediate feedback to the senders and thus allows for short-term adaptation and efficient feedback-based repair mechanisms to be implemented.

Attr Name	Notes	Current	Category
rtcp-fb	Since RTCP feedback are reported per RTP Session, this attribute should be repeated across m= lines	M	IDENTICAL

RFC4585 Attribute Analysis

5.3. RFC5761

TOC

RFC5761 [RFC5761] discusses issues that arise when multiplexing RTP data packets and RTP Control Protocol (RTCP) packets on a single UDP port. It describes when such multiplexing is and is not appropriate, and it explains how the Session Description Protocol (SDP) can be used to signal multiplexed sessions.

Name	Notes	Current	Category
rtcp-mux	RTCP muxing should be repeated across all the m=lines	M	IDENTICAL

RFC5761 Attribute Analysis

5.4. RFC4574

TOC

RFC4574 [RFC4574] defines a new Session Description Protocol (SDP) media-level attribute: "label". The "label" attribute carries a pointer to a media stream in the

context of an arbitrary network application that uses SDP. The sender of the SDP document can attach the "label" attribute to a particular media stream or streams. The application can then use the provided pointer to refer to each particular media stream in its context.

Name	Notes	Current	Category
label	Not Impacted	M	NORMAL

RFC4574 Attribute Analysis

5.5. RFC5432

TOC

RFC5432 [RFC5432] defines procedures to negotiate QOS mechanisms using the Session Description Protocol (SDP) offer/answer model.

Name	Notes	Current	Category
qos-mech-send	QOS mechanism should be same across all the m=lines multiplexed	B	IDENTICAL
qos-mech-recv	AQOS mechanism should be same across all the m=lines multiplexed	B	IDENTICAL

RFC5432 Attribute Analysis

5.6. RFC4568

TOC

RFC4568 [RFC4568] defines a Session Description Protocol (SDP) cryptographic attribute for unicast media streams. The attribute describes a cryptographic key and other parameters that serve to configure security for a unicast media stream in either a single message or a roundtrip exchange.

Name	Notes	Current	Category
crypto		M	TRANSPORT

RFC4568 Attribute Analysis

Open Issue: should this be NORMAL

5.7. RFC5762

TOC

The Real-time Transport Protocol (RTP) is a widely used transport for real-time multimedia on IP networks. The Datagram Congestion Control Protocol (DCCP) is a transport protocol that provides desirable services for real-time applications. **RFC5762** [RFC5762] specifies a mapping of RTP onto DCCP, along with associated signalling, such that real-time applications can make use of the services provided by DCCP

Name	Notes	Current	Category
dccp-service-code	Not recommended due to DCCP service code mismatch between different media types	M	NOT RECOMMENDED

RFC5762 Attribute Analysis

5.8. RFC6773

TOC

RFC6773 [RFC6773] document specifies an alternative encapsulation of the Datagram Congestion Control Protocol (DCCP), referred to as DCCP-UDP. This encapsulation allows DCCP to be carried through the current generation of Network Address Translation (NAT) middleboxes without modification of those middleboxes

Name	Notes	Current	Category
dccp-port	Not recommended due to DCCP service code mismatch between different media types	M	NOT RECOMMENDED

RFC6773 Attribute Analysis

5.9. RFC5506

TOC

RFC5506 [RFC5506] discusses benefits and issues that arise when allowing Real-time Transport Protocol (RTCP) packets to be transmitted with reduced size.

Name	Notes	Current	Category
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rtcp-rsize	RTCP reduced size MUST be repeated across all the m=lines	M	IDENTICAL
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RFC5506 Attribute Analysis

5.10. RFC6787

TOC

The Media Resource Control Protocol Version 2 (MRCPv2) allows client hosts to control media service resources such as speech synthesizers, recognizers, verifiers, and identifiers residing in servers on the network. MRCPv2 is not a "stand-alone" protocol -- it relies on other protocols, such as the Session Initiation Protocol (SIP), to coordinate MRCPv2 clients and servers and manage sessions between them, and the Session Description Protocol (SDP) to describe, discover, and exchange capabilities. It also depends on SIP and SDP to establish the media sessions and associated parameters between the media source or sink and the media server. Once this is done, the MRCPv2 exchange operates over the control session established above, allowing the client to control the media processing resources on the speech resource server. **RFC6787** [RFC6787] defines attributes for this purpose.

Name	Notes	Current	Category
resource	Not Impacted	M	NORMAL
channel	Not Impacted	M	NORMAL
	Not Impacted	M	NORMAL

RFC6787 Attribute Analysis

5.11. RFC5245

TOC

RFC5245 [RFC5245] describes a protocol for Network Address Translator(NAT) traversal for UDP-based multimedia sessions established with the offer/answer model. This protocol is called Interactive Connectivity Establishment (ICE). ICE makes use of the Session Traversal Utilities for NAT (STUN) protocol and its extension, Traversal Using Relay NAT (TURN). ICE can be used by any protocol utilizing the offer/answer model, such as the Session Initiation Protocol (SIP).

Name	Notes	Current	Category
ice-lite	Not Impacted	S	NORMAL

ice-options	Not Impacted	S	NORMAL
ice-options	Not Impacted	S	NORMAL
ice-pwd	Per media-level attribute MUST be used per underlying transport flow	B	TRANSPORT
ice-ufrag	Per media-level attribute MUST be used per underlying transport flow	B	TRANSPORT
candidate	Per media-level attribute MUST be used per underlying transport flow		TRANSPORT
remote-candidates	Per media-level attribute MUST be used per underlying transport flow	M	TRANSPORT

RFC5245 Attribute Analysis

5.12. RFC5285

TOC

RFC5285 [RFC5285] provides a general mechanism to use the header extension feature of RTP (the Real-Time Transport Protocol). It provides the option to use a small number of small extensions in each RTP packet, where the universe of possible extensions is large and registration is de-centralized. The actual extensions in use in a session are signaled in the setup information for that session.

Name	Notes	Current	Category
extmap	Specific RTP extension document MUST be referred	B	SPECIAL

RFC5285 Attribute Analysis

5.13. RFC3605

TOC

Originally, SDP assumed that RTP and RTCP were carried on consecutive ports. However, this is not always true when NATs are involved. **[RFC3605]** specifies an early mechanism to indicate the RTCP port.

Name	Notes	Current	Category
rtcp	Case1:Same RTCP port is repeated across the m=lines.	M	TRANSPORT

RFC3605 Attribute Analysis

5.14. RFC5576

TOC

RFC5576 [RFC5576] defines a mechanism to describe RTP media sources, which are identified by their synchronization source (SSRC) identifiers, in SDP, to associate attributes with these sources, and to express relationships among sources. It also defines several source-level attributes that can be used to describe properties of media sources.

Name	Notes	Current	Category
ssrc	SSRCs repeated over multiple m=lines is forbidden if the m-lines are in the same RTP session.	M	NOT RECOMMENDED
ssrc-group	Refer to section Section 11 for specific analysis of the grouping semantics	M	SPECIAL
cname	Not Impacted [Open Issues: what are the rules for CNAME duplication across sessions?]	SR	NORMAL
previous-ssrc	SSRCs repeated over multiple m=lines complicates multiplexing	SR	NOT RECOMMENDED
fntp	Not Impacted	SR	NORMAL

RFC5576 Attribute Analysis

5.15. RFC6236

TOC

RFC6236 [RFC6236] proposes a new generic session setup attribute to make it possible to negotiate different image attributes such as image size. A possible use case is to make it possible for a low-end hand-held terminal to display video without the need to rescale the image, something that may consume large amounts of memory and processing power. The document also helps to maintain an optimal bitrate for video as only the image size that is desired by the receiver is transmitted.

Name	Notes	Current	Category
imageattr	Not Impacted	M	NORMAL

RFC6236 Attribute Analysis

5.16. RFC6285

TOC

RFC6285 [RFC6285] describes a method using the existing RTP and RTP Control Protocol (RTCP) machinery that reduces the acquisition delay. In this method, an auxiliary unicast RTP session carrying the Reference Information to the receiver precedes or accompanies the multicast stream. This unicast RTP flow can be transmitted at a faster than natural bitrate to further accelerate the acquisition. The motivating use case for this capability is multicast applications that carry real-time compressed audio and video.

Name	Notes	Current	Category
rams-updates	Not recommended	M	NOT RECOMMENDED

RFC6285 Attribute Analysis

5.17. RFC6230

TOC

RFC6230 [RFC6230] describes a framework and protocol for application deployment where the application programming logic and media processing are distributed. This implies that application programming logic can seamlessly gain access to appropriate resources that are not co-located on the same physical network entity. The framework uses the Session Initiation Protocol (SIP) to establish an application-level control mechanism between application servers and associated external servers such as media servers.

Name	Notes	Current	Category
cfw-id	Not Applicable	M	NORMAL

RFC6230 Attribute Analysis

5.18. RFC6364

TOC

RFC6364 [RFC6364] specifies the use of the Session Description Protocol (SDP) to describe the parameters required to signal the Forward Error Correction (FEC) Framework Configuration Information between the sender(s) and receiver(s). This

document also provides examples that show the semantics for grouping multiple source and repair flows together for the applications that simultaneously use multiple instances of the FEC Framework.

Name	Notes	Current	Category
fec-source-flow	Not Impacted	M	NORMAL
fec-repair-flow	Not Impacted	M	NORMAL
repair-window	Not Impacted	M	NORMAL

RFC6364 Attribute Analysis

5.19. RFC4796

TOC

RFC4796 [RFC4796] defines a new Session Description Protocol (SDP) media- level attribute, 'content'. The 'content' attribute defines the content of the media stream to a more detailed level than the media description line. The sender of an SDP session description can attach the 'content' attribute to one or more media streams. The receiving application can then treat each media stream differently (e.g., show it on a big or small screen) based on its content.

Name	Notes	Current	Category
content	Not Impacted	M	NORMAL

RFC4796 Attribute Analysis

5.20. RFC3407

TOC

RFC3407 [RFC3407] defines a set of Session Description Protocol (SDP) attributes that enables SDP to provide a minimal and backwards compatible capability declaration mechanism.

Name	Notes	Current	Category
sqn	Not Impacted	B	NORMAL
csdc	Mismatch in the offered capability description MAY fail	B	TBD

	multiplexing.		
cpar	Mismatch in the offered capability parameters MAY fail multiplexing.	B	TBD
cparmin	Mismatch in the offered capability parameters MAY fail multiplexing.	B	TBD
cparmax	Mismatch in the offered capability parameters MAY fail multiplexing.	B	TBD

RFC3407 Attribute Analysis

5.21. RFC6284

TOC

RFC6284 [RFC6284] presents a port mapping solution that allows RTP receivers to choose their own ports for an auxiliary unicast session in RTP applications using both unicast and multicast services. The solution provides protection against denial-of-service or packet amplification attacks that could be used to cause one or more RTP packets to be sent to a victim client

Name	Notes	Current	Category
portmapping-req	Not recommended, if port mapping is required by the application	M	NOT RECOMMENDED

RFC6284 Attribute Analysis

5.22. RFC6714

TOC

RFC6714 [RFC6714] defines a Message Session Relay Protocol (MSRP) extension, Connection Establishment for Media Anchoring (CEMA). Support of this extension is OPTIONAL. The extension allows middleboxes to anchor the MSRP connection, without the need for middleboxes to modify the MSRP messages; thus, it also enables secure end-to-end MSRP communication in networks where such middleboxes are deployed. This document also defines a Session Description Protocol (SDP) attribute, 'msrp-cema', that MSRP endpoints use to indicate support of the CEMA extension.

Name	Notes	Current	Category
msrp-cema	Not recommended due to legacy interop purposes	M	NORMAL

RFC6714 Attribute Analysis

5.23. RFC4583

TOC

RFC4583 [RFC4583] document specifies how to describe Binary Floor Control Protocol (BFCP) streams in Session Description Protocol (SDP) descriptions. User agents using the offer/answer model to establish BFCP streams use this format in their offers and answers

Name	Notes	Current	Category
floorctrl	Not Impacted	M	NORMAL
confid	Not Impacted	M	NORMAL
userid	Not Impacted	M	NORMAL
floorid	Not Impacted	M	NORMAL

RFC4583 Attribute Analysis

5.24. RFC5547

TOC

RFC5547 [RFC5547] provides a mechanism to negotiate the transfer of one or more files between two endpoints by using the Session Description Protocol (SDP) offer/answer model specified in **[RFC3264]**.

Name	Notes	Current	Category
file-selector	Not Impacted	M	NORMAL
file-transfer-id	Not Impacted	M	NORMAL
file-disposition	Not Impacted	M	NORMAL
file-date,file-iconfile-range	Not Impacted	M	NORMAL
file-iconfile-range	Not Impacted	M	NORMAL

file-iconfile-range	Not Impacted	M	NORMAL
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RFC5547 Attribute Analysis

5.25. draft-ietf-mmusic-media-loopback

TOC

[MEDIA_LOOPBACK] adds new SDP media types and attributes, which enable establishment of media sessions where the media is looped back to the transmitter. Such media sessions will serve as monitoring and troubleshooting tools by providing the means for measurement of more advanced VoIP, Real-time Text and Video over IP performance metrics.

Name	Notes	Current	Category
loopback rtp-pkt-loopback	The attribute MUST be repeated across all m=lines multiplexed	M	IDENTICAL
loopback rtp-media-loopback	Not Impacted	M	NORMAL
loopback-source	Not Impacted	M	NORMAL
loopback-mirror	Not Impacted	M	NORMAL

draft-ietf-mmusic-media-loopback Attribute Analysis

5.26. RFC5760

TOC

RFC5760 [RFC5760] specifies an extension to the Real-time Transport Control Protocol (RTCP) to use unicast feedback to a multicast sender. The proposed extension is useful for single-source multicast sessions such as Source-Specific Multicast (SSM) communication where the traditional model of many-to-many group communication is either not available or not desired.

Name	Notes	Current	Category
rtcp-unicast	The attribute MUST be reported across all m=lines multiplexed	M	IDENTICAL

RFC5760 Attribute Analysis

5.27. RFC3611

TOC

RFC3611 [RFC3611] defines the Extended Report (XR) packet type for the RTP Control Protocol (RTCP), and defines how the use of XR packets can be signaled by an application if it employs the Session Description Protocol (SDP).

Name	Notes	Current	Category
rtcp-xr	The attribute MUST be reported across all m=lines multiplexed	B	IDENTICAL

RFC3611 Attribute Analysis

5.28. RFC5939

TOC

RFC5939 [RFC5939] defines a general SDP Capability Negotiation framework. It also specifies how to provide attributes and transport protocols as capabilities and negotiate them using the framework. Extensions for other types of capabilities (e.g., media types and media formats) may be provided in other documents.

Name	Notes	Current	Category
pcfg	Depends on capability being negotiated	M	SPECIAL
acfg	Depends on capability being negotiated	M	SPECIAL
csup	Depends on capability being negotiated	B	SPECIAL
creq	Depends on capability being negotiateds	B	SPECIAL
acap	Depends on capability being negotiated	B	SPECIAL
tcap	Repeat transport capability across all m= lines	B	IDENTICAL

RFC5939 Attribute Analysis

5.29. draft-ietf-mmusic-sdp-media-capabilities

TOC

Session Description Protocol (SDP) capability negotiation provides a general

framework for indicating and negotiating capabilities in SDP. The base framework defines only capabilities for negotiating transport protocols and attributes.

[MEDIA_CAP] extends the framework by defining media capabilities that can be used to negotiate media types and their associated parameters.

Name	Notes	Current	Category
rmcap	Not Impacted	B	NORMAL
omcap	Not Impacted	B	NORMAL
mfcap	Not Impacted	B	NORMAL
mscap	Not Impacted	B	NORMAL
lcfg	Not Impacted	B	NORMAL
secap	Not Impacted	S	NORMAL

draft-ietf-mmusic-sdp-media-capabilities Attribute Analysis

5.30. RFC4567

TOC

RFC4567 [RFC4567] defines general extensions for Session Description Protocol (SDP) and Real Time Streaming Protocol (RTSP) to carry messages, as specified by a key management protocol, in order to secure the media. These extensions are presented as a framework, to be used by one or more key management protocols. As such, their use is meaningful only when complemented by an appropriate key management protocol.

Name	Notes	Current	Category
key-mgmt	Key management protocol MUST be identical across all the m=lines	B	IDENTICAL

RFC4567 Attribute Analysis

5.31. RFC4572

TOC

RFC4572 [RFC4572] specifies how to establish secure connection-oriented media transport sessions over the Transport Layer Security (TLS) protocol using the Session

Description Protocol (SDP). It defines a new SDP protocol identifier, 'TCP/TLS'. It also defines the syntax and semantics for an SDP 'fingerprint' attribute that identifies the certificate that will be presented for the TLS session. This mechanism allows media transport over TLS connections to be established securely, so long as the integrity of session descriptions is assured.

Name	Notes	Current	Category
fingerprint	Fingerprint value MUST be identical across all the m=lines	B	IDENTICAL

RFC4572 Attribute Analysis

5.32. RFC4570

TOC

RFC4570 [RFC4570] describes how to adapt the Session Description Protocol (SDP) to express one or more source addresses as a source filter for one or more destination "connection" addresses. It defines the syntax and semantics for an SDP "source-filter" attribute that may reference either IPv4 or IPv6 address(es) as either an inclusive or exclusive source list for either multicast or unicast destinations. In particular, an inclusive source-filter can be used to specify a Source-Specific Multicast (SSM) session

Name	Notes	Current	Category
source-filter	he attribute MUST be repeated across all m=lines multiplexed	B	IDENTICAL

RFC4570 Attribute Analysis

5.33. RFC6128

TOC

The Session Description Protocol (SDP) has an attribute that allows RTP applications to specify an address and a port associated with the RTP Control Protocol (RTCP) traffic. In RTP-based source-specific multicast (SSM) sessions, the same attribute is used to designate the address and the RTCP port of the Feedback Target in the SDP description. However, the RTCP port associated with the SSM session itself cannot be specified by the same attribute to avoid ambiguity, and thus, is required to be derived from the "m=" line of the media description. Deriving the RTCP port from the "m=" line imposes an unnecessary restriction. **RFC6128** [RFC6128] removes this restriction by introducing a new SDP attribute.

Name	Notes	Current	Category
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multicast-rtcp	Multicast RTCP port MUST be identical across all the m=lines	B	IDENTICAL
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RFC6128 Attribute Analysis

5.34. RFC6189

[TOC](#)

RFC6189 [RFC6189] defines ZRTP, a protocol for media path Diffie-Hellman exchange to agree on a session key and parameters for establishing unicast Secure Real-time Transport Protocol (SRTP) sessions for Voice over IP (VoIP) applications.

Name	Notes	Current	Category
zrtp-hash	Complicates if all the m=lines are not authenticated	M	NOT RECOMMENDED

RFC6189 Attribute Analysis

5.35. RFC4145

[TOC](#)

RFC4145 [RFC4145] describes how to express media transport over TCP using the Session Description Protocol (SDP). It defines the SDP 'TCP' protocol identifier, the SDP 'setup' attribute, which describes the connection setup procedure, and the SDP 'connection' attribute, which handles connection reestablishment.

Name	Notes	Current	Category
setup	Should be identical across all m=lines	B	R
connection	Should be identical across all m=lines	B	R

RFC4145 Attribute Analysis

5.36. RFC5159

[TOC](#)

RFC5159 [RFC5159] provides descriptions of Session Description Protocol (SDP) attributes used by the Open Mobile Alliance's Broadcast Service and Content Protection specification.

Name	Notes	Current	Category
bcastversion	Might cause legacy interop issues	S	TBD
stkmstream	Might cause legacy interop purposes	B	TBD
SRTPAuthentication	Might cause legacy interop issues	M	TBD
SRTPROCTxRate	Might cause legacy interop issues	M	TBD

RFC5159 Attribute Analysis

5.37. RFC6193

TOC

RFC6193 [RFC6193] specifies how to establish a media session that represents a virtual private network using the Session Initiation Protocol for the purpose of on-demand media/application sharing between peers. It extends the protocol identifier of the Session Description Protocol (SDP) so that it can negotiate use of the Internet Key Exchange Protocol (IKE) for media sessions in the SDP offer/answer model.

Name	Notes	Current	Category
ike-setup	Attribute MUST be identical across all the m=lines	B	IDENTICAL
psk-fingerprint	Attribute MUST be identical across all the m=lines	B	IDENTICAL
ike-esp	Attribute MUST be identical across all the m=lines	B	IDENTICAL
ike-esp-udpencap	Attribute MUST be identical across all the m=lines	B	IDENTICAL

RFC6193 Attribute Analysis

In the case of session multiplexed with multiple m=lines, this SHOULD create only one IPSEC association for all the m=lines.

5.38. RFC6064

TOC

The Packet-switched Streaming Service (PSS) and the Multimedia Broadcast/Multicast Service (MBMS) defined by 3GPP use the Session Description Protocol (SDP) and Real Time Streaming Protocol (RTSP) with some extensions.

RFC6064 [RFC6064] provides information about these extensions and registers the RTSP and SDP extensions with IANA.

Name	Notes	Current	Category
X-predecbufsize	Case1:Aggregate total when video m-lines are muxed Case2:Multiplexing with audio m=lines is invalid	M	NOT RECOMMENDED
X-initpredecbufperiod	Case1:Aggregate total when video m-lines are muxed Case2:Multiplexing with audio m=lines is invalid	M	NOT RECOMMENDED
X-initpostdecbufperiod	Case1:Aggregate total when video m-lines are muxed Case2:Multiplexing with audio m=lines is invalid	M	NOT RECOMMENDED
X-decbyterate	Case1:Aggregate total when video m-lines are muxed Case2:Multiplexing with audio m=lines is invalid	M	NOT RECOMMENDED
3gpp-videopostdecbufsize	Case1:Aggregate total when video m-lines are muxed. Case2:Multiplexing with audio m=lines is invalid	M	NOT RECOMMENDED
framesize	Not Impacted	M	NORMAL
3GPP-Integrity-Key	Not Impacted	S	NORMAL
3GPP-SRTP-Config	Same config SHALL apply to all the m=lines multiplexed	M	NORMAL
alt,alt-default-id	Specifying alternate m=lines when session with multiple m=lines of different types cannot be clearly specified	M	TBD
alt-group	Complicates selection of alternate m=lines grouped with alt-group on multiplexing	M	TBD
3GPP-Adaptation-Support	Not recommended for legacy interop purposes	M	TBD
3GPP-QoE-Metricsn	Not recommended for legacy interop purposes	B	TBD
3GPP-Asset-Info	Not recommended for legacy interop purposes	B	TBD

mbms-mode	Not recommended for legacy interop purposes	B	TBD
mbms-flowid	Multiplexing multiple m=lines complicates FEC mappings to the transport addresses.	M	TBD
mbms-repair	Not recommended for legacy interop purposes	B	TBD

RFC6064 Attribute Analysis

5.39. RFC3108

TOC

RFC3108 [RFC3108] describes conventions for using the Session Description Protocol (SDP) described for controlling ATM Bearer Connections, and any associated ATM Adaptation Layer (AAL)

Name	Notes	Current	Category
aalType	Not recommended for legacy interop purposes	M	TBD
eecid	Not recommended for legacy interop purposes	M	TBD
aalType	Not recommended for legacy interop purposes	M	TBD
capability	Not recommended for legacy interop purposes	M	TBD
qosClass	Not recommended for legacy interop purposes	M	TBD
bcob	Not recommended for legacy interop purposes	M	TBD
stc	Not recommended for legacy interop purposes	M	TBD
upcc	Not recommended for legacy interop purposes	M	TBD
atmQOSparms	Not recommended for legacy interop purposes	M	TBD
atmTrfcDesc	Not recommended for legacy interop purposes	M	TBD
abrParms	Not recommended for legacy interop purposes	M	TBD
abrSetup	Not recommended for legacy interop purposes	M	TBD
bearerType	Not recommended for legacy interop purposes	M	TBD
lij	Not recommended for legacy interop purposes	M	TBD
anycast	Not recommended for legacy interop purposes	M	TBD
cache	Not recommended for legacy interop purposes	M	TBD
bearerSigIE	Not recommended for legacy interop purposes	M	TBD
aalApp	Not recommended for legacy interop purposes	M	TBD
cbrRate	Not recommended for legacy interop purposes	M	TBD
sbcb	Not recommended for legacy interop purposes	M	TBD
clkrec	Not recommended for legacy interop purposes	M	TBD
fec	Not recommended for legacy interop purposes	M	TBD

prtfI	Not recommended for legacy interop purposes	M	TBD
structure	Not recommended for legacy interop purposes	M	TBD
cpsSDUsize	Not recommended for legacy interop purposes	M	TBD
aal2CPS	Not recommended for legacy interop purposes	M	TBD
aal2CPSSDUrate	Not recommended for legacy interop purposes	M	TBD
aal2sscs3661unassured	Not recommended for legacy interop purposes	M	TBD
aal2sscs3661assured	Not recommended for legacy interop purposes	M	TBD
aal2sscs3662	Not recommended for legacy interop purposes	M	TBD
aal5sscop	Not recommended for legacy interop purposes	M	TBD
atmmap	Not recommended for legacy interop purposes	M	TBD
silenceSupp	Not recommended for legacy interop purposes	M	TBD
ecan	Not recommended for legacy interop purposes	M	TBD
gc	Not recommended for legacy interop purposes	M	TBD
profileDesc	Not recommended for legacy interop purposes	M	TBD
vsel	Not recommended for legacy interop purposes	M	TBD
dsel	Not recommended for legacy interop purposes	M	TBD
fsel	Not recommended for legacy interop purposes	M	TBD
onewaySel	Not recommended for legacy interop purposes	M	TBD
codeconfig	Not recommended for legacy interop purposes	M	TBD
isup_usi	Not recommended for legacy interop purposes	M	TBD
isup_usi	Not recommended for legacy interop purposes	M	TBD
chain	Not recommended for legacy interop purposes	M	TBD

RFC3108 Attribute Analysis

5.40. 3GPP TS 24.182

TOC

3GPP TS 24.182 [3GPP TS 24.182] specifies IP multimedia subsystem Custom Alerting tones

Name	Notes	Current	Category
g.3gpp.cat	Not recommended due to interop purposes	M	TBD

3GPP TS 24.182 Attribute Analysis

5.41. 3GPP TS 24.183

TOC

3GPP TS 24.183 [3GPP TS 24.183] specifies IP multimedia subsystem Custom

Ringing Signal

Name	Notes	Current	Category
g.3gpp.crs	Not recommended due to interop purposes	M	TBD

3GPP TS 24.183 Attribute Analysis

5.42. 3GPP TS 24.229

TOC

3GPP TS 24.229 [3GPP TS 24.229]IP multimedia call control protocol based on Session Initial protocol and Session Description Protocol.

Name	Notes	Current	Category
secondary-realm	Not recommended due to interop purposes	M	TBD
visited realm	Not recommended due to interop purposes	M	TBD
omr-m-cksum	Not recommended due to interop purposes	M	TBD
omr-s-cksum	Not recommended due to interop purposes	M	TBD
omr-m-att	Not recommended due to interop purposes	M	TBD
omr-s-att	Not recommended due to interop purposes	M	TBD
omr-s-bw	Not recommended due to interop purposes	M	TBD
omr-m-att	Not recommended due to interop purposes	M	TBD
omr-codecs	Not recommended due to interop purposes	M	TBD

3GPP TS 24.229 Attribute Analysis

5.43. ITU T.38

TOC

ITU T.38[T.38] defines procedures for real-time Group 3 facsimile communications over IP networks.

Name	Notes	Current	Category
T38FaxVersion	Not Impacted	S	NORMAL
T38MaxBitRate	Not Impacted	S	NORMAL
T38FaxFillBitRemoval	Not Impacted	S	NORMAL
T38FaxTranscodingMMR	Not Impacted	S	NORMAL
T38FaxTranscodingJBIG	Not Impacted	S	NORMAL
T38FaxRateManagement	Not Impacted	S	NORMAL
T38FaxMaxBuffer	Not Impacted	S	NORMAL
T38FaxMaxDatagram	Not Impacted	S	NORMAL
T38FaxUdpEC	Not Impacted	S	NORMAL

Historic Attribute Analysis

5.44. ITU-T H.248.15

TOC

ITU-T H.248.15 [**H.248.15**] defines Gateway Control Protocol SDP H.248 package attribute

Name	Notes	Current	Category
h248item	Not recommended for interop purposes	S	TBD

Historic Attribute Analysis

5.45. RFC4975

TOC

RFC4975 [RFC4975] the Message Session Relay Protocol, a protocol for transmitting a series of related instant messages in the context of a session. Message sessions are treated like any other media stream when set up via a rendezvous or session creation protocol such as the Session Initiation Protocol.

Name	Notes	Current	Category
accept-types	Not recommended due to incompatible media types	M	TBD
accept-wrapped-types	Not recommended due to incompatible media types	M	TBD
max-size	Not recommended due to incompatible media types	M	TBD
path	Not recommended due to incompatible media types	M	TBD

RFC4975 Attribute Analysis

5.46. Unknowns

TOC

This section specifies analysis for the attributes that are included for historic usage alone by the [IANA_REF]

Name	Notes	Current	Category
rtpred1	Not Applicable	Not-Applicable	TBD
rtpred2	Not Applicable	Not-Applicable	TBD
PSCid	Not Applicable	Not-Applicable	TBD
bc_service	Not Applicable	Not-Applicable	TBD
bc_program	Not Applicable	Not-Applicable	TBD
bc_service_package	Not Applicable	Not-Applicable	TBD

Unknowns Attribute Analysis

6. bwtype Attribute Analysis

TOC

This section specifies handling of specific bandwidth attributes when used in multiplexing scenarios.

6.1. RFC4566

TOC

Name	Notes	Current	Category
bwtype:CT	Aggregate bandwidth for the conference	S	NORMAL
bwtype:AS	Aggregate RTP session bandwidth	B	NORMAL,SUM

RFC4566 bwtype Analysis

6.2. RFC3556

TOC

RFC3556 [RFC3556] defines an extension to the Session Description Protocol (SDP) to specify two additional modifiers for the bandwidth attribute. These modifiers may be used to specify the bandwidth allowed for RTP Control Protocol (RTCP) packets in a Real-time Transport Protocol (RTP) session

Name	Notes	Current	Category
bwtype:RS		B	NORMAL,SUM;
bwtype:RR		B	NORMAL,SUM

RFC3556 bwtype Analysis

6.3. RFC3890

TOC

RFC3890 [RFC3890] defines a Session Description Protocol (SDP) Transport Independent Application Specific Maximum (TIAS) bandwidth modifier that does not include transport overhead; instead an additional packet rate attribute is defined. The transport independent bit-rate value together with the maximum packet rate can then be used to calculate the real bit-rate over the transport actually used.

Name	Notes	Current	Category
	Application MUST SUM bandwidth from all m=lines of		

bwtype:TIAS same type and MUST NOT use default values	B	SUM
---	---	-----

RFC3890 bwtype Analysis

7. rtcp-fb Attribute Analysis

TOC

This section analyzes rtcp-fb SDP attributes **[RTCP-FB]**.

7.1. RFC4585

TOC

RFC4585 [RFC4585] defines an extension to the Audio-visual Profile (AVP) that enables receivers to provide, statistically, more immediate feedback to the senders and thus allows for short-term adaptation and efficient feedback-based repair mechanisms to be implemented.

Attr Name	Notes	Current	Category
ack	Not Impacted	M	NORMAL
app	Not Impacted	M	NORMAL
nack	Not Impacted	M	NORMAL
trr-int	Not Impacted	M	NORMAL

RFC4585 Attribute Analysis

7.2. RFC5104

TOC

RFC5104 [RFC5104] specifies a few extensions to the messages defined in the Audio-Visual Profile with Feedback (AVPF). They are helpful primarily in conversational multimedia scenarios where centralized multipoint functionalities are in use. However, some are also usable in smaller multicast environments and point-to-point calls.

Attr Name	Notes	Current	Category
ccm	Not Impacted	M	Normal

8. rtcp-fb "ack/nack" Attribute Analysis

TOC

This section analyzes rtcp-fb SDP attributes specific to ack and nack feedback types **[ACK-NACK]**.

8.1. RFC4585

TOC

RFC4585 [RFC4585] defines an extension to the Audio-visual Profile (AVP) that enables receivers to provide, statistically, more immediate feedback to the senders and thus allows for short-term adaptation and efficient feedback-based repair mechanisms to be implemented.

Attr Name	Notes	Current	Category
nack sli	Not Impacted	M	NORMAL
nack pli	Not Impacted	M	NORMAL
ack rpsi	Not Impacted	M	NORMAL
ack app	Feedback parameters MUST be handled in the app specific way when multiplexed	M	SPECIAL
nack rpsi	Not Impacted	M	NORMAL
nack app	Feedback parameters MUST be handled in the app specific way when multiplexed	M	SPECIAL

RFC4585 Attribute Analysis

8.2. RFC6285

TOC

Name	Notes	Current	Category
nack rai	Not Impacted	M	NORMAL



RFC6285 Attribute Analysis

8.3. RFC6679

TOC

RFC6679 [RFC6679] specifies how Explicit Congestion Notification (ECN) can be used with the Real-time Transport Protocol (RTP) running over UDP, using the RTP Control Protocol (RTCP) as a feedback mechanism. It defines a new RTCP Extended Report (XR) block for periodic ECN feedback, a new RTCP transport feedback message for timely reporting of congestion events, and a Session Traversal Utilities for NAT (STUN) extension used in the optional initialisation method using Interactive Connectivity Establishment (ICE)

Name	Notes	Current	Category
nack ecn	Complicates ECN marking when m=lines of different types are used	M	SPECIAL

RFC6679 Attribute Analysis

8.4. RFC6642

TOC

In a large RTP session using the RTP Control Protocol (RTCP) feedback mechanism defined in RFC 4585 [**RFC4585**], a feedback target may experience transient overload if some event causes a large number of receivers to send feedback at once. This overload is usually avoided by ensuring that feedback reports are forwarded to all receivers, allowing them to avoid sending duplicate feedback reports. However, there are cases where it is not recommended to forward feedback reports, and this may allow feedback implosion. RFC6642 [**RFC6642**] memo discusses these cases and defines a new RTCP Third-Party Loss Report that can be used to inform receivers that the feedback target is aware of some loss event, allowing them to suppress feedback. Associated Session Description Protocol (SDP) signaling is also defined.

Name	Notes	Current	Category
tlei	Not Impacted	M	NORMAL
pslei	Not Impacted	M	NORMAL

RFC6642 Attribute Analysis

9. Codec Control Messages Analysis

TOC

This section analyzes rtcp-fb Codec Control Message **[CCM]**.

9.1. RFC5104

TOC

Attr Name	Notes	Current	Category
fir	Not Impacted	M	NORMAL
tmnbr	Not Impacted	M	NORMAL
tstr	Not Impacted	M	NORMAL
vbcm	Not Impacted	M	NORMAL

RFC5104 Attribute Analysis

10. group Attribute Analysis

TOC

This section analyzes SDP "group" semantics **[GROUP-SEM]**.

10.1. RFC5888

TOC

RFC5888 [RFC5888] defines a framework to group "m" lines in the Session Description Protocol (SDP) for different purposes.

Name	Notes	Current	Category
group:LS	Not Impacted	S	NORMAL
group:FID	Not Impacted	S	NORMAL

RFC5888 Attribute Analysis

10.2. RFC3524

TOC

RFC3524 [RFC3524] defines an extension to the Session Description Protocol (SDP) grouping framework. It allows requesting a group of media streams to be mapped into a single resource reservation flow. The SDP syntax needed is defined, as well as a new "semantics" attribute called Single Reservation Flow (SRF).

Name	Notes	Current	Category
group:SRF	Not Impacted	S	NORMAL

RFC3524 Attribute Analysis

10.3. RFC4091

[TOC](#)

RFC4091 [RFC4091] defines the Alternative Network Address Types (ANAT) semantics for the Session Description Protocol (SDP) grouping framework. The ANAT semantics allow alternative types of network addresses to establish a particular media stream.

Name	Notes	Current	Category
group:ANAT	Not Impacted	S	NOT RECOMMENDED

RFC4091 Attribute Analysis

10.4. RFC5956

[TOC](#)

RFC5956 [RFC5956] defines the semantics for grouping the associated source and FEC-based (Forward Error Correction) repair flows in the Session Description Protocol (SDP). The semantics defined in the document are to be used with the SDP Grouping Framework (RFC 5888). These semantics allow the description of grouping relationships between the source and repair flows when one or more source and/or repair flows are associated in the same group, and they provide support for additive repair flows. SSRC-level (Synchronization Source) grouping semantics are also defined in this document for Real-time Transport Protocol (RTP) streams using SSRC multiplexing.

Name	Notes	Current	Category
group:FEC-FR	Not Impacted	S	NORMAL

10.5. RFC5583

TOC

RFC5583 [RFC5583] defines semantics that allow for signaling the decoding dependency of different media descriptions with the same media type in the Session Description Protocol (SDP). This is required, for example, if media data is separated and transported in different network streams as a result of the use of a layered or multiple descriptive media coding process.

Name	Notes	Current	Category
depend lay	Not Impacted	M	NORMAL
depend mdc	Not Impacted	M	NORMAL

RFC5583 Attribute Analysis

11. ssrc-group Attribute Analysis

TOC

This section analyzes "ssrc-group" semantics [**SSRC-GROUP**].

11.1. RFC5576

TOC

Name	Notes	Current	Category
FID	Not Impacted	M	NORMAL
FEC	Not Impacted	M	NORMAL
FEC-FR	Not Impacted	M	NORMAL

RFC5576 Attribute Analysis

12. QoS Mechanism Token Analysis

TOC

This section analyzes QoS tokens specified with SDP[**QOS**].

12.1. RFC5432

TOC

Name	Notes	Current	Category
rsvp	Not Impacted	B	NORMAL
nsis	Not Impacted	B	NORMAL

RFC5432 Attribute Analysis

13. k= Attribute Analysis

TOC

13.1. RFC4566

TOC

Name	Notes	Current	Category
k=	It is NOT recommended to use this attribute	S	NOT RECOMMENDED

RFC4566 Attribute Analysis

14. content Attribute Analysis

TOC

14.1. RFC4796

TOC

Name	Notes	Current	Category
content:slides	Not Impacted	M	NORMAL
content:speaker	Not Impacted	M	NORMAL
content:main	Not Impacted	M	NORMAL

content:sl	Not Impacted	M	NORMAL
content:alt	Not Impacted	M	NORMAL

RFC4796 Attribute Analysis

15. Payload Formats

[TOC](#)

15.1. RFC5109

[TOC](#)

RFC5109 [RFC5109] describes a payload format for generic Forward Error Correction (FEC) for media data encapsulated in RTP. It is based on the exclusive-or (parity) operation. The payload format allows end systems to apply protection using various protection lengths and levels, in addition to using various protection group sizes to adapt to different media and channel characteristics. It enables complete recovery of the protected packets or partial recovery of the critical parts of the payload depending on the packet loss situation.

Name	Notes	Current	Category
audio/ulpfec	Not recommended for multiplexing due to reuse of SSRCS	M	NOT RECOMMENDED
video/ulpfec	Not recommended for multiplexing due to reuse of SSRCS	M	NOT RECOMMENDED
text/ulpfec	Not recommended for multiplexing due to reuse of SSRCS	M	NOT RECOMMENDED
application/ulpfec	Not recommended for multiplexing due to reuse of SSRCS	M	NOT RECOMMENDED

RFC5109 Payload Format Analysis

Draft draft-lennox-payload-ulp-ssrc-mux proposes a simple fix to make it possible to use ULP with multiplexing and ULP is allowed when used with that.

16. IANA Considerations

[TOC](#)

IANA shall register categories from this specification by expanding the Session

Description Protocol (SDP) Parameters table with a column listing categories against each SDP parameter.

Category
NORMAL
NOT RECOMMENDED
IDENTICAL
TRANSPORT
SPECIAL

17. Security Considerations

TOC

All the attributes which involve security key needs a careful review to ensure two-time pad vulnerability is not created

18. Acknowledgments

TOC

I would like to thank Cullen Jennings for suggesting the categories, contributing text and helping review the draft.

19. Change Log

TOC

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

Changes from draft-nandakumar-mmusic-mux-attributes-01

- Replaced Category BAD with NOT RECOMMENDED.
- Added Category TBD.
- Updated IANA Consideration Section.

Changes from draft-nandakumar-mmusic-mux-attributes-00

- Added new section for dealing with FEC payload types.

20. References

TOC

20.1. Normative References

TOC

- [RFC2119] Bradner, S., "[Key words for use in RFCs to Indicate Requirement Levels](#)," BCP 14, RFC 2119, March 1997 ([TXT](#), [HTML](#), [XML](#)).
- [RFC4566] Handley, M., Jacobson, V., and C. Perkins, "[SDP: Session Description Protocol](#)," RFC 4566, July 2006 ([TXT](#)).

20.2. Informative References

TOC

- [3GPP TS 24.182] "[IP Multimedia Subsystem \(IMS\) Customized Alerting Tones \(CAT\); Protocol specification](#)."
- [3GPP TS 24.183] "[IP Multimedia Subsystem \(IMS\) Customized Ringing Signal \(CRS\); Protocol specification](#)."
- [3GPP TS 24.229] "[IP multimedia call control protocol based on Session Initiation Protocol \(SIP\) and Session Description Protocol \(SDP\)](#);"
- [ACK-NACK] "[Session Description Protocol \(SDP\) RTCP ACK/NACK Feedback attributes](#)."
- [CCM] "[Session Description Protocol \(SDP\) RTCP-FB Codec Control Messages](#)."
- [GROUP-SEM] "[Session Description Protocol \(SDP\) "group" semantics](#)."
- [H.248.15] "[Gateway control protocol: SDP H.248 package attribute](#)."
- [I-D.ietf-avt-multiplexing-rtp] El-Khatib, K., Luo, G., Bochmann, G., and Pinjiang. Feng, "[Multiplexing Scheme for RTP Flows between Access Routers](#)," Internet-Draft <http://tools.ietf.org/html/draft-ietf-avt-multiplexing-rtp-01>, October 1999.
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