

**A Framework for SDP Attributes when Multiplexing
draft-ietf-mmusic-sdp-mux-attributes-10**

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. Typically media associated with individual media descriptions ("m=" lines) represent RTP sessions and are thus carried over individual underlying transport layer flows. For scenarios where SDP is used to negotiate the usage of single 5-tuple for sending and receiving media associated with multiple media descriptions, it is required to understand the semantic implications of the SDP attributes associated with the RTP Media Streams multiplexed over a single underlying transport layer flow.

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

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[1. Introduction](#)

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

[\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#) defines a way to use a single address:port combination (BUNDLE address) for receiving media associated with multiple SDP media descriptions. This would for e.g. allow the usage of a single set of ICE [\[RFC5245\]](#) candidates for multiple media descriptions. 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 [\[IANA\]](#) 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 apply the framework to the SDP attributes registered with the [\[IANA\]](#).

2. Terminology

5-tuple: A collection of the following values: source address, source port, destination address, destination port, and transport-layer protocol.

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

The time and complications of setting up ICE [\[RFC5245\]](#) and DTLS-SRTP [\[RFC5763\]](#) transports for use by RTP, and conservation of ports (to avoid maintaining large number of NAT bindings open, reduce time/ports needed for ICE to detect connectivity), forms a requirement to try and reduce the number of transport level flows needed. This has resulted in the definition of ways, such as, [\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#) 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 the 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.

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

4. SDP Attribute Analysis Framework

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

- o Attributes related to media content such as media type, encoding schemes, payload types.
- o Attributes specifying media transport characteristics like RTP/RTCP port numbers, network addresses, QOS.
- o Metadata description attributes capturing session timing and origin information.
- o Attributes establishing relationships between media descriptions such as grouping framework [[RFC5888](#)]

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

4.1. Category: 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
```


4.2. Category: NOT RECOMMENDED

Attributes that are not recommended for multiplexing since their usage under multiplexing might lead to incorrect behavior.

Example: Multiplexing media descriptions over a single DCCP transport [[RFC5762](#)] is NOT RECOMMENDED since DCCP being a connection oriented protocol doesn't allow multiple connections on the same 5-tuple.

```
v=0
o=bob 2890844527 2890844527 IN IP4 client.biloxi.example.com
s=
c=IN IP4 client.biloxi.example.com
t=0 0
m=video 5004 DCCP/RTP/AVP 99
a=rtpmap:99 h261/9000
a=dccp-service-code:SC=x52545056
a=setup:passive
a=connection:new
m=video 5004 DCCP/RTP/AVP 100
a=rtpmap:100 h261/9000
a=dccp-service-code:SC=x5254504f
a=setup:passive
a=connection:new
```

4.3. Category: IDENTICAL

Attributes and their associated values (if any) 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, RTCP Multiplexing MUST be enabled for both the audio and video "m=" lines if they are transported over a single 5-tuple.

```
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
a=rtcp-mux
```


4.4. Category: SUM

Attributes can be set as they are normally used but software using them in the multiplexing scenario, MUST apply the sum of all the attributes being multiplexed instead of trying to use them independently. This is typically used for bandwidth or other rate limiting attributes to the underlying 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 kilobits per second for the given example.

```
v=0
o=test 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
```

4.5. Category: TRANSPORT

Attributes that can be set normally for multiple items in a multiplexed group but the software MUST pick the one that's associated with the "m=" line whose information is used for setting up the underlying transport.

In the example below, "a=crypto" attribute is defined for both the audio and the video "m=" lines. The video media line's a=crypto attribute is chosen since its mid value (bar) appears first in the a=group:BUNDLE line. This is due to BUNDLE grouping semantic [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)] which mandates the values from "m=" line corresponding to the mid appearing 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 bar foo
m=audio 49172 RTP/AVP 99
a=mid:foo
a=crypto:1 AES_CM_128_HMAC_SHA1_80
    inline:d0RmdmcmVCspeEc3QGZiNWpVLFJhQX1cfHAWJSoj|2^20|1:32
a=rtpmap:99 iLBC/8000
m=video 51374 RTP/AVP 31
a=mid:bar
a=crypto:1 AES_CM_128_HMAC_SHA1_80
    inline:EcGZiNWpFJhQXdspcl1ekcmVCNwpVLcfHAWJSoj|2^20|1:32
a=rtpmap:96 H261/90000
```

4.6. Category: INHERIT

Attributes that encapsulate other SDP attributes or parameters. These attributes inherit their multiplexing characteristics from the attributes or parameters they encapsulate. Such attributes are defined in [\[RFC3407\]](#), [\[RFC5939\]](#) and [\[RFC6871\]](#) as part of a generic framework for indicating and negotiating transport, media and media format related capabilities in the SDP.

The inheritance manifests itself when the encapsulated attribute or parameter is being leveraged. In the case of SDP Capability Negotiation [\[RFC5939\]](#) for example, this occurs when a capability (encapsulating attribute) is used as part of a configuration; the configuration inherits the multiplexing category of each of its constituent (encapsulated) attributes and parameters. This in turn MAY place constraints on what constitutes a valid configuration from a multiplexing point of view, e.g. because some attributes MUST be IDENTICAL (see [Section 14](#) for further details).


```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
m=video 3456 RTP/AVP 100
a=rtpmap:100 VP8/90000
a=fmtp:100 max-fr=30;max-fs=8040
a=sqn: 0
a=cdsc: 1 video RTP/AVP 100
a=cpar: a=rtcp-mux
m=video 3456 RTP/AVP 101
a=rtpmap:101 VP8/90000
a=fmtp:100 max-fr=15;max-fs=1200
a=cdsc: 2 video RTP/AVP 101
a=cpar: a=rtcp-mux
```

In the above example, the category IDENTICAL is inherited for the cpar encapsulated rtcp-mux attribute.

4.7. Category: IDENTICAL-PER-PT

Attributes that define the RTP payload configuration on per Payload Type basis and MUST have identical values across all the media descriptions for a given RTP Payload Type when repeated. These Payload Types identify the same codec configuration as defined in the Section 10.1.2 of [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)] under this context.

In the SDP example below, Payload Types 96 and 97 are repeated across all the video "m=" lines and all the payload specific parameters (ex: rtpmap, fmtp) are identical (Note: some line breaks included are due to formatting only).


```
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 cam1 cam2
m=video 96 97
a=mid:cam1
a=rtpmap:96 H264/90000
a=fmtp:96 profile-level-id=42400d; max-fs=3600; max-fps=3000;
max-mbps=108000; max-br=1000
a=rtpmap:97 H264/90000
a=fmtp:97 profile-level-id=42400a; max-fs=240; max-fps=3000;
max-mbps=7200; max-br=200
m=video 96 97
a=mid:cam2
a=rtpmap:96 H264/90000
a=fmtp:96 profile-level-id=42400d; max-fs=3600; max-fps=3000;
max-mbps=108000; max-br=1000
a=rtpmap:97 H264/90000
a=fmtp:97 profile-level-id=42400a; max-fs=240; max-fps=3000;
max-mbps=7200; max-br=200
```

4.8. Category: SPECIAL

Attributes where the text in the specification defining the attribute MUST be consulted for further handling when multiplexed.

As an example, for the attribute extmap [[RFC5285](#)], the specification defining the extension needs to be referred to understand the multiplexing implications.

4.9. Category: TBD

Attributes that have not been analyzed under the proposed multiplexing framework. For the purposes of implementations it is advised to consider "NOT RECOMMENDED" as the category when multiplexing these attributes.

5. Analysis of Existing Attributes

This section analyzes attributes listed in [[IANA](#)], grouped under the IETF document that defines them.

The "Level" column indicates whether the attribute is currently specified as:

- o S -- Session level

- o M -- Media level
- o B -- Both
- o SR -- Source-level (for a single SSRC) [[RFC5576](#)]

The "Mux Category" column identifies multiplexing category assigned per attribute and the "Notes" column captures additional informative details regarding the assigned category, wherever necessary.

5.1. [RFC4566](#) - SDP: Session Description Protocol

[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.

Name	Notes	Level	Mux 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	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
maxptime	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
orient	Not Impacted	M	NORMAL
framerate	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
quality	Not Impacted	M	NORMAL

rtpmap	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
fntp	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
keywds	Not impacted	S	NORMAL
type	Not Impacted	S	NORMAL
type:broadcast	Not Impacted	S	NORMAL
type:H332	Not Impacted	S	NORMAL
type:meeting	Not Impacted	S	NORMAL
type:moderated	Not Impacted	S	NORMAL
type:test	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](#) - RTP/AVPF

[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.

Name	Notes	Level	Mux Category
rtcp-fb	Since RTCP feedback attributes are Payload Type (PT) scoped, their values MUST be identical for a given PT across the multiplexed "m=" lines.	M	IDENTICAL-PER-PT

[RFC4585](#) Attribute Analysis

5.3. [RFC5761](#) - Multiplexing RTP and RTCP

[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	Level	Mux Category
rtcp-mux	RTP and RTCP Multiplexing affects the entire RTP session	M	IDENTICAL

[RFC5761](#) Attribute Analysis

5.4. [RFC3312](#) - Integration of Resource Management and (SIP)

[RFC3312] defines a generic framework for preconditions, which are extensible through IANA registration. This document also discusses how network quality of service can be made a precondition for establishment of sessions initiated by the Session Initiation Protocol (SIP). These preconditions require that the participant reserve network resources before continuing with the session.

Name	Notes	Level	Mux Category
des	Refer to notes below	M	NOT RECOMMENDED
conf	Refer to notes below	M	NOT RECOMMENDED
curr	Refer to notes below	M	NOT RECOMMENDED

[RFC3312](#) Attribute Analysis

NOTE: A mismatched set of preconditions across media descriptions results in Session establishment failures due to inability in meeting the right resource reservations requested.

5.5. [RFC4574](#) - SDP Label Attribute

[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	Level	Mux Category
label	Not Impacted	M	NORMAL

[RFC4574](#) Attribute Analysis

5.6. [RFC5432](#) - QoS Mechanism Selection in SDP

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

Name	Notes	Level	Mux Category
qos-mech-send	Refer to section Section 10	B	TRANSPORT
qos-mech-recv	Refer to section Section 10	B	TRANSPORT

[RFC5432](#) Attribute Analysis

5.7. [RFC4568](#) - SDP Security Descriptions

[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	Level	Mux Category
crypto	crypto attribute MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT

[RFC4568](#) Attribute Analysis

5.8. [RFC5762](#) - RTP over DCCP

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] specifies a mapping of RTP onto DCCP, along with associated signaling, such that real-time applications can make use of the services provided by DCCP.

Name	Notes	Current	Mux Category
dccp-service-code	If RFC6773 is not being used in addition to RFC5762 , the port in the "m=" line is a DCCP port. DCCP being a connection oriented protocol, it does not allow multiple connections on the same 5-tuple	M	NOT RECOMMENDED

[RFC5762](#) Attribute Analysis

If [RFC6773](#) is being used in addition to [RFC5762](#) and provided that DCCP-in-UDP layer has additional demultiplexing, then it may be possible to use different DCCP service codes for each DCCP flow, given each uses a different DCCP port. Although doing so might conflict with the media type of the "m=" line. None of this is standardized yet and it wouldn't work as explained. Hence multiplexing MUST not be performed even in this alternate scenario.

5.9. [RFC6773](#) - DCCP-UDP Encapsulation

[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) middle boxes without modification of those middle boxes.

Name	Notes	Level	Mux Category
dccp-port	Multiplexing MUST not be performed due to potential conflict between the port used for DCCP en/decapsulation and the RTP	M	NOT RECOMMENDED

[RFC6773](#) Attribute Analysis

NOTE: [RFC6773](#) is about tunneling DCCP in UDP, with the UDP port being the port of the DCCP en-/de-capsulation service. This encapsulation allows arbitrary DCCP packets to be encapsulated and the DCCP port chosen MAY conflict with the port chosen for the RTP traffic. For multiplexing several DCCP-in-UDP encapsulations on the same UDP port, with no RTP traffic on the same port implies collapsing several DCCP port spaces together. This may or may not work depending on the nature of DCCP encapsulation and ports choices thus rendering it to be very application dependent.

5.10. [RFC5506](#) - Reduced-Size RTCP in RTP Profile

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

Name	Notes	Level	Mux Category
rtcp-rsize	Reduced size RTCP affects the entire RTP session	M	IDENTICAL

[RFC5506](#) Attribute Analysis

5.11. [RFC6787](#) - Media Resource Control Protocol Version 2

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](#)] defines attributes for this purpose.

Name	Notes	Level	Mux Category
resource	Not Impacted	M	NORMAL
channel	Not Impacted	M	NORMAL
cmid	Not Impacted	M	NORMAL

[RFC6787](#) Attribute Analysis

5.12. [RFC5245](#) - Interactive Connectivity Establishment (ICE)

[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	Level	Mux Category
ice-lite	Not Impacted	S	NORMAL
ice-options	Not Impacted	S	NORMAL
ice-mismatch	Not Impacted	S	NORMAL
ice-pwd	ice-pwd MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	B	TRANSPORT
ice-ufrag	ice-ufrag MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	B	TRANSPORT
candidate	ice candidate MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT
remote-candidates	ice remote candidate MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT

[RFC5245](#) Attribute Analysis

5.13. [RFC5285](#) - RTP Header Extensions

[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	Level	Mux Category
extmap	Specific RTP extension document MUST be referred	B	SPECIAL

[RFC5285](#) Attribute Analysis

5.14. [RFC3605](#) - RTCP attribute in SDP

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	Level	Mux Category
rtcp	RTCP Port MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow.	M	TRANSPORT

[RFC3605](#) Attribute Analysis

5.15. [RFC5576](#) - Source-Specific SDP Attributes

[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	Level	Mux Category
ssrc	Refer to Notes below	M	NORMAL
ssrc-group	Refer to Section 9 for specific analysis of the grouping semantics	M	NORMAL
cname	Not Impacted	SR	NORMAL
previous-ssrc	Refer to notes below	SR	NORMAL
fntp	The attribute value MUST be same for a given codec configuration	SR	IDENTICAL-PER-PT

[RFC5576](#) Attribute Analysis

NOTE: If SSRCS are repeated across "m=" lines being multiplexed, they MUST all represent the same underlying RTP Source.

5.16. [RFC7273](#) - RTP Clock Source Signalling

[RFC7273] specifies Session Description Protocol (SDP) signalling that identifies timestamp reference clock sources and SDP signalling that identifies the media clock sources in a multimedia session.

Name	Notes	Level	Mux Category
ts-refclk	Not Impacted	B	NORMAL
mediaclock	Not Impacted	B	NORMAL

[RFC7273](#) Attribute Analysis

5.17. [RFC6236](#) - Image Attributes in SDP

[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	Level	Mux Category
imageattr	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC6236](#) Attribute Analysis

5.18. [RFC7197](#) - Duplication Delay Attribute in SDP

[RFC7197] defines an attribute to indicate the presence of temporally redundant media streams and the duplication delay in the Session Description Protocol.

Name	Notes	Level	Mux Category
duplication-delay	Not Impacted	B	NORMAL

[RFC7197](#) Attribute Analysis

5.19. [RFC7266](#) - RTCP XR Blocks for MOS Metric Reporting

[RFC7266] defines an RTP Control Protocol (RTCP) Extended Report (XR) Block including two new segment types and associated Session Description Protocol (SDP) parameters that allow the reporting of mean opinion score (MOS) Metrics for use in a range of RTP applications.

Name	Notes	Level	Mux Category
calgextmap	Not Impacted	B	NORMAL

[RFC7266](#) Attribute Analysis

5.20. [RFC6285](#) - Rapid Acquisition of Multicast RTP Sessions

[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	Level	Mux Category
rams-updates	Not recommended	M	NOT RECOMMENDED

[RFC6285](#) Attribute Analysis

5.21. [RFC6230](#) - Media Control Channel Framework

[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	Level	Mux Category
cfw-id	Not Impacted	M	NORMAL

[RFC6230](#) Attribute Analysis

5.22. [RFC6364](#) - SDP Elements for FEC Framework

[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	Level	Mux Category
fec-source-flow	Specific FEC scheme document needs to be referred	M	SPECIAL
fec-repair-flow	Specific FEC scheme document needs to be referred	M	SPECIAL
repair-window	Specific FEC scheme document needs to be referred	M	SPECIAL

[RFC6364](#) Attribute Analysis

5.23. [RFC4796](#) - Content Attribute

[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	Level	Mux Category
content	Not Impacted	M	NORMAL

[RFC4796](#) Attribute Analysis

5.24. [RFC3407](#) - SDP Simple Capability Declaration

[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	Level	Mux Category
sqn	Not Impacted	B	NORMAL
cdsc	Not Impacted.	B	NORMAL
cpar	Refer to Section 14	B	INHERIT
cparmin	Refer to notes below	B	SPECIAL
cparmax	Refer to notes below	B	SPECIAL

[RFC3407](#) Attribute Analysis

NOTE: Since the attributes (a=cparmin and a=cparmax) define minimum and maximum numerical values associated with the attributes described in a=cpar, it is recommended to consult the document defining the attribute.

5.25. [RFC6284](#) - Port Mapping between Unicast and Multicast RTP Sessions

[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	Level	Mux Category
portmapping-req	Not recommended, if port mapping is required by the application	M	NOT RECOMMENDED

[RFC6284](#) Attribute Analysis

5.26. [RFC6714](#) - MSRP-CEMA

[RFC6714] defines a Message Session Relay Protocol (MSRP) extension, Connection Establishment for Media Anchoring (CEMA). Support of this extension is OPTIONAL. The extension allows middle boxes to anchor

the MSRP connection, without the need for middle boxes to modify the MSRP messages; thus, it also enables secure end-to-end MSRP communication in networks where such middle boxes 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	Level	Mux Category
msrp-cema	Refer to notes below	M	TBD

[RFC6714](#) Attribute Analysis

NOTE: As per section 9.1 of [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)], there exists no publicly available specification that defines procedures for multiplexing/demultiplexing MRSP flows over a single 5-tuple. Once such a specification is available, the multiplexing categories assignments for the attributes in this section MUST be revisited.

5.27. [RFC4583](#) - SDP Format for BFCP Streams

[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	Level	Mux Category
floorctrl	The attribute MUST be repeated across all the multiplexed "m=" lines	M	IDENTICAL
confid	Not Impacted	M	NORMAL
userid	Not Impacted	M	NORMAL
floorid	The floorid MUST be globally unique	M	NORMAL

[RFC4583](#) Attribute Analysis

5.28. [RFC5547](#) - SDP Offer/Answer for File Transfer

[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	Level	Mux Category
file-selector	Refer to notes below	M	TBD
file-transfer-id	Refer to notes below	M	TBD
file-disposition	Refer to notes below	M	TBD
file-date	Refer to notes below	M	TBD
file-icon	Refer to notes below	M	TBD
file-range	Refer to notes below	M	TBD

[RFC5547](#) Attribute Analysis

NOTE: As per section 9.1 of [\[I-D.ietf-mmusic-sdp-bundle-negotiation\]](#), there exists no publicly available specification that defines procedures for multiplexing/demultiplexing MRSP flows over a single 5-tuple. Once such a specification is available, the multiplexing categories assignments for attributes in this section MUST be revisited.

5.29. [RFC6849](#) - SDP and RTP Media Loopback Extension

[RFC6849] 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	Level	Mux Category
loopback rtp-pkt-loopback	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
loopback rtp-media-loopback	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
loopback-source	Not Impacted	M	NORMAL
loopback-mirror	Not Impacted	M	NORMAL

[RFC6849](#) Analysis

5.30. [RFC5760](#) - RTCP with Unicast Feedback

[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	Level	Mux Category
rtcp-unicast	The attribute MUST be reported across all "m=" lines multiplexed	M	IDENTICAL

[RFC5760](#) Attribute Analysis

5.31. [RFC3611](#) - RTCP XR

[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	Level	Mux Category
rtcp-xr	Not Impacted	B	NORMAL

[RFC3611](#) Attribute Analysis**5.32. [RFC5939](#) - SDP Capability Negotiation**

[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	Level	Mux Category
pcfg	Refer to Section 14	M	SPECIAL
acfg	Refer to Section 14	M	SPECIAL
csup	Not Impacted	B	NORMAL
creq	Not Impacted	B	NORMAL
acap	Refer to Section 14	B	INHERIT
tcap	Refer to Section 14	B	INHERIT
cap-v0	Not Impacted	B	NORMAL

[RFC5939](#) Attribute Analysis

5.33. [RFC6871](#)- SDP Media Capabilities Negotiation

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. [\[RFC6871\]](#) extends the framework by defining media capabilities that can be used to negotiate media types and their associated parameters.

Name	Notes	Level	Mux Category
rmcap	Refer to Section 14	B	IDENTICAL-PER-PT
omcap	Not Impacted	B	NORMAL
mfcap	Refer to Section 14	B	IDENTICAL-PER-PT
mscap	Refer to Section 14	B	INHERIT
lcfg	Refer to Section 14	B	SPECIAL
sescap	Refer to notes below	S	NOT RECOMMENDED
med-v0	Not Impacted	S	NORMAL

[RFC6871](#) - Attribute Analysis

NOTE: The "sescap" attribute is NOT RECOMMENDED for use with multiplexing. The reason is that it requires the use of unique configuration numbers across the entire SDP (per [\[RFC6871\]](#)) as opposed to within a media description only (per [\[RFC5939\]](#)). As described in [Section 14](#), the use of identical configuration numbers between multiplexed (bundled) media descriptions is the default way of indicating compatible configurations in a bundle.

5.34. [RFC7006](#) - Miscellaneous Capabilities Negotiation SDP

[\[RFC7006\]](#) extends the SDP capability negotiation framework to allow endpoints to negotiate three additional SDP capabilities. In particular, this memo provides a mechanism to negotiate bandwidth ("b=" line), connection data ("c=" line), and session or media titles ("i=" line for each session or media).

Name	Notes	Level	Mux Category
bcap	Inherit the category SUM as applicable to b= attribute	B	INHERIT
bcap-v0	Not Impacted	B	NORMAL
ccap	The connection address type MUST be identical across all the multiplexed "m=" lines	B	IDENTICAL
ccap-v0	Not Impacted	B	NORMAL
icap	Not Impacted	B	NORMAL
icap-v0	Not Impacted	B	NORMAL

[RFC7006](#) - Attribute Analysis

5.35. [RFC4567](#) - Key Management Extensions for SDP and RTSP

[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	Level	Mux Category
key-mgmt	Key management protocol MUST be identical across all the "m=" lines	B	IDENTICAL
mikey	Key management protocol MUST be identical across all the "m=" lines	B	IDENTICAL

[RFC4567](#) Attribute Analysis

5.36. [RFC4572](#) - Comedia over TLS in SDP

[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	Level	Mux Category
fingerprint	fingerprint value from the "m=" line defining the underlying transport is chosen	B	TRANSPORT

[RFC4572](#) Attribute Analysis**5.37. [RFC4570](#) - SDP Source Filters**

[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	Level	Mux Category
source-filter	The attribute MUST be repeated across all "m=" lines multiplexed	B	IDENTICAL

[RFC4570](#) Attribute Analysis

5.38. [RFC6128](#) - RTCP Port for Multicast Sessions

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](#)] removes this restriction by introducing a new SDP attribute.

Name	Notes	Level	Mux Category
multicast-rtcp	Multicast RTCP port MUST be identical across all the "m=" lines	B	IDENTICAL

[RFC6128](#) Attribute Analysis**5.39. [RFC6189](#) - ZRTP**

[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	Level	Mux Category
zrtp-hash	zrtp-hash attribute MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT

[RFC6189](#) Attribute Analysis

5.40. [RFC4145](#) - Connection-Oriented Media

[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	Level	Mux Category
setup	The attribute MUST be identical across all "m=" lines	B	IDENTICAL
connection	The attribute MUST be identical across all "m=" lines	B	IDENTICAL

[RFC4145](#) Attribute Analysis**5.41. [RFC6947](#) - The SDP ALTC Attribute**

[RFC6947] proposes a mechanism that allows the same SDP offer to carry multiple IP addresses of different address families (e.g., IPv4 and IPv6). The proposed attribute, the "altc" attribute, solves the backward-compatibility problem that plagued Alternative Network Address Types (ANAT) due to their syntax.

Name	Notes	Level	Mux Category
altc	The IP Address and port MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT

[RFC6947](#) Attribute Analysis

5.42. [RFC7195](#) - SDP Extension for Circuit Switched Bearers in PSTN

[RFC7195] describes use cases, requirements, and protocol extensions for using the Session Description Protocol (SDP) offer/answer model for establishing audio and video media streams over circuit-switched bearers in the Public Switched Telephone Network (PSTN).

Name	Notes	Level	Mux Category
cs-correlation:callerid	Refer to notes below	M	TBD
cs-correlation:uuie	Refer to notes below	M	TBD
cs-correlation:dtmf	Refer to notes below	M	TBD
cs-correlation:external	Refer to notes below	M	TBD

[RFC7195](#) Attribute Analysis

NOTE: [RFC7195] defines SDP attributes for establishing audio and video media streams over circuit-switched bearers by defining a new nettype value "PSTN". However, section 7.2 of [I-D.ietf-mmusic-sdp-bundle-negotiation] requires the "c=" line nettype value of 'IN'. If in future there exists a specification that defines procedures to multiplex media streams over nettype "PSTN", the multiplexing categories for attributes in this section MUST be revisited.

5.43. [RFC7272](#) - IDMS Using the RTP Control Protocol (RTCP)

[RFC7272] defines a new RTP Control Protocol (RTCP) Packet Type and an RTCP Extended Report (XR) Block Type to be used for achieving Inter-Destination Media Synchronization (IDMS).

Name	Notes	Level	Mux Category
rtcp-idms	Not Impacted	M	NORMAL

[RFC7272](#) Attribute Analysis

5.44. [RFC5159](#) - OMA BCAST SDP Attributes

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

Name	Notes	Level	Mux Category
bcastversion	Not Impacted	S	NORMAL
stkmstream	Not Impacted	B	NORMAL
SRTPAuthentication	Needs further analysis	M	TBD
SRTPROCTxRate	Needs further analysis	M	TBD

[RFC5159](#) Attribute Analysis

5.45. [RFC6193](#) - Media Description for IKE in SDP

[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	Level	Mux 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

NOTE: With the above SDP constraints, a session multiplexed with multiple "m=" lines will use only one IPSec association for all of the "m=" lines.

5.46. [RFC2326](#) - Real Time Streaming Protocol

The Real Time Streaming Protocol, or RTSP, is an application-level protocol for control over the delivery of data with real-time properties. RTSP provides an extensible framework to enable controlled, on-demand delivery of real-time data, such as audio and video.

Name	Notes	Level	Mux Category
etag	RTSP is not supported for RTP Stream multiplexing	B	NOT RECOMMENDED
range	RTSP is not supported for RTP Stream multiplexing	B	NOT RECOMMENDED
control	RTSP is not supported for RTP Stream multiplexing	B	NOT RECOMMENDED
mtag	RTSP is not supported for RTP Stream multiplexing	B	NOT RECOMMENDED

[RFC2326](#) Attribute Analysis

NOTE: [[RFC2326](#)] defines SDP attributes that are applicable in the declarative usage of SDP alone. For purposes of this document, only the Offer/Answer usage of SDP is considered as mandated by [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)].

5.47. [RFC6064](#) - SDP and RTSP Extensions for 3GPP

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](#)] provides information about these extensions and registers the RTSP and SDP extensions with IANA.

Name	Notes	Level	Mux Category
X-predecbufsize	Refer to notes below	M	NOT RECOMMENDED
X-initpredecbufperiod	Refer to notes below	M	NOT RECOMMENDED
X-initpostdecbufperiod	Refer to notes below	M	NOT RECOMMENDED
X-decbyterate	Refer to	M	NOT

	notes		RECOMMENDED
	below		
3gpp-videopostdecbuFSIZE	Refer to	M	NOT
	notes		RECOMMENDED
	below		
framesize	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-Integrity-Key	Refer to	S	NOT
	notes		RECOMMENDED
	below		
3GPP-SDP-Auth	Refer to	S	NOT
	notes		RECOMMENDED
	below		
3GPP-SRTP-Config	Refer to	M	NOT
	notes		RECOMMENDED
	below		
alt	Refer to	M	NOT
	notes		RECOMMENDED
	below		
alt-default-id	Refer to	M	NOT
	notes		RECOMMENDED
	below		
alt-group	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-Adaptation-Support	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-Asset-Information	Refer to	B	NOT
	notes		RECOMMENDED
	below		
mbms-mode	Refer to	B	NOT
	notes		RECOMMENDED
	below		
mbms-flowid	Refer to	M	NOT

	notes		RECOMMENDED
	below		
mbms-repair	Refer to	B	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Corruption duration	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Rebuffering duration	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Initial buffering duration	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Successive loss of RTP packets	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Frame rate deviation	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Jitter duration	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Content Switch Time	Refer to	B	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Average Codec Bitrate	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Codec Information	Refer to	M	NOT
	notes		RECOMMENDED
	below		
3GPP-QoE-Metrics:Buffer	Refer to	M	NOT

Status	notes		RECOMMENDED	
	below			
+-----+	+-----+	+-----+	+-----+	+-----+

[RFC6064](#) Attribute Analysis

NOTE: [[RFC6064](#)] defines SDP attributes that are applicable in the declarative usage of SDP alone. For purposes of this document, only the Offer/Answer usage of SDP is considered as mandated by [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)].

5.48. [RFC3108](#) - ATM SDP

[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	Level	Mux Category	
+-----+	+-----+	+-----+	+-----+	+-----+
aalType	Refer to notes	B	NOT	
	below		RECOMMENDED	
eecid	Refer to notes	B	NOT	
	below		RECOMMENDED	
capability	Refer to notes	B	NOT	
	below		RECOMMENDED	
qosClass	Refer to notes	B	NOT	
	below		RECOMMENDED	
bcob	Refer to notes	B	NOT	
	below		RECOMMENDED	
stc	Refer to notes	B	NOT	
	below		RECOMMENDED	
upcc	Refer to notes	B	NOT	
	below		RECOMMENDED	
atmQOSparms	Refer to notes	B	NOT	
	below		RECOMMENDED	
atmTrfcDesc	Refer to notes	B	NOT	
	below		RECOMMENDED	
abrParms	Refer to notes	B	NOT	
	below		RECOMMENDED	
abrSetup	Refer to notes	B	NOT	
	below		RECOMMENDED	
bearerType	Refer to notes	B	NOT	
	below		RECOMMENDED	
lij	Refer to notes	B	NOT	
	below		RECOMMENDED	
anycast	Refer to notes	B	NOT	

	below		RECOMMENDED
cache	Refer to notes	B	NOT
	below		RECOMMENDED
bearerSigIE	Refer to notes	B	NOT
	below		RECOMMENDED
aalApp	Refer to notes	B	NOT
	below		RECOMMENDED
cbrRate	Refer to notes	B	NOT
	below		RECOMMENDED
sbc	Refer to notes	B	NOT
	below		RECOMMENDED
clkrec	Refer to notes	B	NOT
	below		RECOMMENDED
fec	Refer to notes	B	NOT
	below		RECOMMENDED
prtfl	Refer to notes	B	NOT
	below		RECOMMENDED
structure	Refer to notes	B	NOT
	below		RECOMMENDED
cpsSDUsize	Refer to notes	B	NOT
	below		RECOMMENDED
aal2CPS	Refer to notes	B	NOT
	below		RECOMMENDED
aal2CPSSDURate	Refer to notes	B	NOT
	below		RECOMMENDED
aal2sscs3661unassured	Refer to notes	B	NOT
	below		RECOMMENDED
aal2sscs3661assured	Refer to notes	B	NOT
	below		RECOMMENDED
aal2sscs3662	Refer to notes	B	NOT
	below		RECOMMENDED
aal5sscop	Refer to notes	B	NOT
	below		RECOMMENDED
atmmmap	Refer to notes	B	NOT
	below		RECOMMENDED
silenceSupp	Refer to notes	B	NOT
	below		RECOMMENDED
ecan	Refer to notes	B	NOT
	below		RECOMMENDED
gc	Refer to notes	B	NOT
	below		RECOMMENDED
profileDesc	Refer to notes	B	NOT
	below		RECOMMENDED
vsel	Refer to notes	B	NOT
	below		RECOMMENDED
dsel	Refer to notes	B	NOT
	below		RECOMMENDED
fsel	Refer to notes	B	NOT

	below		RECOMMENDED	
onewaySel	Refer to notes	B	NOT	
	below		RECOMMENDED	
codecconfig	Refer to notes	B	NOT	
	below		RECOMMENDED	
isup_usi	Refer to notes	B	NOT	
	below		RECOMMENDED	
uiLayer1_Prot	Refer to notes	B	NOT	
	below		RECOMMENDED	
chain	Refer to notes	B	NOT	
	below		RECOMMENDED	
+-----+	+-----+	+-----+	+-----+	+-----+

[RFC3108](#) Attribute Analysis

NOTE: [RFC3108](#) describes conventions for using the Session Description Protocol (SDP) for characterizing ATM bearer connections using an AAL1, AAL2 or AAL5 adaptation layers. For AAL1, AAL2 and AAL5, bearer connections can be used to transport single media streams. In addition, for AAL1 and AAL2, multiple media streams MAY be multiplexed into a bearer connection. For all adaptation types (AAL1, AAL2 and AAL5), bearer connections MAY be bundled into a single media group. In all cases addressed by [RFC3108](#), a real-time media stream (voice, video, voiceband data, pseudo-wire and others) or a multiplex of media streams is mapped directly into an ATM connection. [RFC3108](#) does not address cases where ATM serves as a low-level transport pipe for IP packets which in turn MAY carry one or more real-time (e.g. VoIP) media sessions with a life-cycle different from that of the underlying ATM transport.

[5.49.](#) 3GPP TS 26.114

[R3GPPTS26.114] specifies IP multimedia subsystem: Media handling and interaction

Name	Notes	Level	Mux Category
3gpp_sync_info	Usage defined for the IP Multimedia Subsystem	M	NORMAL
3gpp_MaxRecvSDUSize	Usage defined for the IP Multimedia Subsystem	M	NORMAL

3GPP TS 26.114 Attribute Analysis

5.50. 3GPP TS 183.063

[R3GPPTS183.063] Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);

Name	Notes	Level	Mux Category
PSCid	Not Impacted	S	NORMAL
bc_service	Not Impacted	S	NORMAL
bc_program	Not Impacted	S	NORMAL
bc_service_package	Not Impacted	S	NORMAL

3GPP TS 183.063 Attribute Analysis

5.51. 3GPP TS 24.182

[R3GPPTS24.182] specifies IP multimedia subsystem Custom Alerting tones

Name	Notes	Level	Mux Category
g.3gpp.cat	Usage defined for the IP Multimedia Subsystem	M	NORMAL

3GPP TS 24.182 Attribute Analysis

[5.52.](#) 3GPP TS 24.183

[R3GPPTS24.183] specifies IP multimedia subsystem Custom Ringing Signal

Name	Notes	Level	Mux Category
g.3gpp.crs	Usage defined for the IP Multimedia Subsystem	M	NORMAL

3GPP TS 24.183 Attribute Analysis

[5.53.](#) 3GPP TS 24.229

[R3GPPTS24.229] specifies IP multimedia call control protocol based on Session Initial protocol and Session Description Protocol.

Name	Notes	Level	Mux Category
secondary-realm	secondary-realm MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT
visited-realm	visited-realm MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	M	TRANSPORT
omr-m-cksum	Not Impacted	M	NORMAL
omr-s-cksum	Not Impacted	M	NORMAL
omr-m-att	Not Impacted	M	NORMAL
omr-s-att	Not Impacted	M	NORMAL
omr-m-bw	Not Impacted	M	NORMAL
omr-s-bw	Not Impacted	M	NORMAL
omr-codecs	Not Impacted	M	NORMAL

3GPP TS 24.229 Attribute Analysis

[5.54.](#) ITU T.38

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

Name	Notes	Level	Mux Category
T38FaxVersion	Refer to notes below	S	TBD
T38MaxBitRate	Refer to notes below	S	TBD

T38FaxFillBitRemoval	Refer to notes below	S	TBD
T38FaxTranscodingMMR	Refer to notes below	S	TBD
T38FaxTranscodingJBIG	Refer to notes below	S	TBD
T38FaxRateManagement	Refer to notes below	S	TBD
T38FaxMaxBuffer	Refer to notes below	S	TBD
T38FaxMaxDatagram	Refer to notes below	S	TBD
T38FaxUdpEC	Refer to notes below	S	TBD
T38FaxMaxIFP	Refer to notes below	S	TBD
T38FaxUdpECDepth	Refer to notes below	S	TBD
T38FaxUdpFECMaxSpan	Refer to notes below	S	TBD
T38ModemType	Refer to notes below	S	TBD
T38VendorInfo	Refer to notes below	S	TBD

ITU T.38 Attribute Analysis

NOTE: As per section 9.1 of [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)], there exists no publicly available specification that defines procedures for multiplexing/demultiplexing fax protocols flows over a single 5-tuple. Once such a specification is available, the multiplexing category assignments for the attributes in this section MUST be revisited.

5.55. ITU-T Q.1970

[Q.1970] defines BICC IP bearer control protocol.

Name	Notes	Level	Mux Category
ipbcp	ipbcp version identifies type of IPBCP message used in BICC (ITU-T Q.1901) environment which are limited to single media payload. Pertinent ITU.T specifications needs to be referred while multiplexing	S	SPECIAL

ITU-T Q.1970 Attribute Analysis

5.56. ITU-T H.248.15

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

Name	Notes	Level	Mux Category
h248item	It is only applicable for signaling the inclusion of H.248 extension packages to a gateway via the local and remote descriptors. The attribute itself is unaffected by multiplexing, but the packaged referenced in a specific use of the attribute may be impacted. Further analysis of each package is needed to determine if there is an issue. This is only a concern in environments using a decomposed server/gateway with H.248 signaled between them. The ITU-T will need to do further analysis of various packages when they specify how to signal the use of multiplexing to a gateway	B	SPECIAL

ITU-T H.248.15 Attribute Analysis

5.57. [RFC4975](#) - The Message Session Relay Protocol

[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	Level	Mux Category
accept-types	Refer to notes below	M	TBD
accept-wrapped-types	Refer to notes below	M	TBD
max-size	Refer to notes below	M	TBD
path	Refer to notes below	M	TBD

[RFC4975](#) Attribute Analysis

NOTE: As per section 9.1 of [[I-D.ietf-mmusic-sdp-bundle-negotiation](#)], there exists no publicly available specification that defines procedures for multiplexing/demultiplexing MRSP flows over a single 5-tuple. Once such a specification is available, the multiplexing categories assignments for the attributes in this section MUST be revisited.

[5.58](#). Historical Attributes

This section specifies analysis for the attributes that are included for historic usage alone by the [[IANA](#)].

Name	Notes	Level	Mux Category
rtppred1	Historic attributes	M	NOT RECOMMENDED
rtppred2	Historic attributes	M	NOT RECOMMENDED

Historical Attribute Analysis

[6](#). bwtype Attribute Analysis

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

6.1. [RFC4566](#) - SDP: Session Description Protocol

[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.

Name	Notes	Level	Mux Category
bwtype:CT	Not Impacted	S	NORMAL
bwtype:AS	For the media level usage, the aggregate of individual bandwidth values is considered	B	SUM

[RFC4566](#) bwtype Analysis

6.2. [RFC3556](#) - SDP Bandwidth Modifiers for RTCP Bandwidth

[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	Level	Mux Category
bwtype:RS	Session level usage represents session aggregate and media level usage indicates SUM of the individual values while multiplexing	B	SUM
bwtype:RR	Session level usage represents session aggregate and media level usage indicates SUM of the individual values while multiplexing	B	SUM

[RFC3556](#) bwtype Analysis

6.3. [RFC3890](#) - Bandwidth Modifier for SDP

[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	Level	Mux Category
bwtype:TIAS	The usage of TIAS is not clearly defined Offer/Answer usage.	B	SPECIAL
maxprate	The usage of TIAS and maxprate is not well defined under multiplexing	B	SPECIAL

[RFC3890](#) bwtype Analysis

NOTE: The intention of TIAS is that the media level bit-rate is multiplied with the known per-packet overhead for the selected transport and the maxprate value to determine the worst case bit-rate from the transport to more accurately capture the required usage. Summing TIAS values independently across "m=" lines and multiplying the computed sum with maxprate and the per-packet overhead would inflate the value significantly. Instead performing multiplication and adding the individual values is a more appropriate usage.

7. rtcp-fb Attribute Analysis

This section analyzes rtcp-fb SDP attributes.

7.1. [RFC4585](#) - RTP/AVPF

[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.

Name	Notes	Level	Mux Category
ack rpsi	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
ack app	Feedback parameters MUST be handled in the app specific way when multiplexed	M	SPECIAL
nack	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
nack pli	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
nack sli	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
nack rpsi	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
nack app	Feedback parameters MUST be handled in the app specific way when multiplexed	M	SPECIAL
trr-int	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC4585](#) Attribute Analysis

7.2. [RFC5104](#) - Codec Control Messages in AVPF

[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.

Name	Notes	Level	Mux Category
ccm	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC5104](#) Attribute Analysis

7.3. [RFC6285](#) - Unicast-Based RAMS

[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	Level	Mux Category
nack	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC6285](#) Attribute Analysis

7.4. [RFC6679](#) - ECN for RTP over UDP/IP

[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 initialization method using Interactive Connectivity Establishment (ICE).

Name	Notes	Level	Mux Category
ecn-capable-rtp	ECN markup are enabled at the RTP session level	M	IDENTICAL
nack ecn	This attribute enables ECN at the RTP session level	M	IDENTICAL

[RFC6679](#) Attribute Analysis

7.5. [RFC6642](#) - Third-Party Loss Report

In a large RTP session using the RTP Control Protocol (RTCP) feedback mechanism defined in [\[RFC4585\]](#), 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. [\[RFC6642\]](#) 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	Level	Mux Category
nack ttlei	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
nack pslei	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC6642](#) Attribute Analysis

7.6. [RFC5104](#) - Codec Control Messages in AVPF

[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.

Name	Notes	Level	Mux Category
ccm	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
fir			
ccm	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
tmmbr			
ccm	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
tstr			
ccm	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
vbcm			

[RFC5104](#) Attribute Analysis

8. group Attribute Analysis

This section analyzes SDP "group" attribute semantics [[RFC5888](#)].

8.1. [RFC5888](#) - SDP Grouping Framework

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

Name	Notes	Level	Mux Category
group:LS	Not Impacted	S	NORMAL
group:FID	Not Impacted	S	NORMAL

[RFC5888](#) Attribute Analysis

8.2. [RFC3524](#) - Mapping Media Streams to Resource Reservation Flows

[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	Level	Mux Category
group:SRF	Not Impacted	S	NORMAL

[RFC3524](#) Attribute Analysis

8.3. [RFC4091](#) - ANAT Semantics

[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	Level	Mux Category
group:ANAT	ANAT semantics is obseleted	S	NOT RECOMMENDED

[RFC4091](#) Attribute Analysis

8.4. [RFC5956](#) - FEC Grouping Semantics in SDP

[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	Level	Mux Category
group:FEC-FR	Not Impacted	S	NORMAL

[RFC5956](#) Attribute Analysis

8.5. [RFC5583](#) - Signaling Media Decoding Dependency in SDP

[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	Level	Mux Category
depend lay	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT
depend mdc	The attribute value MUST be same for a given codec configuration	M	IDENTICAL-PER-PT

[RFC5583](#) Attribute Analysis

8.6. [RFC7104](#) - Duplication Grouping Semantics in the SDP

[RFC7104] defines the semantics for grouping redundant streams in the Session Description Protocol (SDP). The semantics defined in this document are to be used with the SDP Grouping Framework. Grouping semantics at the Synchronization Source (SSRC) level are also defined in this document for RTP streams using SSRC multiplexing.

Name	Notes	Level	Mux Category
group:DUP	Not Impacted	S	NORMAL

[RFC7104](#) Attribute Analysis

9. ssrc-group Attribute Analysis

This section analyzes "ssrc-group" semantics.

9.1. [RFC5576](#) - Source-Specific SDP Attributes

[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	Level	Mux Category
ssrc-group:FID	Not Impacted	SR	NORMAL
ssrc-group:FEC	Not Impacted	SR	NORMAL
ssrc-group:FEC-FR	Not Impacted	SR	NORMAL

[RFC5576](#) Attribute Analysis

9.2. [RFC7104](#) - Duplication Grouping Semantics in the SDP

[RFC7104] defines the semantics for grouping redundant streams in the Session Description Protocol (SDP). The semantics defined in this document are to be used with the SDP Grouping Framework. Grouping

semantics at the Synchronization Source (SSRC) level are also defined in this document for RTP streams using SSRC multiplexing.

Name	Notes	Level	Mux Category
ssrc-group:DUP	Not Impacted	SR	NORMAL

[RFC7104](#) Attribute Analysis

10. QoS Mechanism Token Analysis

This section analyzes QoS tokens specified with SDP.

10.1. [RFC5432](#) - QoS Mechanism Selection in SDP

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

Name	Notes	Level	Mux Category
rsvp	rsvp attribute MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport flow	B	TRANSPORT
nsis	rsvp attribute MUST be the one that corresponds to the "m=" line chosen for setting up the underlying transport	B	TRANSPORT

[RFC5432](#) Attribute Analysis

NOTE: A single DSCP code point per flow being multiplexed doesn't impact multiplexing since QoS mechanisms are signaled/scoped per flow. For scenarios that involve having different DSCP code points for packets being transmitted over the same 5-tuple, issues as discussed in [[I.D-draft-ietf-dart-dscp-rtp](#)] need to be taken into consideration.

11. k= Attribute Analysis

11.1. [RFC4566](#) SDP: Session Description Protocol

[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.

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

[RFC4566](#) Attribute Analysis

12. content Attribute Analysis

12.1. [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	Level	Mux 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

13. Payload Formats

13.1. [RFC5109](#) - RTP Payload Format for Generic FEC

[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	Level	Mux 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

14. Multiplexing Considerations for Encapsulating Attributes

This sections deals with recommendations for defining the multiplexing characteristics of the SDP attributes that encapsulate other SDP attributes/parameters. Such attributes as of today, for example, are defined in [[RFC3407](#)], [[RFC5939](#)] and [[RFC6871](#)] as part of a generic framework for indicating and negotiating transport, media and media format related capabilities in the SDP.

The behavior of such attributes under multiplexing is in turn defined by the multiplexing behavior of the attributes they encapsulate which

are made known once the Offer/Answer negotiation process is completed.

14.1. [RFC3407](#) - cpar Attribute Analysis

[RFC3407] capability parameter attribute (a=cpar) encapsulates b= (bandwidth) or an a= attribute. For bandwidth attribute encapsulation, the category SUM is inherited. For the case of a= attribute, the category corresponding to the SDP attribute being encapsulated is inherited.

```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
m=video 3456 RTP/AVP 100
a=rtpmap:100 VP8/90000
a=sn: 0
a=cdsc: 1 video RTP/AVP 100
a=cpar: a=rtcp-mux
m=video 3456 RTP/AVP 101
a=rtpmap:101 VP8/90000
a=fmtp:100 max-fr=15;max-fs=1200
a=cdsc: 2 video RTP/AVP 101
a=cpar: a=rtcp-mux
```

In the above example, the category IDENTICAL is inherited for the cpar encapsulated rtcp-mux attribute.

14.2. [RFC5939](#) Analysis

[RFC5939] defines a general SDP capability negotiation framework. It also specifies how to provide transport protocols and SDP attributes as capabilities and negotiate them using the framework.

For this purpose, [[RFC5939](#)] defines the following

- o A set of capabilities for the session and its associated media stream components, supported by each side. The attribute ("a=acap") defines how to list an attribute name and its associated value (if any) as a capability. The attribute ("a=tcap") defines how to list transport protocols (e.g., "RTP/AVP") as capabilities.
- o A set of potential configurations ("a=pcfg") provided by the offerer to indicate which combinations of those capabilities can be used for the session and its associated media stream

components. Potential configurations are not ready for use until fully negotiated. They provide an alternative that MAY be used, subject to SDP capability negotiation procedures. In particular the answerer MAY choose one of the potential configurations for use as part of the current Offer/Answer exchange.

- o An actual configuration ("a=acfg") for the session and its associated media stream components. The actual configuration identifies the potential configuration that was negotiated for use. Use of an actual configuration does not require any further negotiation.
- o A negotiation process that takes the current actual and the set of potential configurations (combinations of capabilities) as input and provides the negotiated actual configurations as output. In [\[RFC5939\]](#) the negotiation process is done independently for each media description.

14.2.1. Recommendation - Procedures for Potential Configuration Pairing

This section provides recommendations for entities generating and processing SDP under the generic capability negotiation framework as defined in [\[RFC5939\]](#) under the context of media stream multiplexing.

These recommendations are provided for the purposes of enabling the Offerer to make sure that the generated potential configurations between the multiplexed streams can (easily) be negotiated to be consistent between those streams. In particular, the procedures aim to simplify Answerer's procedure to choose potential configurations that are consistent across all the multiplexed media descriptions.

A potential configuration selects a set of attributes and parameters that become part of the media description when negotiated. When multiplexing media descriptions with potential configurations specified, there MAY be a need for coordinating this selection between multiplexed media descriptions to ensure the right multiplexing behavior.

Although it is possible to analyze the various potential configurations in multiplexed media descriptions to find combinations that satisfy such constraints, it can quickly become complicated to do so.

The procedures defined in [\[RFC5939\]](#) state that each potential configuration in the SDP has a unique configuration number, however the scope of uniqueness is limited to each media description. To make it simple for the answerer to choose valid combinations of potential configurations across media descriptions in a given bundle

group, we provide a simple rule for constructing potential configurations

- o Let m-bundle be the set of media descriptions that form a given bundle .
- o Let m-bundle-pcfg be the set of media descriptions in m-bundle that include one or more potential configurations.
- o Each media description in m-bundle-pcfg MUST have at least one potential configuration with the same configuration number (e.g. "1").
- o For each potential configuration with configuration number x in m-bundle-pcfg, the offerer MUST ensure that if the answerer chooses configuration number x in each of the media descriptions in m-bundle-pcfg, then the resulting SDP will have all multiplexing constraints satisfied for those media descriptions.
- o Since it is nearly impossible to define a generic mechanism for various capability extensions, this document doesn't provide procedures for dealing with the capability extension attributes. However, [Section 14.3](#) provide analysis of media capability extension attributes as defined in [\[RFC6871\]](#).

The above allows the answerer to easily find multiplexing compatible combinations of potential configurations: The answerer simply chooses a potential configuration (number) that is present in all of the media descriptions with potential configurations in the bundle.

Note that it is still possible for the offerer to provide additional potential configurations with independent configuration numbers. The answerer will have to perform more complicated analysis to determine valid multiplexed combinations of those.

[14.2.1.1](#). Example: Transport Capability Multiplexing


```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
a=tcap:1 RTP/SAVPF
a=tcap:2 RTP/SAVP
a=group:BUNDLE audio video
m=audio
a=mid:audio
a=pcfg:1 t=1
a=pcfg:2
m=video
a=mid:video
a=pcfg:1 t=1
a=pcfg:2 t=2
```

In the example above, the potential configurations that offer transport protocol capability of RTP/SAVPF has the same configuration number "1" in both the audio and video media descriptions.

14.2.1.2. Example: Attribute Capability Multiplexing

```
v=0
o=alice 2890844526 2890844527 IN IP4 host.atlanta.example.com
s=
c=IN IP4 host.atlanta.example.com
t=0 0
a=acap:1 a=rtcp-mux
a=acap:2 a=crypto:1 AES_CM_128_HMAC_SHA1_80
    inline:EcGZiNWpFJhQXdspcl1ekcmVCNWpVLcfHAWJSoj|2^20|1:32
a=group:BUNDLE audio video
m=audio 49172 RTP/AVP 99
a=mid:audio
a=pcfg:1 a=1
a=pcfg:2
m=video 560024 RTP/AVP 100
a=mid:video
a=pcfg:1 a=1
a=pcfg:2 a=2
```

In the example above, the potential configuration number "1" is repeated while referring to attribute capability `a=rtcp-mux`, since the behavior is IDENTICAL for the attribute `a=rtcp-mux` under multiplexing.

14.3. RFC6871 Analysis

[RFC6871] extends capability negotiation framework described in [RFC5939] by defining media capabilities that can be used to indicate and negotiate media types and their associated format parameters. It also allows indication of latent configurations and session capabilities.

14.3.1. Recommendation: Dealing with Payload Type Numbers

[RFC6871] defines a new payload type ("pt") parameter to be used with the potential, actual and latent configuration parameters. The parameter associates RTP payload type numbers with the referenced RTP-based media format capabilities ("a=rmcap") defined in [RFC6871] and is appropriate only when the transport protocol uses RTP. This means that the same payload type number can be assigned as part of potential or actual configurations in different media descriptions in a bundle. There are rules for the usage of identical Payload Type values across multiplexed "m=" lines as described in [I-D.ietf-mmusic-sdp-bundle-negotiation], which MUST be followed here as well. As described in [Section 14.2.1](#), the use of identical configuration numbers for compatible configurations in different media descriptions that are part of the bundle provides a way to ensure that the answerer can easily pick compatible configurations here as well.

14.3.1.1. Example: Attribute Capability Under Shared Payload Type

The attributes (a=rmcap, a=mfcap) follow the above recommendations under multiplexing.


```
v=0
o=- 25678 753849 IN IP4 192.0.2.1
s=
c=IN IP4 192.0.2.1
t=0 0
a=creq:med-v0
m=audio 54322 RTP/AVP 96
a=rtpmap:96 AMR-WB/16000/1
a=fmtp:96 mode-change-capability=1; max-red=220;
mode-set=0,2,4,7
a=rmcap:1,3 audio AMR-WB/16000/1
a=rmcap:2 audio AMR/8000/1
a=mfcap:1,2 mode-change-capability=1
a=mfcap:3 mode-change-capability=2
a=pcfg:1 m=1 pt=1:96
a=pcfg:2 m=2 pt=2:97
a=pcfg:3 m=3 pt=3:98
m=audio 54322 RTP/AVP 96
a=rtpmap:96 AMR-WB/16000/1
a=fmtp:96 mode-change-capability=1; max-red=220;
mode-set=0,2,4,7
a=rmcap:4 audio AMR/8000/1
a=rmcap:5 audio OPUS/48000/2
a=mfcap:5 minptime=40
a=mfcap:4 mode-change-capability=1
a=pcfg:1 m=4 pt=4:97
a=pcfg:4 m=5 pt=5:101
```

In the example above, the potential configuration number "1" is repeated when referring to media and media format capability used for the Payload Type 96. This implies that both the media capability 2 and 4 along with their media format capabilities MUST refer to the same codec configuration, as per the definition of IDENTICAL-PER-PT.

14.3.2. Recommendation: Dealing with Latent Configurations

[RFC6871] adds the notion of a latent configurations, which provides configuration information that may be used to guide a subsequent offer/exchange, e.g. by adding another media stream or use alternative codec combinations not currently offered. Latent configurations have configuration numbers which cannot overlap with the potential configuration numbers [RFC6871]. Supported combinations of potential and latent configurations are indicated by use of the "a=sescap" attribute, however use of this attribute is NOT RECOMMENDED with multiplexed media, since it requires the use of unique configuration numbers across the SDP. Taken together, this means there is no well-defined way to indicate supported combinations

of latent configurations, or combinations of latent and potential configurations with multiplexed media. It is still allowed to use the latent configuration attribute, however the limitations above will apply. To determine valid combinations, actual negotiation will have to be attempted subsequently instead.

15. IANA Considerations

[RFC EDITOR NOTE: Please replace RFCXXXX with the RFC number of this document.]

The IANA is requested to add a new column named "Mux Category" to several of the subregistries in the "Session Description Protocol (SDP) Parameters" registry. [Section 15.1](#) defines a new subregistry for identifying the initial registrations for various multiplexing categories applicable, as proposed in this document.

The tables in [Section 15.2](#) identify name of an entry in the existing subregistry and specify the value to put in the new "Mux Category" column of the associated IANA registry. Any entries in the existing tables that do not have a value for the "Mux Category" specified in this RFC will get a value of "TBD". Future specifications can change the "TBD" entries to the correct value.

15.1. New 'Multiplexing Categories' subregistry

A new sub-registry needs to be defined called the "Multiplexing Categories", with the following registrations created initially: "NORMAL", "NOT RECOMMENDED", "IDENTICAL", "TRANSPORT", "SUM", "INHERIT", "IDENTICAL-PER-PT", "SPECIAL" and "TBD" as defined in this document.

Initial value registration for "Multiplexing Categories".

+-----+		
Multiplexing Categories Reference		
+-----+		
NORMAL	RFCXXXX	
NOT RECOMMENDED	RFCXXXX	
IDENTICAL	RFCXXXX	
TRANSPORT	RFCXXXX	
SUM	RFCXXXX	
INHERIT	RFCXXXX	
IDENTICAL-PER-PT	RFCXXXX	
SPECIAL	RFCXXXX	
TBD	RFCXXXX	
+-----+		

Further entries may be registered on a first-come first-serve basis. Each registration needs to indicate the multiplexing category value to be added to the "Multiplexing Categories" subregistry as defined in this section.

Such a registration MUST also indicate the applicability of the newly defined multiplexing category value to various subregistries defined at "Session Description Protocol (SDP) Parameters".

The general registration procedures of [[RFC4566](#)] apply.

15.2. 'Mux Category' column for subregistries

Each sub-section identifies a subregistry in the "Session Description Protocol (SDP) Parameters" registry. The tables list the column that identifies the SDP attribute name/Token/Value from the corresponding subregistries and the values to be used for the new "Mux Category" column to be added.

15.2.1. Table: SDP bwtype

The following values are to be added to the 'SDP bwtype' subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

SDP Name	Mux Category
CT	NORMAL
AS	SUM
RS	SUM
RR	SUM
TIAS	SPECIAL

15.2.2. Table: att-field (session level)

The following values are to be added to the "att-field (session level)" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

SDP Name	Mux Category
cat	NORMAL
keywds	NORMAL
type	NORMAL
type:broadcast	NORMAL
type:H332	NORMAL
type:meeting	NORMAL
type:moderated	NORMAL
type:test	NORMAL
charset	NORMAL
charset:iso8895-1	NORMAL
tool	NORMAL
ipbcp	SPECIAL
group	NORMAL
ice-lite	NORMAL
ice-options	NORMAL
bcastversion	NORMAL
3GPP-Integrity-Key	NOT RECOMMENDED
3GPP-SDP-Auth	NOT RECOMMENDED
alt-group	NOT RECOMMENDED
PSCid	NORMAL
bc_service	NORMAL
bc_program	NORMAL
bc_service_package	NORMAL
sescap	NOT RECOMMENDED
rtsp-ice-d-m	NOT RECOMMENDED

15.2.3. Table: att-field (both session and media level)

The following values are to be added to the "att-field (both session and media level)" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

NOTE: The attributes from [draft-ietf-rmt-flute-sdp](#) ('flute-tsi', 'flute-ch', 'FEC-declaration', 'FEC-OTI-extension', 'content-desc') were not analyzed for their multiplexing behavior due to the expired status of the draft. For purposes of this specification, the multiplexing category of 'TBD' is assigned.

SDP Name	Mux Category
recvonly	NORMAL
sendrecv	NORMAL

sendonly	NORMAL	
sdplang	NORMAL	
lang	NORMAL	
h248item	SPECIAL	
sqn	NORMAL	
cdsc	NORMAL	
cpar	INHERIT	
cparmin	SPECIAL	
cparmax	SPECIAL	
rtcp-xr	NORMAL	
maxprate	SPECIAL	
setup	IDENTICAL	
connection	IDENTICAL	
key-mgmt	IDENTICAL	
source-filter	IDENTICAL	
inactive	NORMAL	
fingerprint	TRANSPORT	
flute-tsi	TBD	
flute-ch	TBD	
FEC-declaration	TBD	
FEC-OTI-extension	TBD	
content-desc	TBD	
ice-pwd	TRANSPORT	
ice-ufrag	TRANSPORT	
stkmstream	NORMAL	
extmap	SPECIAL	
qos-mech-send	NORMAL	
qos-mech-recv	NORMAL	
csup	NORMAL	
creq	NORMAL	
acap	INHERIT	
tcap	INHERIT	
3GPP-QoE-Metrics	NOT RECOMMENDED	
3GPP-Asset-Information	NOT RECOMMENDED	
mbms-mode	NOT RECOMMENDED	
mbms-repair	NOT RECOMMENDED	
ike-setup	IDENTICAL	
psk-fingerprint	IDENTICAL	
multicast-rtcp	IDENTICAL	
rmcap	IDENTICAL-PER-PT	
omcap	NORMAL	
mfcap	IDENTICAL-PER-PT	
mscap	INHERIT	
3gpp.iut.replication	TBD	
bcap	INHERIT	
ccap	IDENTICAL	
icap	NORMAL	
3gpp_sync_info	NORMAL	

3gpp_MaxRecvSDUSize	NORMAL	
etag	NOT RECOMMENDED	
duplication-delay	NORMAL	
range	NOT RECOMMENDED	
control	NOT RECOMMENDED	
mtag	NOT RECOMMENDED	
ts-refclk	NORMAL	
mediactk	NORMAL	
calgextmap	NORMAL	
+-----+		

15.2.4. Table: att-field (media level only)

The following values are to be added to the "att-field (media level only)" registry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

+-----+		
SDP Name	Mux Category	
+-----+		
ptime	IDENTICAL-PER-PT	
orient	NORMAL	
orient:portrait	NORMAL	
orient:landscape	NORMAL	
orient:seascape	NORMAL	
framerate	IDENTICAL-PER-PT	
quality	NORMAL	
rtpmap	IDENTICAL-PER-PT	
fmt	IDENTICAL-PER-PT	
rtpred1	NOT RECOMMENDED	
rtpred2	NOT RECOMMENDED	
T38FaxVersion	TBD	
T38MaxBitRate	TBD	
T38FaxFillBitRemoval	TBD	
T38FaxTranscodingMMR	TBD	
T38FaxTranscodingJBIG	TBD	
T38FaxRateManagement	TBD	
T38FaxMaxBuffer	TBD	
T38FaxMaxDatagram	TBD	
T38FaxUdpEC	TBD	
maxptime	IDENTICAL-PER-PT	
des	NOT RECOMMENDED	
curr	NOT RECOMMENDED	
conf	NOT RECOMMENDED	
mid	NORMAL	
rtcp	TRANSPORT	
rtcp-fb	IDENTICAL-PER-PT	

label	NORMAL	
T38VendorInfo	TBD	
crypto	TRANSPORT	
eecid	NOT RECOMMENDED	
aalType	NOT RECOMMENDED	
capability	NOT RECOMMENDED	
qosClass	NOT RECOMMENDED	
bcob	NOT RECOMMENDED	
stc	NOT RECOMMENDED	
upcc	NOT RECOMMENDED	
atmQOSparms	NOT RECOMMENDED	
atmTrfcDesc	NOT RECOMMENDED	
abrParms	NOT RECOMMENDED	
abrSetup	NOT RECOMMENDED	
bearerType	NOT RECOMMENDED	
lij	NOT RECOMMENDED	
anycast	NOT RECOMMENDED	
cache	NOT RECOMMENDED	
bearerSigIE	NOT RECOMMENDED	
aalApp	NOT RECOMMENDED	
cbrRate	NOT RECOMMENDED	
sbc	NOT RECOMMENDED	
clkrec	NOT RECOMMENDED	
fec	NOT RECOMMENDED	
prtfl	NOT RECOMMENDED	
structure	NOT RECOMMENDED	
cpsSDUsize	NOT RECOMMENDED	
all2CPS	NOT RECOMMENDED	
all2CPSSDUrate	NOT RECOMMENDED	
aal2sscs3661unassured	NOT RECOMMENDED	
aal2sscs3661assured	NOT RECOMMENDED	
aal2sscs3662	NOT RECOMMENDED	
aal5sscop	NOT RECOMMENDED	
atmmmap	NOT RECOMMENDED	
silenceSupp	NOT RECOMMENDED	
ecan	NOT RECOMMENDED	
gc	NOT RECOMMENDED	
profileDesc	NOT RECOMMENDED	
vsel	NOT RECOMMENDED	
dsel	NOT RECOMMENDED	
fsel	NOT RECOMMENDED	
onewaySel	NOT RECOMMENDED	
codecConfig	NOT RECOMMENDED	
isup_usi	NOT RECOMMENDED	
uiLayer1_Prot	NOT RECOMMENDED	
chain	NOT RECOMMENDED	
floorctrl	IDENTICAL	
confid	NORMAL	

userid	NORMAL	
floorid	NORMAL	
FEC	NORMAL	
accept-types	TBD	
accept-wrapped-types	TBD	
max-size	TBD	
path	TBD	
dccp-service-code	NOT RECOMMENDED	
rtcp-mux	IDENTICAL	
candidate	TRANSPORT	
ice-mismatch	NORMAL	
remote-candidates	TRANSPORT	
SRTPAuthentication	TBD	
SRTPROCTxRate	TBD	
rtcp-rsize	IDENTICAL	
file-selector	TBD	
file-transfer-id	TBD	
file-disposition	TBD	
file-date	TBD	
file-icon	TBD	
file-range	TBD	
depend	IDENTICAL-PER-PT	
ssrc	NORMAL	
ssrc-group	NORMAL	
rtcp-unicast	IDENTICAL	
pcfg	SPECIAL	
acfg	SPECIAL	
zrtp-hash	TRANSPORT	
X-predecbufsize	NOT RECOMMENDED	
X-initpredecbufperiod	NOT RECOMMENDED	
X-initpostdecbufperiod	NOT RECOMMENDED	
X-decbyterate	NOT RECOMMENDED	
3gpp-videopostdecbufsize	NOT RECOMMENDED	
framesize	NOT RECOMMENDED	
3GPP-SRTP-Config	NOT RECOMMENDED	
alt	NOT RECOMMENDED	
alt-default-id	NOT RECOMMENDED	
3GPP-Adaption-Support	NOT RECOMMENDED	
mbms-flowid	NOT RECOMMENDED	
fec-source-flow	SPECIAL	
fec-repair-flow	SPECIAL	
repair-window	SPECIAL	
rams-updates	NOT RECOMMENDED	
imageattr	IDENTICAL-PER-PT	
cfw-id	NORMAL	
portmapping-req	NOT RECOMMENDED	
g.3gpp.cat	NORMAL	
g.3gpp.crs	NORMAL	

ecn-capable-rtp	IDENTICAL	
visited-realm	TRANSPORT	
secondary-realm	TRANSPORT	
omr-s-cksum	NORMAL	
omr-m-cksum	NORMAL	
omr-codecs	NORMAL	
omr-m-att	NORMAL	
omr-s-att	NORMAL	
omr-m-bw	NORMAL	
omr-s-bw	NORMAL	
msrp-cema	TBD	
dccp-port	NOT RECOMMENDED	
resource	NORMAL	
channel	NORMAL	
cmid	NORMAL	
content	NORMAL	
lcfg	SPECIAL	
loopback	NORMAL	
loopback-source	NORMAL	
loopback-mirror	NORMAL	
chatroom	TBD	
altc	TRANSPORT	
T38FaxMaxIFP	TBD	
T38FaxUdpECDepth	TBD	
T38FaxUdpFECMaxSpan	TBD	
T38ModemType	TBD	
cs-correlation	TBD	
rtcp-idms	NORMAL	
+-----+		

15.2.5. Table: att-field (source level)

The following values are to be added to the "att-field (source level)" registry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

+-----+		
SDP Name	Mux Category	
+-----+		
cname	NORMAL	
previous-ssrc	NORMAL	
fntp	IDENTICAL-PER-PT	
ts-refclk	NORMAL	
mediacclk	NORMAL	
+-----+		

15.2.6. Table: content SDP Parameters

The following values are to be added to the "content SDP Parameters" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

SDP Name	Mux Category
slides	NORMAL
speaker	NORMAL
sl	NORMAL
main	NORMAL
alt	NORMAL

15.2.7. Table: Semantics for the 'group' SDP Attribute

The following values are to be added to the "Semantics for the 'group' SDP Attribute" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Token	Mux Category
LS	NORMAL
FID	NORMAL
SRF	NORMAL
ANAT	NOT RECOMMENDED
FEC	NORMAL
FEC-FR	NORMAL
CS	NORMAL
DDP	NORMAL
DUP	NORMAL

15.2.8. Table: 'rtcp-fb' Attribute Values

The following values are to be added to the "'rtcp-fb' Attribute Values" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Value Name	Mux Category
ack	IDENTICAL-PER-PT
app	SPECIAL
ccm	IDENTICAL-PER-PT
nack	IDENTICAL-PER-PT
trr-int	IDENTICAL-PER-PT

[15.2.9.](#) Table: 'ack' and 'nack' Attribute Values

The following values are to be added to the " 'ack' and 'nack' Attribute Values" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Value Name	Mux Category
sli	IDENTICAL-PER-PT
pli	IDENTICAL-PER-PT
rpsi	IDENTICAL-PER-PT
app	SPECIAL
rai	IDENTICAL-PER-PT
tllei	IDENTICAL-PER-PT
pslei	IDENTICAL-PER-PT
ecn	IDENTICAL

[15.2.10.](#) Table: 'depend' SDP Attribute Values

The following values are to be added to the " 'depend' SDP Attribute Values" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Token	Mux Category
lay	IDENTICAL-PER-PT
mdc	IDENTICAL-PER-PT

15.2.11. Table: 'cs-correlation' Attribute Values

The following values are to be added to the " "cs-correlation" Attribute Values" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Value	Mux Category
callerid	TBD
uuie	TBD
dtmf	TBD
external	TBD

15.2.12. Table: Semantics for the 'ssrc-group' SDP Attribute

The following values are to be added to the Semantics for the "Semantics for the "ssrc-group" SDP Attribute" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Token	Mux Category
FID	NORMAL
FEC	NORMAL
FEC-FR	NORMAL
DUP	NORMAL

15.2.13. Table: SDP/RTSP key management protocol identifiers

The following values are to be added to the "SDP/RTSP key management protocol identifiers" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Value Name	Mux Category
mikey	IDENTICAL

15.2.14. Table: Codec Control Messages

The following values are to be added to the "Codec Control Messages" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Value Name	Mux Category
fir	IDENTICAL-PER-PT
tmmbr	IDENTICAL-PER-PT
tstr	IDENTICAL-PER-PT
vbcm	IDENTICAL-PER-PT

15.2.15. Table: QoS Mechanism Tokens

The following values are to be added to the "QoS Mechanism Tokens" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

QoS Mechanism	Mux Category
rsvp	TRANSPORT
nsis	TRANSPORT

15.2.16. Table: SDP Capability Negotiation Option Tags

The following values are to be added to the "SDP Capability Negotiation Option Tags" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

QoS Mechanism	Mux Category
cap-v0	NORMAL
med-v0	NORMAL
bcap-v0	NORMAL
ccap-v0	NORMAL
icap-v0	NORMAL

15.2.17. Table: Timestamp Reference Clock Source Parameters

The following values are to be added to the "Timestamp Reference Clock Source Parameters" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Name	Mux Category
ntp	NORMAL
ptp	NORMAL
gps	NORMAL
gal	NORMAL
glonass	NORMAL
local	NORMAL
private	NORMAL

15.2.18. Table: Media Clock Source Parameters

The following values are to be added to the "Media Clock Source Parameters" subregistry in the "Session Description Protocol (SDP) Parameters" registry. The references should be updated to point at this RFC as well as the previous references.

Name	Mux Category
sender	NORMAL
direct	NORMAL
IEEE1722	NORMAL

16. Security Considerations

This document does not add any new security considerations beyond the existing considerations in the RFCs for protocols that are being multiplexed together.

The ways that SRTP streams are keyed is not believed to create any two-time pad vulnerability for the currently defined SRTP keying mechanism.

17. Acknowledgments

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18. Change Log

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

Changes from [draft-ietf-mmusic-sdp-mux-attributes-06](#) - 08

- o Assigned TBD category to all the attributes for whom there exists no specification on multiplexing behavior over the underlying transport protocol today.
- o Incorporated comments from Flemming and Ari (post last call)

Changes from [draft-ietf-mmusic-sdp-mux-attributes-06](#)

- o Incorporated last call review comments from Thomas Stach and Ari Keranen.
- o Fixed more nits to prep for the LastCall.

Changes from [draft-ietf-mmusic-sdp-mux-attributes-05](#)

- o Incorporated review comments from Christian Grooves and Ari Keranen.

- o Fixed more nits to prep for the LastCall.

Changes from [draft-ietf-mmusic-sdp-mux-attributes-04](#)

- o Fixed minor nits overall.
- o Updated Acknowledgement Sections
- o Last Call Version.

Changes from [draft-ietf-mmusic-sdp-mux-attributes-03](#)

- o More re-work on the IANA section.
- o Clean ups preparing for the last call.

Changes from [draft-ietf-mmusic-sdp-mux-attributes-02](#)

- o Incorporated suggestions from Flemming on Capability Negotiation.
- o Closed open issues from IETF90
- o Added IANA section to list the categories for all the SDP attributes analyzed
- o Lots of cleanup
- o Reformatted References section to use short-form notation

Changes from [draft-ietf-mmusic-sdp-mux-attributes-01](#)

- o Updated [section 15](#) to provide detailed recommendation on dealing with encapsulating attributes. Also updated sections [5.20](#), [5.28](#), [5.29](#) to refer to [Section 15](#).
- o Added new categories IDENTICAL-PER-PT and INHERIT
- o Updated Sections [16](#) to add the new categories.
- o Updated Sections [5.1](#), [5.14](#), [5.15](#), [5.38](#), [8.5](#) to reflect the category IDENTICAL-PER-PT.
- o Reformatted [section 4](#) to add individual categories to their own sections.

Changes from [draft-ietf-mmusic-sdp-mux-attributes-00](#)

- o Added [Section 15](#) to provide recommendations on multiplexing SDP encapsulating attributes. Also updated sections [5.20](#), [5.28](#), [5.29](#) to refer to [Section 15](#).
- o Updated [Section 5.38](#) to incorporate PM-dir review inputs from Qin Wu
- o Updated Sections [5.2](#), 5.14, 8.5 to refer to BUNDLE draft for more clarity.
- o Fixed few nits regarding sentence clarity and fill-in the NOTES section where information was lacking.

Changes from [draft-nandakumar-mmusic-mux-attributes-05](#)

- o Renamed the document to be a WG document.
- o Added [Section 14](#).
- o Updated Open Issues based on IETF88 discussions.

Changes from [draft-nandakumar-mmusic-mux-attributes-04](#)

- o Added few OPEN ISSUES that needs to be discussed.
- o Updated sections [5.10](#), 5.23, 5.24, 5.25, 7.2, 9.1, 5.12, 5.27, 8.4, 5.44, 5.11, 5.4, 5.19, 10.1, 10.5, 5.21, 10.4, 15.1
- o Updated Table Column name Current to Level and improved TRANSPORT category explanation on suggestions form Dan Wing.
- o Grouped all the rtcp-fb attribute analysis under a single section as suggested by Magnus/

Changes from [draft-nandakumar-mmusic-mux-attributes-03](#)

- o Maintenance change to clean up grammatical nits and wordings.

Changes from [draft-nandakumar-mmusic-mux-attributes-02](#)

- o Updated Sections [5.3](#), 5.5, 5.6, 5.7, 5.9, 5.8, 5.11, 5.13, 5.22, 5.34, 5.37, 5.40, 5.41, 5.42, 5.43, 5.44, 5.45, 6.1, 6.2, 6.3, 8, 3, 12.1 based on the inputs from the respective RFC Authors.

Changes from [draft-nandakumar-mmusic-mux-attributes-01](#)

- o Replaced Category BAD with NOT RECOMMENDED.

- o Added Category TBD.
- o Updated IANA Consideration Section.

Changes from [draft-nandakumar-mmusic-mux-attributes-00](#)

- o Added new section for dealing with FEC payload types.

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