

MIME Type Registration of RTP Payload Formats

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Copyright Notice

Copyright (C) The Internet Society (2003). All Rights Reserved.

Abstract

This document defines the procedure to register RTP Payload Formats as audio, video or other MIME subtype names. This is useful in a text-based format or control protocol to identify the type of an RTP transmission. This document also registers all the RTP payload formats defined in the RTP Profile for Audio and Video Conferences as MIME subtypes. Some of these may also be used for transfer modes other than RTP.

Table of Contents

1. Introduction	2
1.1. IANA Considerations	2
1.2. Terminology	3
2. Procedure For Registering MIME Types for RTP Payload Types	3
3. Mapping to SDP Parameters	5
4. Registrations for "Audio/Video Profile"	6
4.1. Audio Type Registrations	6
4.2. Video Type Registrations	30
5. Security Considerations	42
6. Normative References	43
7. Authors' Addresses	44
8. Full Copyright Statement	45

1. Introduction

The MIME registration procedure described in RFC 2048 [1] was originally designed for transport of multimedia information via asynchronous Internet mail, but the MIME namespace now provides identification for other transport modes as well. This document defines the procedure to register MIME subtype names for use with the Real-time Transport Protocol (RTP), RFC 3550 [2], to identify RTP payload formats.

This document also registers all the RTP payload formats defined in the RTP Profile for Audio and Video Conferences, RFC 3551 [3], as MIME subtypes under the "audio" and "video" MIME types.

1.1. IANA Considerations

This document registers the following MIME subtypes:

- audio/DVI4
- audio/G722
- audio/G723
- audio/G726-16
- audio/G726-24
- audio/G726-32
- audio/G726-40
- audio/G728
- audio/G729
- audio/G729D
- audio/G729E
- audio/GSM
- audio/GSM-EFR
- audio/L8
- audio/L16
- audio/LPC
- audio/MPA
- audio/PCMA
- audio/PCMU
- audio/QCELP
- audio/RED
- audio/VDVI
- video/BT656
- video/CelB
- video/JPEG
- video/H261
- video/H263
- video/H263-1998
- video/H263-2000
- video/MPV

video/MP2T
video/MP1S
video/MP2P
video/BMPEG
video/nv

MIME subtype audio/L16 has already been registered via RFC 2586 for transports other than RTP. That registration is incorporated here and augmented with additional information for RTP transport.

1.2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [4] and indicate requirement levels for implementations compliant with this specification.

2. Procedure For Registering MIME Types for RTP Payload Types

Registering an RTP payload type as a MIME type follows the same procedures as described in RFC 2048 and uses the registration template shown in Section 2.8 of RFC 2048. Some additional parameters are required to specify how a particular payload format is transported over RTP:

Published specification

A description of the encoding and a specification of the payload format must be provided, usually by reference to an RTP payload format specification RFC. That RFC may be separate, or the MIME subtype registration may be incorporated into the payload format specification RFC. The payload format specification MUST include the RTP timestamp clock rate (or multiple rates for audio encodings with multiple sampling rates).

A reference to a further description of the data compression format itself should be provided, if available.

Required parameters

If the payload format does not have a fixed RTP timestamp clock rate, then a "rate" parameter is required to specify the RTP timestamp clock rate. A particular payload format may have additional required parameters.

Optional parameters

Most audio payload formats can have an optional "channels" parameter to specify the number of audio channels included in the transmission. Any payload format, but most likely audio formats, may also include the optional parameters "ptime", to specify the recommended length of time in milliseconds represented by the media in a packet, and/or "maxptime" to specify the maximum amount of media which can be encapsulated in each packet, expressed as time in milliseconds. The "ptime" and "maxptime" parameters are defined in the Session Description Protocol (SDP) [5].

A particular payload format may have additional optional parameters.

Encoding considerations

The fact that the type can be transferred via RTP MUST be noted.

Depending on whether the type has already been registered for transfer with a non-RTP protocol (e.g. MIME mail or http) or not, several different cases can occur:

a) Not yet registered as a MIME type

A new registration should be constructed using the MIME registration template. The registration may specify transfer via other means in addition to RTP if that is feasible and desired. The encoding considerations must specify how the type is transferred via RTP.

Optional parameters may be defined as needed, and it must be clearly stated whether to which mode(s) of transfer the parameters apply.

b) MIME type exists for a non-RTP protocol

The encoding considerations of the existing type should be changed to indicate that the type can also be transferred via RTP.

RTP-specific parameters may be added, and it must be clearly stated that these are only to be used when the media type is transmitted via RTP transport.

- c) Update an existing MIME type for RTP to be used for a non-RTP protocol

The encoding considerations of the existing type should be changed to indicate that the type can also be transferred via a non-RTP protocol (e.g. SMTP, HTTP).

Non-RTP-specific parameters can be added, and it must be clearly stated that these are only to be used when the media type is transmitted via a non-RTP transport.

3. Mapping to SDP Parameters

The representation of a MIME media type is specified in the syntax of the Content-Type header field in RFC 2045 [6] as follows:

type "/" subtype *("; " parameter)

Parameters may be required for a particular type or subtype or they may be optional. For media types which represent RTP payload formats, the parameters "rate", "channels", "ptime", and "maxptime" have general definitions (given above) that may apply across types and subtypes. The format for a parameter is specified in RFC 2045 as

attribute "=" value

where attribute is the parameter name and the permissible values are specified for each parameter. The value may need to be a quoted string if it contains any of the special characters listed in RFC 2045.

The information carried in the media type string has a specific mapping to fields in the Session Description Protocol (SDP) [5], which is commonly used to describe RTP sessions. The mapping is as follows:

- o The MIME type (e.g., audio) goes in SDP "m=" as the media name.
- o The MIME subtype (payload format) goes in SDP "a=rtpmap" as the encoding name.
- o The general (possibly optional) parameters "rate" and "channels" also go in "a=rtpmap" as clock rate and encoding parameters, respectively.
- o The general (and optional) parameters "ptime" and "maxptime" go in the SDP "a=ptime" and "a=maxptime" attributes, respectively.

- o Any payload-format-specific parameters go in the SDP "a=fmtp" attribute. The set of allowed parameters is defined by the RFC that specifies the payload format and MUST NOT be extended by the MIME subtype registration without a corresponding revision of the payload format specification. The format and syntax of these parameters may also be defined by the payload format specification, but it is suggested that the parameters be copied directly from the MIME media type string as a semicolon separated list of parameter=value pairs. For payload formats that specify some other syntax for the fmtp parameters, the registration of that payload format as a MIME subtype must specify what the parameters are in MIME format and how to map them to the SDP "a=fmtp" attribute. See Section 4.1.21 for an example.

An example mapping is as follows:

```
audio/L16; rate=48000; channels=2; ptime=5; emphasis=50-15
```

```
m=audio 49170 RTP/AVP 97
a=rtpmap:97 L16/48000/2
a=fmtp:97 emphasis=50-15
a=ptime:5
```

Note that the payload format (encoding) names defined in the RTP Profile are commonly shown in upper case. MIME subtypes are commonly shown in lower case. These names are case-insensitive in both places. Similarly, parameter names are case-insensitive both in MIME types and in the default mapping to the SDP a=fmtp attribute.

4. Registrations for "Audio/Video Profile"

In the following sections, all RTP payload formats described in the RTP Profile for Audio and Video Conferences, RFC 3551 [3], are registered as MIME subtypes.

4.1. Audio Type Registrations

The following sections register all of the RTP audio payload types defined in RFC 3551 as MIME types.

For most audio payload formats, the RTP timestamp clock rate is equal to the sampling rate. Some payload formats operate only at one fixed sampling rate, while others are adjustable.

4.1.1. Registration of MIME media type audio/DVI4

MIME media type name: audio

MIME subtype name: DVI4

Required parameters: rate

The RTP timestamp clock rate, which is equal to the sampling rate. The typical rate is 8000, but other rates may be specified.

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.2. Registration of MIME media type audio/G722

MIME media type name: audio

MIME subtype name: G722

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.3. Registration of MIME media type audio/G723

MIME media type name: audio

MIME subtype name: G723

Required parameters: None

Optional parameters:

ptime, maxptime

bitrate: the data rate in kb/s used or preferred for the audio bit stream, with permissible values 5.3 or 6.3. If unspecified, the bitrate may change from frame to frame as indicated inband.

annexa: indicates that Annex A, voice activity detection, is used or preferred. Permissible values are "yes" and "no" (without the quotes); "yes" is implied if this parameter is omitted.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.4. Registration of MIME media type audio/G726-16

MIME media type name: audio

MIME subtype name: G726-16

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.5. Registration of MIME media type audio/G726-24

MIME media type name: audio

MIME subtype name: G726-24

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.6. Registration of MIME media type audio/G726-32

MIME media type name: audio

MIME subtype name: G726-32

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.7. Registration of MIME media type audio/G726-40

MIME media type name: audio

MIME subtype name: G726-40

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.8. Registration of MIME media type audio/G728

MIME media type name: audio

MIME subtype name: G728

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.9. Registration of MIME media type audio/G729

MIME media type name: audio

MIME subtype name: G729

Required parameters: None

Optional parameters:

ptime, maxptime

annexb: indicates that Annex B, voice activity detection, is used or preferred. Permissible values are "yes" and "no" (without the quotes); "yes" is implied if this parameter is omitted.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.10. Registration of MIME media type audio/G729D

MIME media type name: audio

MIME subtype name: G729D

Required parameters: None

Optional parameters:

ptime, maxptime

annexb: indicates that Annex B, voice activity detection, is used or preferred. Permissible values are "yes" and "no" (without the quotes); "yes" is implied if this parameter is omitted.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.11. Registration of MIME media type audio/G729E

MIME media type name: audio

MIME subtype name: G729E

Required parameters: None

Optional parameters:

ptime, maxptime

annexb: indicates that Annex B, voice activity detection, is used or preferred. Permissible values are "yes" and "no" (without the quotes); "yes" is implied if this parameter is omitted.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.12. Registration of MIME media type audio/GSM

MIME media type name: audio

MIME subtype name: GSM

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.13. Registration of MIME media type audio/GSM-EFR

MIME media type name: audio

MIME subtype name: GSM-EFR

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.14. Registration of MIME media type audio/L8

MIME media type name: audio

MIME subtype name: L8

Required parameters: rate, the RTP timestamp clock rate

Optional parameters: channels, ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.15. Registration of MIME media type audio/L16

MIME subtype audio/L16 has already been registered via RFC 2586 for transports other than RTP. That registration is incorporated here and augmented with additional information for RTP transport.

MIME media type name: audio

MIME subtype name: L16

Required parameters

rate: number of samples per second -- For non-RTP transport, the permissible values for rate are 8000, 11025, 16000, 22050, 24000, 32000, 44100, and 48000 samples per second. For RTP transport, other values are permissible but the aforementioned values are RECOMMENDED. For RTP, the rate parameter indicates the RTP timestamp clock rate, which is equal to the sample rate.

Optional parameters

channels: how many audio streams are interleaved -- defaults to 1; stereo would be 2, etc. Interleaving takes place between individual two-byte samples.

emphasis: analog preemphasis applied to the signal before quantization. The only emphasis value defined here is emphasis=50-15 to indicate the 50/15 microsecond preemphasis used with Compact Disks. This parameter MUST be omitted if no analog preemphasis was applied.

channel-order: specifies the sample interleaving order for multiple-channel audio streams (see [7] Section 7). Permissible values are DV.LRLsRs, DV.LRCS, DV.LRCWo, DV.LRLsRsC, DV.LRLsRsCS, DV.LmixRmixTWoQ1Q2, DV.LRCWoLsRsLmixRmix, DV.LRCWoLs1Rs1Ls2Rs2, DV.LRCWoLsRsLcRc. For interoperation with DV video systems, only a subset of these channel combinations is specified for use with 20-bit linear encoding in the DV video specification [4]; those are DV.LRLsRs, DV.LRCS, DV.LmixRmixTWoQ1Q2. This parameter MUST be omitted when the AIFF-C channel order convention (see RFC 3551) is in use.

For RTP, ptime: RECOMMENDED duration of each packet in milliseconds.

For RTP, maxptime: maximum duration of each packet in milliseconds.

Encoding considerations

Audio data is binary data, and must be encoded for non-binary transport; the Base64 encoding is suitable for Email. Note that audio data does not compress easily using lossless compression.

This type is also defined for transfer via RTP [RFC 3550].

Security considerations

Audio data is believed to offer no security risks.
See Section 5 of RFC 3555.

Interoperability considerations

This type is compatible with the encoding used in the WAV (Microsoft Windows RIFF) and Apple AIFF union types, and with the public domain "sox" and "rateconv" programs.

Published specification

RFC 2586 for non-RTP transports, RFC 3551 for RTP

Applications which use this media

The public domain "sox" and "rateconv" programs accept this type.

1. Magic number(s) : None
2. File extension(s) : WAV L16
3. Macintosh file type code : AIFF

Person to contact for further information

1. Name : James Salsman
2. E-mail : jps-L16@bovik.org

Intended usage

Common

It is expected that many audio and speech applications will use this type. Already the most popular platforms provide this type with the rate=11025 parameter referred to as "radio quality speech."

Author/Change controller

James Salsman for non-RTP transports.
Stephen Casner for RTP transport.

4.1.16. Registration of MIME media type audio/LPC

MIME media type name: audio

MIME subtype name: LPC

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.17. Registration of MIME media type audio/MPA

MIME media type name: audio

MIME subtype name: MPA (MPEG audio)

Required parameters: None

Optional parameters:

layer: which layer of MPEG audio encoding; permissible values are 1, 2, 3.

samplerate: the rate at which audio is sampled. MPEG-1 audio supports sampling rates of 32, 44.1, and 48 kHz; MPEG-2 supports sampling rates of 16, 22.05 and 24 kHz. This parameter is separate from the RTP timestamp clock rate which is always 90000 Hz for MPA.

mode: permissible values are "stereo", "joint_stereo", "single_channel", "dual_channel". The "channels" parameter does not apply to MPA. It is undefined to put a number of channels in the SDP rtpmap attribute for MPA.

bitrate: the data rate for the audio bit stream.

ptime: RECOMMENDED duration of each packet in milliseconds.

maxptime: maximum duration of each packet in milliseconds.

Parameters which are omitted are left to the encoder to choose based on the session bandwidth, configuration information, or other constraints. The selected layer as well as the sampling rate and mode are indicated in the payload so receivers can process the data without these parameters being specified externally.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:
Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:
Stephen Casner

4.1.18. Registration of MIME media type audio/PCMA

MIME media type name: audio

MIME subtype name: PCMA

Required parameters: rate
The RTP timestamp clock rate, which is equal to the sampling rate. The typical rate is 8000, but other rates may be specified.

Optional parameters: channels, ptime, maxptime

Encoding considerations:
This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:
Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:
Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:
Stephen Casner

4.1.19. Registration of MIME media type audio/PCMU

MIME media type name: audio

MIME subtype name: PCMU

Required parameters: rate

The RTP timestamp clock rate, which is equal to the sampling rate. The typical rate is 8000, but other rates may be specified.

Optional parameters: channels, ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.20. Registration of MIME media type audio/QCELP

MIME media type name: audio

MIME subtype name: QCELP

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2658

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.21. Registration of MIME media type audio/RED

MIME media type name: audio

MIME subtype name: RED

Required parameters:

pt: a comma-separated list of RTP payload types. Because comma is a special character, the list must be a quoted-string (enclosed in double quotes). For static payload types, each list element is simply the type number. For dynamic payload types, each list element is a mapping of the dynamic payload type number to an embedded MIME content-type specification for the payload format corresponding to the dynamic payload type. The format of the mapping is:

dynamic-payload-type "=" content-type

If the content-type string includes a comma, then the content-type string MUST be a quoted-string. If the content-type string does not include a comma, it MAY still be quoted. Since it is part of the list which must itself be a quoted-string, that means the quotation marks MUST be quoted with backslash quoting as specified in RFC 2045. If the content-type string itself contains a quoted-string, then the requirement for backslash quoting is recursively applied. To specify the audio/RED payload format in SDP, the pt parameter is mapped to an a=fmtp attribute by eliminating the parameter name (pt) and changing the commas to slashes. For example, 'pt="0,5"' maps to 'a=fmtp:99 0/5'. A more complicated example, with a dynamic payload type, is:

```
pt = "0, 103 = \"audio/G729D;annexb=yes\" "
```

```
m=audio 49170 RTP/AVP 99 0 103
a=rtpmap:99 RED/8000
a=fmtp:99 0/103
a=rtpmap:103 G729D/8000
a=fmtp:103 annexb=yes
```

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2198

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.1.22. Registration of MIME media type audio/VDVI

MIME media type name: audio

MIME subtype name: VDVI

Required parameters: None

Optional parameters: ptime, maxptime

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2. Video Type Registrations

For all of the video payload formats registered here, the RTP timestamp clock rate is always 90000 Hz, so the "rate" parameter is not applicable. Likewise, the "channel" parameter is not used with video, and while "ptime" and "maxptime" could be used with video, they typically are not.

4.2.1. Registration of MIME media type video/BT656

MIME media type name: video

MIME subtype name: BT656

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2431

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.2. Registration of MIME media type video/CelB

MIME media type name: video

MIME subtype name: CelB

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2029

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.3. Registration of MIME media type video/JPEG

MIME media type name: video

MIME subtype name: JPEG

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2435

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.4. Registration of MIME media type video/H261

MIME media type name: video

MIME subtype name: H261

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2032

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.5. Registration of MIME media type video/H263

MIME media type name: video

MIME subtype name: H263

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2190

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.6. Registration of MIME media type video/H263-1998

MIME media type name: video

MIME subtype name: H263-1998

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2429

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.7. Registration of MIME media type video/H263-2000

MIME media type name: video

MIME subtype name: H263-2000

Required parameters: None

Optional parameters:

profile: H.263 profile number, in the range 0 through 10, specifying the supported H.263 annexes/subparts.

level: Level of bitstream operation, in the range 0 through 100, specifying the level of computational complexity of the decoding process.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2429

The specific values for the profile and level parameters and their meaning are defined in Annex X of ITU-T Recommendation H.263, "Video coding for low bit rate communication". Note that the RTP payload format for H263-2000 is the same as for H263-1998, but additional annexes/subparts are specified along with the profiles and levels.

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.8. Registration of MIME media type video/MPV

MIME media type name: video

MIME subtype name: MPV

MPEG-1 or -2 Elementary Streams

Required parameters: None

Optional parameters:

type: the type of MPEG video, from the set "mpeg1", "mpeg2-halfd1", or "mpeg2-fullld1". The default is "mpeg1".
The mapping to a=fmtp is identity.

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2250

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.9. Registration of MIME media type video/MP2T

MIME media type name: video

MIME subtype name: MP2T
MPEG-2 Transport Streams

Required parameters: None

Optional parameters: None

Encoding considerations:
This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2250

Applications which use this media type:
Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:
Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:
Stephen Casner

4.2.10. Registration of MIME media type video/MP1S

MIME media type name: video

MIME subtype name: MP1S
MPEG-1 Systems Streams

Required parameters: None

Optional parameters: None

Encoding considerations:
This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2250

Applications which use this media type:
Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:
Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:
Stephen Casner

4.2.11. Registration of MIME media type video/MP2P

MIME media type name: video

MIME subtype name: MP2P
MPEG-2 Program Streams

Required parameters: None

Optional parameters: None

Encoding considerations:
This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2250

Applications which use this media type:
Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:
Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:
Stephen Casner

4.2.12. Registration of MIME media type video/BMPEG

MIME media type name: video

MIME subtype name: BMPEG

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 2343

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

4.2.13. Registration of MIME media type video/nv

MIME media type name: video

MIME subtype name: nv

Required parameters: None

Optional parameters: None

Encoding considerations:

This type is only defined for transfer via RTP [RFC 3550].

Security considerations: See Section 5 of RFC 3555

Interoperability considerations: none

Published specification: RFC 3551

Applications which use this media type:

Audio and video streaming and conferencing tools.

Additional information: none

Person & email address to contact for further information:

Stephen Casner <casner@acm.org>

Intended usage: COMMON

Author/Change controller:

Stephen Casner

5. Security Considerations

The MIME subtype registration procedure specified in this memo does not impose any security considerations on its own. This memo also contains several MIME type registrations. The registrations themselves do not impose security risks, but some may state security considerations specific to the particular registration.

Several audio and video encodings are perfect for hiding data using steganography.

The RTP specification, RFC 3550, provides security considerations for the transport of audio and video data over RTP, including the use of encryption where confidentiality is required.

6. Normative References

- [1] Freed, N., Klensin, J. and J. Postel, "Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures", BCP 13, RFC 2048, November 1996.
- [2] Schulzrinne, H., Casner, S., Frederick, R. and V. Jacobson, "RTP: A Transport Protocol for Real-Time Applications", RFC 3550, July 2003.
- [3] Schulzrinne, H. and S. Casner, "RTP Profile for Audio and Video Conferences with Minimal Control", RFC 3551, July 2003.
- [4] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [5] Handley, M. and V. Jacobson, "SDP: Session Description Protocol", RFC 2327, April 1998.
- [6] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996.
- [7] Kobayashi, K., Ogawa, A., Casner, S. and C. Bormann, "RTP Payload Format for 12-bit DAT Audio and 20- and 24-bit Linear Sampled Audio", RFC 3190, January 2002.

7. Authors' Addresses

Stephen L. Casner
Packet Design
3400 Hillview Avenue, Building 3
Palo Alto, CA 94304
United States

Phone: +1 650 739-1843
EMail: casner@acm.org

Philipp Hoschka
INRIA
Route des Lucioles 2004
06904, Sophia-Antipolis Cedex
BP 93, France

Phone: (+33) 4 92 38 79 84
Fax: (+33) 4 92 38 77 65
EMail: ph@w3.org

W3C
<http://www.w3.org/people/hoschka>

8. Full Copyright Statement

Copyright (C) The Internet Society (2003). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Acknowledgement

Funding for the RFC Editor function is currently provided by the Internet Society.