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**Summary**

It is the latest draft of H.248.66 (ex H.248.RTSP) work item, which is output from the 17 - 23 January 2008 Seoul meeting, and input to this 22 April - 2 May 2008 Geneva meeting for convenience. The Editor has updated the PackageID according to the registration result.

**NOTE FROM TSB:** This text has dependencies (as noted in the list of normative references, below) on one IETF drafts: draft-ietf-mmusic-rfc2326bis. The text as is cannot be considered for approval before the respective RFC is issued.

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## **Draft new ITU-T Recommendation H.248.66 (ex. RTSP)**

### **Gateway control protocol: Packages for RTSP and H.248 interworking**

#### **AAP Summary**

**TBD.**

#### **Summary**

**TBD.**

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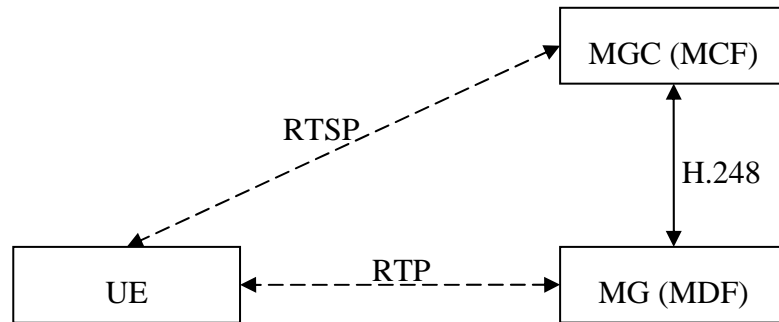
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## **1 Scope**

This Recommendation provides guidance on mapping Real Time Streaming Protocol (RTSP) Methods, Error/StatusCodes and Header Fields to H.248 protocol information elements, packages and procedures. Several packages are defined that enhance interoperability between RTSP and the H.248, however the functionalities defined in these packages may be used for other applications/services.

RTSP operates between User equipment (UE) and a Media Server. This Recommendation assumes that the Media Server is functionally decomposed into a Media Control Function (MCF) and a Media Delivery Function (MDF). These functions can be realized in a Media Gateway Controller (MGC) and a Media Gateway (MG). The Figure 1 illustrates the theoretical architecture in scope.

NOTE: There may be other network entities between the UE and MGC (MCF), or the UE and the MG (MDF).



**Figure 1/H.248.RTSP-66 – RTSP and H.248 interworking architecture**

Note: Alternate architectures are for further study.

## 2 Reference

The following ITU-T Recommendations and other references contain provisions, which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T H.248.1] ITU-T Recommendation H.248.1 (09/2005), *Gateway Control Protocol: Version 3*
- [ITU-T H.248.8] ITU-T Recommendation H.248.8 (08/2007), *Gateway control protocol: Error code and service change reason description*
- [ITU-T H.248.9] ITU-T Recommendation H.248.9 (09/2005) Amendment 1 (08/2007), *Gateway control protocol: Advanced media server packages*
- [ITU-T H.248.10] ITU-T Recommendation H.248.10 (07/2001), *Gateway control protocol: Media gateway resource congestion handling package*
- [ITU-T H.248.11] ITU-T Recommendation H.248.11 (11/2002), *Gateway control protocol: Media gateway overload control package*
- [IETF RFC1123] IETF RFC 1123 (10/1989), *Requirements for Internet Hosts -- Application and Support*
- [IETF RFC2234] IETF RFC 2234 (11/1997), *Augmented BNF for Syntax Specifications: ABNF*
- [IETF RFC2326] IETF RFC 2326 (04/1998), *Real Time Streaming Protocol (RTSP)*
- [IETF RFC2327] IETF RFC 2327 (04/1998), *SDP: Session Description Protocol*
- [IETF RFC2616] IETF RFC 2616 (06/1999), *Hypertext Transfer Protocol -- HTTP/1.1*
- [IETF RFC3550] IETF RFC 3550 (07/2003), *RTP: A Transport Protocol for Real-Time Applications*
- [IETF RFC3986] IETF RFC 3986 (01/2005), *Uniform Resource Identifier (URI): Generic Syntax*
- [IETF RFC3987] IETF RFC 3987 (01/2005), *Internationalized Resource Identifiers (IRIs)*
- [IETF RFC4566] IETF RFC 4566 (07/2006), *SDP: Session Description Protocol*
- [IETF RFC RTSP2] [draft-ietf-mmusic-rfc2326bis-15.txt](#), *Real Time Streaming Protocol 2.0 (RTSP)*

### **3 Definitions**

#### **3.1 Terms defined elsewhere:**

None

#### **3.2 Terms defined in this Recommendation**

This Recommendation defines the following terms:

<b>Add.req:</b>	H.248.1 Add command request
<b>AuditCapabilities.req:</b>	H.248.1 AuditCapabilities command request
<b>AuditValue.req:</b>	H.248.1 AuditValue command request
<b>Modify.req:</b>	H.248.1 Modify command request
<b>Move.req:</b>	H.248.1 Move command request
<b>Notify.req:</b>	H.248.1 Notify command request
<b>ServiceChange.req:</b>	H.248.1 ServiceChange command request

### **4 Abbreviations and acronyms**

This Recommendation uses the following abbreviations and acronyms:

ABNF	Augmented Backus–Naur form
IETF	Internet Engineering Task Force
IRI	Internationalized Resource Indicator
LD	Local Descriptor
MG	Media Gateway
MGC	Media Gateway Controller
NPT	Normal Play Time
RD	Remote Descriptor
RFC	Request for Comment
RTP	Real-Time Transport Protocol
RTCP	RTP Control Protocol
RTSP	Real Time Streaming Protocol
SDP	Session Description Protocol
SMPTE	Society of Motion Picture and Television Engineers
TCP	Transport Control Protocol
TLS	Transport Layer Security
UDP	User Datagram Protocol
UTC	Universal Time Constant
URI	Universal Resource Indicator

### **5 Conventions**

None

## **6 RTSP and H.248 interworking**

### **6.1 Method interworking**

#### **6.1.1 OPTIONS**

The MGC should be able to provide a response to an RTSP OPTIONS method based on the RTSP service capabilities. As the RTSP OPTIONS method may be used as a keep alive the MGC may issue an appropriate H.248 command (e.g. an empty AuditValue.req) to the MG to maintain a keep alive with the MG for a particular termination.

#### **6.1.2 DESCRIBE**

On receipt of a RTSP DESCRIBE method the MGC may request the presentation/session description from the MG if it does not already have this information. The MGC should add a Termination to a Context using an Add.req and the set the Media Resource Identifier (*mri/spec*) property to the URI received in the DESCRIBE. The MGC should also CHOOSE wildcard the LocalControl Descriptor to determine the presentation/session description information for the media resource of interest.

#### **6.1.3 SETUP**

Using the information in the RTSP SETUP method the MGC can use an Add.req or Modify.req to set the remote address/port in the Remote Descriptor and request the server port from the Local Descriptor. The MGC shall ensure that the Media Resource Identifier (*mri/spec*) property is set for the particular stream/termination to ensure that the correct media resource is specified.

Session information can either be provided by the MGC or from the SDP session information from the MG. If a Session identifier is provided by the client then the MGC can use the H.248 stream concept to bundle the session.

In the case that a SETUP contains multiple transport options these may be provided to the MG using multiple groups and allowing the MG to choose the applicable group. The MGC may also request the acceptable range formats by performing a CHOOSE wildcard on the Format Types (*rfs/ft*) property.

A RTSP SETUP method may result in the transport parameters being changed whilst a media resource is being played. In this case the MGC may need to reissue a new RTSP Play (*rtsp/play*) signal whilst CHOOSE wildcarding the Range Info (*rnginf*) parameter to determine the playout time at which the change in transport parameters occurred. In addition the MGC may need to perform a CHOOSE wildcard on the RTP Information including Synchronization Source (*ssrc*), Sequence Number (*seq*) and RTP Timestamp (*ts*) properties.

On RTSP SETUP failure or Session timeout the MGC is responsible subtracting the applicable H.248 terminations.

See section 11.3/[IETF RFC RTSP2] for more information on SETUP procedures.

#### **6.1.4 PLAY**

The RTSP PLAY method relates directly to sending a H.248 signal. The playout of a particular media resource may be achieved by issuing a RTSP Play (*rtsp/play*) signal in a Modify.req. The MG shall play the media resource indicated by the Media Resource Identifier (*mri/spec*) property. Optionally the MGC may provide a Universal Resource Indicator (*uri*) parameter with the URI to be played. If provided this overrides the *mri/spec* property.

The RTSP PLAY method may include time range information in the Range Header, if included this should be sent to the MG in the Play Range (*pr*) parameter.

The MGC may need to determine the time range formats that are supported by the MG for the particular media resource for use in a RTSP PLAY response, in this case the MGC shall CHOOSE wildcard the Range Format (*rf*) parameter.

The MGC may need to determine the time range information regarding the playout of the media resource used in a RTSP PLAY response, in this case the MGC shall CHOOSE wildcard the Range Info (*rnginf*) parameter.

If the RTSP PLAY method contains a Scale header the appropriate value should be included in the Play Speed (*sp*) parameter. If the RTSP PLAY method contains a Speed header the appropriate value should be included in the Data Speed (*ds*) parameter.

In addition the MGC may need to perform a CHOOSE wildcard on the RTP Information properties including Synchronization Source (*ssrc*), Sequence Number (*seq*) and RTP Time (*ts*).

The MGC may also set a NotifyCompletion event in order to ascertain when the playout of the signal has ceased.

If a RTSP PLAY method is received for a media resource which is currently playing out several alternatives exist. If the time range information in the RTSP PLAY method Range header has changed compared to the playing out signal then the MGC should reissue an *rtsp/play* signal with the update time information (and any other relevant parameters). This will have the effect of restarting the signal at a different time location. If the RTSP PLAY method contains changed “Speed” or “Scale” information then the MGC should issue the Speed (*dds/spd*) and/or Scale (*prsa/scl*) signal respectively.

In order to be backwards compatibility to RTSP version 1 [IETF RFC2326] a MGC can provide PLAY METHOD queuing as H.248 provides a signal completion mechanism that can be used to indicate when a play request is finished. Signals lists can also be used to ensure sequenced playout.

See section 11.4/[IETF RFC RTSP2] for more information on PLAY procedures.

### 6.1.5 PAUSE

The RTSP PAUSE method is achieved through the use of the “Signal Pause (*sp/pause*)” signal. On receipt of a RTSP PAUSE method the MGC should issue the *sp/pause* signal with the applicable parameters. In order to determine the pause point information the MGC should perform CHOOSE wildcard on the Pause Range (*pr*)” parameter. That MGC may specify the Time format to be used by setting the “Range Format (*rf*)” parameter.

On reception of the *sp/pause* signal the MG shall pauses the relevant signals. To resume playout of the signal from the pause point the MGC shall remove the *sp/pause* from the SignalsDescriptor. If the MGC wishes to resume playout from another time point then the procedures for RTSP PLAY method should be followed.

See section 11.5/[IETF RFC RTSP2] for more information on PAUSE procedures.

### 6.1.6 TEARDOWN

The RTSP TEARDOWN method can be directly mapped to:

- A H.248 Subtract.req command where an entire session is removed.
- Removal of a H.248 stream via a H.248 Modify command where only a single media is to be removed.
- Stopping a “RTSP Play signal (*rtsp/play*)” through removal from a SignalsDescriptor will also result in resources being freed.



See section 11.6/[IETF RFC RTSP2] for more information on TEARDOWN procedures.

### **6.1.7 GETPARAMETER**

The RTSP GETPARAMETER method is mapped to the H.248 Auditvalue.req message in order to determine property values.

See section 11.7/[IETF RFC RTSP2] for more information on TEARDOWN procedures.

### **6.1.8 SET\_PARAMETER**

The RTSP SET\_PARAMETER method is mapped to a MOD.request command to that modifies a property/parameter in an applicable H.248 descriptor.

See section 11.8/[IETF RFC RTSP2] for more information on TEARDOWN procedures.

### **6.1.9 REDIRECT**

A RTSP REDIRECT method may be initiated by the MGC based on service information from a MG. This information may be as a result of overload indications such as those defined in [ITU-T H.248.10] and [ITU-T H.248.11] or as a result of H.248 ServiceChange procedures.

#### **6.1.10 Extension Methods**

Extension methods defined outside the core [IETF RFC RTSP2] specification may be supported by existing H.248 procedures / code points. For example the “Announce” method [IETF RFC RTSPANN] may use existing H.248 NotifyCompletion mechanisms to indicate the end of a stream of media.

## **6.2 Embedded (Interleaved) Binary Data**

Routing media data through an MGC is not recommended for performance reasons however the use of H.248 signals and events to allow the tunnelling of data. If a MGC receives an indication that Interleaving should be used then it should set the “RTSP Interleaving Package Outgoing Data (*rtspint/od*)” event on the MG with the channel number that should be used to encode the data block. The MGC shall then be ready to receive media data from the MG to forward to the RTSP client. If the MGC receives media data (e.g. RTP reports) it shall forward this information to the MG via the “RTSP Interleaving Incoming Data (*rtspint/id*)”.

## **6.3 Status / Error Code Interworking**

H.248 has a full range of status codes which map to HTTP and RTSP status codes. These codes are defined in [ITU-T H.248.8]. Mappings to various Status codes are discussed below:

### **6.3.1 Success 1xx**

A Success Status Code 1xx may be generated as a result of a H.248 response message that does not contain an error.

### **6.3.2 Success 2xx**

A Success Status Code 2xx may be generated as a result of a H.248 response message that does not contain an error.

### **6.3.3 Redirection 3xx**

H.248 has ServiceChange messages and overload mechanisms that enables the MGC to determine MG (resource) availability in order to generate 3xx responses.

#### 6.3.4 Client Error 4xx

The following error codes should be handled at the MGC level: 400, 405, 451, 452, 454, 455, 456, 459, 460, 462, 463, 464, 470 and 471.

The following error codes may be mapped to H.248 error codes in the following manner:

453 Not Enough Bandwidth: May be issued as a result of H.248 error codes i.e. 526.

457 Invalid Range: May be handled by the MGC if it knows the values supported by the MG otherwise may be mapped from H.248 error codes i.e. 449.

458 Parameter Is Read-Only: May be handled by the MGC if it knows the values supported by the MG otherwise may be mapped from H.248 error codes i.e. 534.

461 Unsupported Transport: May be handled by the MGC if it knows the values supported by the MG otherwise may be mapped from H.248 error codes i.e. 445.

#### 6.3.5 Sever Error 5xx

The MGC is able to issue a status code 551 independent of the MG.

### 6.4 Header Field Definitions

The mapping of the header fields to H.248 information elements is dependent on the RTSP method they are associated with. Some cases RTSP headers are not mapped to H.248 information elements as they are used solely by the MGC.

#### 6.4.1 Non Mapped Headers

The following headers can be considered to be used by the MGC only and do not have a direct mapping to H.248 information elements:

Accept-Credentials	Content-Type	Referer
Accept-Encoding	CSeq	Require
Accept-Language	Date	Server
Allow	From	Session
Authorization	If-Match	Supported
Cache-Control	If-Modified-Since	Timestamp
Connection	If-None-Match	User-Agent
Connection-Credentials	Last-Modified	Vary
Content-Base	Proxy-Authenticate	Via
Content-Encoding	Proxy-Authorization	WWW-Authentica
Content-Language	Proxy-Require	
Content-Length	Proxy-Supported	
Content-Location	Public	

#### 6.4.2 Mapped Headers

The following RTSP Headers may be mapped to H.248:

#### **6.4.2.1 Accept**

The MGC should know the content types that are acceptable for the RTSP method response. However if the MGC is unaware of the content types it may alternatively perform a H.248 AuditCapabilities.req on the MG to determine the allowable application types.

#### **6.4.2.2 Accept-Ranges**

The Accept-Ranges information may be determined by performing a CHOOSE wildcard on the “Range Format (*rf*)” parameter in a “RTSP Play (*rtsp/play*)”, “Signal Pause (*sp/pause*)”, “Data Delivery Speed Adjustment Speed (*ddsa/spd*)” and/or “Playback Relative Scale Adjustment Scale (*prsa/scl*)” signals.

#### **6.4.2.3 Bandwidth**

The Bandwidth header may be mapped to “Bandwidth parameter (b=)” in SDP carried by H.248.

#### **6.4.2.4 Blocksize**

The block size header may be mapped to the “Block Size (*mbs/size*)” property.

#### **6.4.2.5 ETag**

If the MGC requires the information for populating the etag header, then it should use “SDP a=etag:?” in a H.248 Add.req or Modify.req to determine the value from the MG.

#### **6.4.2.6 Expires**

If the MGC requires media resource expiry information it should set the URI of the applicable resource on the MG via the Media Resource Identifier (*mri/spec*) property. The MGC may either CHOOSE wildcard via Add.req or Modify.req or perform an AuditValue.req on the Media Resource Description Expiry Date and Time (*mrde/dt*) property.

#### **6.4.2.7 Location**

It is expected that the MGC will use this for any re-directs. As discussed in 6.1.9 this may be based on information provided by the MG.

#### **6.4.2.8 Range**

Range is supported in H.248 depending on the METHOD and functionality required. See above text on section 11 on how range maps to the “Play Range (*plyrng*)”, “Pause Range (*pr*)” and “Range Info (*rnginf*)” parameters.

#### **6.4.2.9 Retry-After**

The MGC may provide this information based on provisioned values and MG outage information from H.248 ServiceChange.req commands or Notify.req commands with MG overload indications.

Note: The inclusion of a specific ServiceChange Outage Time is for further study and may be included in subsequent [ITU-T H.248.1] versions.

#### **6.4.2.10 RTP-Info**

The ssrc, seq and rtpime values may be determined by performing a CHOOSE wildcard via an Add.req or Modify.req on the RTP Information Synchronisation Source (*rtpinfo/ssrc*), Sequence Number (*rtpinfo/seq*) and RTP Timestamp (*rtpinfo/ts*) properties respectively.

#### 6.4.2.11 Scale

The scale header maps to the on the Playback Speed (*sp*) parameter in a “RTSP Play (*rtsp/play*)” and or a Playback Scale (*ps*) parameter in the “Playback Relative Scale Adjustment Scale (*prsa/scl*)” signal. See section 6.1 for procedural information.

#### 6.4.2.12 Speed

The scale header maps to the on the Data Speed (*ds*) parameter in a “RTSP Play (*rtsp/play*)” and or a Data Speed (*ds*) parameter in the “Data Delivery Speed Adjustment Speed (*ddsa/spd*)” signal. See section 6.1 for procedural information.

#### 6.4.2.13 Transport

The MGC may interact with the MG via Add, Modify and Move commands to determine/set the transport parameters in the local and remote descriptors. H.248 supports over specification to allow for preferential lists of parameters.

Unicast | multicast: The MGC may provide this to the MG via SDP in H.248 Add.req, Modify.req or Move.req. An IPv4 address range 224.0.0.0 to 239.255.255.255 or an IPv6 address starting with FF indicates a Multicast address. If a multicast address is used it is the responsibility of the MG to allocate a unicast IP address and join the multicast group through an applicable protocol, e.g. IGMP. Likewise at subtraction it is the responsibility to remove the unicast address from the multicast group.

If the MG is unable to allocate an IP address error code XXX “Address Allocation Failed” is returned.

Destination: The MGC may provide this to the MG via SDP in H.248 Add.req, Modify.req or Move.req.

Source: It is expected that the MGC will provide this to the MG via SDP in H.248 Add.req, Modify.req or Move.req.

Layers: Multicast layers is supported by the SDP c=line.

Mode: It is expected that the MGC will be able to map a mode to the relevant H.248 request.

Interleaved: Interleaving is supported by the RTSP Interleaving (*rtspint*) Package.

Ttl: Multicast TTL is supported by SDP c= line.

#### 6.4.2.14 Unsupported

It is expected the MGC will handle this. There may be some interaction with the MG via the H.248 error codes i.e. 440, 443-446.

## 7 Media Resource Identification Package

<b>Package Name:</b>	Media Resource Identification
<b>PackageID:</b>	mri (0x00??)d5)
<b>Description:</b>	This package allows the MGC to identify a Media Resource that operated by its current or subsequent command.
<b>Version:</b>	1
<b>Extends:</b>	None

## 7.1 Properties

### 7.1.1 Specification

<b>Property Name:</b>	Specification
<b>PropertyID:</b>	spec (0x0001)
<b>Description:</b>	This property allows the MGC to specify a Media Resource which it currently or subsequently performs an operation on.
<b>Type:</b>	String
<b>Possible values:</b>	As per <b>RTSPMediaResourceSpec</b> of RTSP Media Resource Syntax ( <i>rmrs</i> ) package.  Optionally <b>AnnouncementSpec</b> in section 6.2.5/[H.248.9] may be supported in addition.
<b>Default:</b>	None
<b>Defined in:</b>	TerminationState or LocalControl
<b>Characteristics:</b>	ReadWrite

### 7.2 Events

None

### 7.3 Signals

None

### 7.4 Statistics

None

### 7.5 Error Codes

None

### 7.6 Procedures

A MGC may determine that Media Resource syntax that is supported by a MG/Termination through auditing Packages. If the “RTSP Media Resource Syntax (*rmrs*)” package is supported by the MG, the MGC can assume that the RTSP URI/IRI syntax may be used to describe a Media Resource. If the “Basic Announcement Syntax (*bannsyx*)” package is supported, the announcement syntax may be also used to describe a Media Resource.

However the MGC through auditing Packages is unable to determine the individual properties of a Media Resource. If the MGC requires additional information such as range, expiry, etc., or wants to adjust detailed parameters such as scale, speed, etc., of a particular Media Resource, it shall firstly set the Specification property of the Media Resource Identification package (*mri/spec*) to that Media Resource that will be used in its subsequent operating instruction to the MG regarding that Media Resource.

When the MGC performs an operation on a particular Media Resource via sending an Add, Modify or Move command request, it shall set the *mri/spec* property in this command request to identify the Media Resource. The MG shall then associate the Media Resource Identifier indicated by this property with that Media Resource, and respond the information about the Media Resource to the MGC via corresponding command reply.

Subsequently, the MGC may use additional packages/properties with above Media Resource identifier to determine information or adjust parameters regarding that particular Media Resource. Whilst the Media Resource Identifier is provided a non-“None” value by the MGC in a request, then all responses from the MG for that request shall pertain to the Media Resource identified by that value.

The *mri/spec* property may be set on a Stream (of a Termination) level, an Individual Termination level or the Root Termination level. This allows the operation regarding the Media Resource to be scoped according to usage. If the *mri/spec* property is set on the Termination/Stream level, any subsequent operation should also pertain to the instance of this property on the Termination/Stream level.

If the *mri/spec* property is set on the higher (e.g. Root Termination) level and subsequent operation pertains to the instance of this property on lower (e.g. Individual Termination) level, the MG should process it based on the setting of the this property on the lower level.

## 8 Range Format Support Package

<b>Package Name:</b>	Range Format Support
<b>PackageID:</b>	rfs (0x00??)d6)
<b>Description:</b>	This package allows the MGC and the MG to exchange which range format/s they respectively support for the particular media resource that have range information associated with them.
<b>Version:</b>	1
<b>Extends:</b>	None

### 8.1 Properties

#### 8.1.1 Format Types

<b>Property Name:</b>	Format Types																		
<b>PropertyID:</b>	ft (0x0001)																		
<b>Description:</b>	This property describes the range formats that may be supported.																		
<b>Type:</b>	Sub-list of String																		
<b>Possible values:</b>	<table><tr><td>“NPT”</td><td>NPT format is support</td></tr><tr><td>“SMPTE”</td><td>SMPTE format with the default (29.97fps) frame rate is support</td></tr><tr><td>“SMPTE-30”</td><td>SMPTE format with the 30fps frame rate is support</td></tr><tr><td>“SMPTE-25”</td><td>SMPTE format with the 25fps frame rate is support</td></tr><tr><td>“UTC”</td><td>UTC format is support</td></tr><tr><td>“Frame”</td><td>Frame number format is support</td></tr><tr><td>“Byte”</td><td>Byte number format is support</td></tr><tr><td>“Bit”</td><td>Bit number format is support</td></tr><tr><td>“None”</td><td>No range information is associated with the Media Resource</td></tr></table>	“NPT”	NPT format is support	“SMPTE”	SMPTE format with the default (29.97fps) frame rate is support	“SMPTE-30”	SMPTE format with the 30fps frame rate is support	“SMPTE-25”	SMPTE format with the 25fps frame rate is support	“UTC”	UTC format is support	“Frame”	Frame number format is support	“Byte”	Byte number format is support	“Bit”	Bit number format is support	“None”	No range information is associated with the Media Resource
“NPT”	NPT format is support																		
“SMPTE”	SMPTE format with the default (29.97fps) frame rate is support																		
“SMPTE-30”	SMPTE format with the 30fps frame rate is support																		
“SMPTE-25”	SMPTE format with the 25fps frame rate is support																		
“UTC”	UTC format is support																		
“Frame”	Frame number format is support																		
“Byte”	Byte number format is support																		
“Bit”	Bit number format is support																		
“None”	No range information is associated with the Media Resource																		

Note: The use of type String allows the use of extension tokens without the need to open the Package.

**Default:** Provisioned  
**Defined in:** TerminationState or LocalControl  
**Characteristics:** ReadWrite

## 8.2 Events

None

## 8.3 Signals

None

## 8.4 Statistics

None

## 8.5 Error Codes

None

## 8.6 Procedures

Media Resources may have range information associated with them. This range information may be in different formats such as: NPT (Normal Play Time), SMPTE (Society of Motion Picture and Television Engineers) with typical frame rate, UTC (Universal Time Code), Frame, Byte and Bit.

- NPT indicates the stream absolute position relative to the beginning of the presentation (see section 3.5/[IETF RFC RTSP2]).
- SMPTE expresses time relative to the start of the clip for frame-level access accuracy (see section 3.4/[IETF RFC RTSP2]).
- UTC is used to express a absolute time (see section 3.6/[IETF RFC RTSP2]).
- Frame, Byte and Bit indicate the position respectively in frame, byte and bit number relative to the beginning of the presentation/clip.

When the MGC wishes to exchange the range format support capabilities about a particular media resource with the MG, it shall set the Format Type property of the Range Format Support package (*rfs/ft*) in the Add, Move or Modify command request regarding to that media resource. The MGC shall set the value of the *rfs/ft* property to a list of the range formats it requests (i.e. it supports). The MG shall then determine the list of range formats to be used by the media resource, and respond it via the *rfs/ft* property in the corresponding command reply to the MGC. The MG may determine this range format support by getting the intersection between the one requested by the MGC and the one supported by the MG itself.

When the MGC wishes to know what range format a particular media resource supports from the MG, it shall either set the *rfs/ft* property with “CHOOSE (\$)” wildcard value in the Add, Move or Modify command request, or perform an AuditCapabilities command request of the *rfs/ft* property regarding to that media resource. Then the MG shall respond the *rfs/ft* property with a list of range formats supported by the media resource in the corresponding command reply to the MGC.

Where a MGC wishes to exchange or know the range format support capabilities about a particular instance of media resource, it shall synchronously set the Media Resource Identifier (*mri/spec*) property in above Add, Modify or Move command request.

## 9 Media Resource Description Expiry Package

<b>Package Name:</b>	Media Resource Description Expiry
<b>PackageID:</b>	mrde (0x00??)d7)
<b>Description:</b>	This package allows the MGC to determine when the description of a particular media resource should be considered stale.
<b>Version:</b>	1
<b>Extends:</b>	None

### 9.1 Properties

#### 9.1.1 Date and Time

<b>Property Name:</b>	Date and Time
<b>PropertyID:</b>	dt (0x0001)
<b>Description:</b>	This property indicates the Date and Time of the expiry of the media resource description.
<b>Type:</b>	String
<b>Possible values:</b>	The format is an absolute date and time as defined by HTTP-date in [IETF RFC2616]; it MUST be in [IETF RFC1123]-date format.  See section 14.22/[IETF RFC RTSP2] for more details.
<b>Default:</b>	Provisioned
<b>Defined in:</b>	TerminationState or LocalControl
<b>Characteristics:</b>	ReadOnly

### 9.2 Events

None

### 9.3 Signals

None

### 9.4 Statistics

None

### 9.5 Error Codes

None



## 9.6 Procedures

Media resources may be described through the use of a “presentation” description which may be sent to (and through) various network entities. These “presentation” descriptions commonly use the Session Description Protocol (SDP) [IETF RFC4566] as a means to describe the characteristics of the media resource. When these “presentation” descriptions pass through the network they may be cached by intermediate network entities or the endpoint. However the descriptions of the media resources may change with time due to changes of provisioning or dynamic changes of low level information and thus the original “presentation” description becomes stale. By indicating the expiry information associated with the “presentation” description it allows the network entities to be aware how long the media resource description is valid for. See section 14.22/[IETF RFC RTSP2] for more information how an expiry information may be used.

As it is the MG that contains the media resources, the MGC may not be aware of the expiry information associated with a particular media resource.

When the MGC wishes to know the expiry information associated with a particular media resource from the MG, it shall either set the Date and Time property of the Media Resource Description Expiry package (*mrde/dt*) property with “CHOOSE (\$)” wildcard value in the Add, Move or Modify command request, or perform AuditValue command request of the *mrde/dt* property regarding to that media resource. Then the MG shall respond via the *mrde/dt* property with the expiry information related to that media resource in the corresponding command reply to the MGC.

Where a MGC wishes to know the expiry information associated with a particular instance of media resource, it shall synchronously set the Media Resource Identifier (*mri/spec*) property in above Add, Modify or Move command request.

IF the *mrde/dt* property is set on a Termination/Stream without the Media Resource Identifier and there are multiplex Media Resources on the Termination/Stream, the MG shall respond the value related to the Media Resource which will expire earliest.

*{Editor’s note: Alternative is the error code 472 “Required Information Missing” should be returned if the mri/spec property is not set?}*

## 10 Media Block Size Package

<b>Package Name:</b>	Media Block Size
<b>PackageID:</b>	mbs (0x00??)d8)
<b>Description:</b>	This package allows the MGC to request the MG to use a particular media packet size when delivering media from a Termination/Stream.
<b>Version:</b>	1
<b>Extends:</b>	None

### 10.1 Properties

#### 10.1.1 Size

<b>Property Name:</b>	Size
<b>PropertyID:</b>	size (0x0001)
<b>Description:</b>	This property allows the MGC to request a particular media packet size. The media packet size does not include lower-layer headers such as IP, UDP, or RTP.

<b>Type:</b>	Integer
<b>Possible values:</b>	Any positive number of Octets
<b>Default:</b>	Provisioned dependent on media format/type
<b>Defined in:</b>	TerminationState or LocalControl
<b>Characteristics:</b>	ReadWrite

## 10.2 Events

None

## 10.3 Signals

None

## 10.4 Statistics

None

## 10.5 Error Codes

None

## 10.6 Procedures

A MGC may be requested by a client entity to provide a particular media packet size. The media packet size shall be provided to the MG via the use of the Size property of Media Block Size (*mbs/size*) property. The MG may freely use a media packet size which is lower than the one requested. The MG may truncate this media packet size to the closest multiple of the minimum, media-specific block size, or override it with a media-specific size if necessary. No H.248 error response is returned if the value is overridden. Then the MG shall return the actual media packet size it uses to the MGC. See section 14.9/[IETF RFC RTSP2] for further information.

Where a MGC requests that all media on a particular Termination use a specific media packet size the *mbs/size* property should be provided in the TerminationState descriptor. Where only a particular Stream should use a specific media packet size the *mbs/size* property should be provided in the LocalControl descriptor.

If a MGC performs a “CHOOSE (\$)” wildcard on the *mbs/size* property, the MG should provide the media packet size value. However if it is unable to do so due to the media description (i.e. Local and Remote) being insufficient, error code 472 “Required Information Missing” should be returned.

## 11 RTSP Media Resource Syntax Package

**Package Name:** RTSP Media Resource Syntax

**PackageID:** mrs (0x00??)d9)

**Description:** This package exists only to indicate that the MG is capable of processing the RTSP URI syntax described herein. An MGC learns that the capability is supported by auditing the packages supported by the Termination on which RTSP playout is to be performed and verifying that this package is listed.

Note: The syntax of “RTSPMediaResourceSpec” described below is aligned with the H.248.9 “Basic Announcement Syntax” package

syntax for provisioned segments described by “announcementSpec”. This is in order that generic packages such as the “Signal Pause” Package may have applicability to various Media Resource syntaxes.

**Version:** 1  
**Extends:** None

### **11.1 Properties**

None

### **11.2 Events**

None

### **11.3 Signals**

None

### **11.4 Statistics**

None

### **11.5 Error Codes**

None

### **11.6 Procedures**

#### **11.6.1 General structure**

A RTSP Media Resource is identified through the use of an URI that whose syntax is restricted as compared to RFC3986. Section 3.2/[IETF RFC3986] describes the use of URIs and IRIs with respect to RTSP. The sections below describe the encoding of the RTSP URIs and IRIs which respect to H.248 Signal parameters and Properties. IRIs can be mapped to URI using the procedures defined in section 3/[IETF RFC3987].

##### **11.6.1.1 ASN.1 encoding**

In the ASN.1 encoding, the general signal parameter syntax is ultimately constrained by the Value production of Annex A/[ITU-T H.248.1]. Parameter values are double-wrapped with an inner BER encoding applied first to aid interpretation of the parameter, followed by an outer BER encoding as an OCTET STRING. The general structure of the basic RTSP Media Resource specification syntax for purposes of the inner encoding is expressed as follows:

**RTSPMediaResourceSpec ::= IA5String**

The details of the string structure are as specified in the remainder of clause 17.5: they are equally applicable to text and ASN.1 encoding.

### 11.6.1.2 Text encoding

In the text encoding, the detailed signal parameter syntax is ultimately constrained by the VALUE production of Annex B/[ITU-T H.248.1]. The ABNF [IETF RFC2234] description of the gross structure of an announcement specification is as follows:

```
RTSPMediaResourceSpec = DQUOTE segSpec DQUOTE
                        ; DQUOTE and COMMA are as defined in Annex B/H.248.1.

segSpec = keyword "=" "<" spec ">" ; angle brackets as delimiters

keyword = "sid"           ; provisioned segment identifier

spec     = provSegSpec     ; provisioned segment identifier
```

The quotedString form of VALUE is required for RTSPMediaResourceSpec because a segSpec can contain restricted characters (e.g., =, <, > as shown above), and because successive segSpecs are comma-separated. However, the VALUE production requires escapes for the following:

- all control characters (%x00-%x1F and %x7F) except TAB (%x09) ;
- the DQUOTE character (%x22).

Escaping within URIs must be performed as “percent-encoding” described in [IETF RFC3986]. Escaping within stand-alone voice variable specifications uses the same mechanism as [IETF RFC3986], but applies only to the characters listed above, the percent sign “%” (which is used as an escape character), and the closing angle bracket “>” (which terminates a variable value). (This is currently a non-issue, since neither “%” as a non-escape character nor “>” will be found within any variable value defined in this Recommendation.)

Keywords in the text encoded syntax are case-insensitive. Case sensitivity within URIs is defined by the applicable standards.

### 11.6.2 Provisioned segment specifications

A provisioned segment specification consists of a URI formed under the rules of [IETF RFC3986]. This Recommendation supports three URI schemes:

- the rtsp: scheme, the rtsp: scheme, the rtspu: The rtsp schemes are used to indicate resources for the primary purpose of streaming delivery of the resource to a client. The difference of the schemes is with regards to the RTSP protocol itself. i.e. “rtsp” relates to its transport of TLS, “rtspu” relates to its transport over UDP and “rtsp” relates to its transport over TCP.

In accordance with IETF RFC 3986, the following characters must be escaped within all URIs:

- reserved characters within the individual URI schemes.
- the space character;
- characters used as delimiters or for escaping: "<", ">", "#", "%", and "<>";
- characters subject to unwanted transformations or subject to misinterpretation: "{", "}", "|", "\", "^", "[", "]", and "^".

### 11.6.2.1 Text encoding

This clause provides a detailed description of the provSegSpec production which is referred to in 6.2.5.1.2.

```
provSegSpec = rtspurl  
  
rtspurl = RTSP-URI  
; See section 19.2.1/[RFC RTSP] for the  
; syntax related to URIs using the rtsp, rtspu and rtspu schemes.
```

## 12 RTSP Play Package

**Package Name:** RTSP Play  
**PackageID:** rtspp (0x00~~22~~da)  
**Description:** This Package is used to playout a particular media resource with the specified parameters.  
**Version:** 1  
**Extends:** None

*{Editor's note: The added parameters and procedures below may equally be applied to the package aasb or as an extension in order to also apply to announcements.}*

### 12.1 Properties

None

### 12.2 Events

*{Editor's note: Is an "Operation Failure" event needed? E.g. as per Audio Operation Failure H.248.9 section 8.2.1.}*

### 12.3 Signals

#### 12.3.1 Play

**Signal Name:** Play  
**SignalID:** play (0x0001)  
**Description:** Plays a RTSP Media Resource.  
**SignalType:** Brief  
**Duration:** Not applicable to Brief signals

##### 12.3.1.1 Additional parameters

###### 12.3.1.1.1 Media Resource Identifier

**Parameter Name:** Media Resource Identifier  
**ParameterID:** mri (0x0001)  
**Description:** The identifier of the media resource that is to be streamed.  
**Type:** String  
**Optional:** Yes

**Possible values:** As per **RTSPMediaResourceSpec** of RTSP Media Resource Syntax (*rmrs*) package.

**Default:** None

#### 12.3.1.1.2 Playback Scale

**Parameter Name:** Playback Scale

**ParameterID:** ps (0x0002)

**Description:** The playback relative scale of media resource specifiable as a positive (faster) or negative (slower) variation from the normal playback speed. For more information on playback scale see section 14.39/[IETF RFC RTSP2].

Note: The functionality of the Playback Scale parameter is otherwise known as “play speed”.

**Type:** String

**Optional:** Yes

**Possible values:** [ "-" ] 1\*DIGIT [ "." \*DIGIT ]

**Default:** 1

#### 12.3.1.1.3 Direction

**Parameter Name:** Direction

**ParameterID:** di (0x0003)

**Description:** The direction parameter can be used to indicate the direction that the RTSP media stream is to be sent.

**Type:** Enumeration

**Optional:** Yes

**Possible values:**

*Ext (0x01)* indicates that the RTSP media stream is sent from the MG to an external point

*Int (0x02)* indicates that the RTSP media stream is played into the MG to the other terminations

*Both (0x03)* indicates internal and external behaviour

**Default:** *Ext (0x01)*

*{Editor's note: If support of H.248.1v3 is assumed for RTSP then this parameter may be omitted.}*

#### 12.3.1.1.4 Play Range

**Parameter Name:** Play Range

**ParameterID:** pr (0x0004)

**Description:** This parameter is used to indicate the playout range information of the media resource associated with the signal.

**Type:** String

**Optional:** Yes

**Possible values:** **Range = ranges-list [exec-time]**

The ABNF syntax is defined in Section 19.2.3/[IETF RFC RTSP2].

Note: The above syntax omits **"Range" HCOLON** as it is unnecessary for H.248 encoding.

**Default:** None

*{Editor's note: there may be an issue using the "quoted-string" syntax in range-value in the H.248 quoted string form.}*

#### 12.3.1.1.5 Range Format

**Parameter Name:** Range Format

**ParameterID:** rf (0x0005)

**Description:** This parameter is used to indicate the range format used in the range information related to the URI parameter in this signal.

**Type:** String

**Optional:** Yes

**Possible values:** As per the Format Type property of the Range Format Support package (*rfs/ft*).

Note: The use of type String allows the use of extension tokens without the need to open the Package.

**Default:** *"NPT"*

#### 12.3.1.1.6 Data Speed

**Parameter Name:** Data Speed

**ParameterID:** ds (0x0006)

**Description:** This parameter allows the MGC to instruct the MG to deliver the media resource at a specified data speed. The bandwidth required to deliver the media resource may need to be altered. For more information on data delivery speed see section 14.40/[IETF RFC RTSP2].

**Type:** String

**Optional:** Yes

**Possible values:** **["-"] 1\*DIGIT [ "." \*DIGIT ]**

**Default:** 1

### 12.4 Statistics

None

### 12.5 Error Codes

None

## 12.6 Procedures

The MGC invokes the Play signal of the RTSP Play package (*rtsp/play*) with at least the Media Resource Identifier (*mri*) parameter set to play out the specified RTSP media resource. RTSP media resource playout is subject to terminated by Events or new Signals descriptor settings in the normal way. The MGC can use the standard signal NotifyCompletion capability to determine when and why playout has ended.

The MGC may also specify the range of the RTSP media resource that should be played through the use of the Play Range (*pr*) parameter. The MG shall then play the content indicated by the *pr* parameter from the MGC, and return the actual range of the RTSP media resource it is playing via the *pr* parameter to the MGC. The MGC or the MG may use the Range Format (*rf*) parameter to indicate the format of the information in the *pr* parameter.

The MGC may set an initial playback relative scale and/or data delivery speed through the use of the Playback Scale (*ps*) and Data Speed (*ds*) respectively.

If the MGC needs the range information associated with the RTSP media resource, it should “CHOOSE (\$)” wildcard the *pr* parameter. The MG shall then return the range of the RTSP media resource via the *pr* parameter. If the MGC requires specified range format, it shall use the *rf* parameter.

## 13 Signal Pause Package

**Package Name:** Signal Pause

**PackageID:** sp (0x00??)db)

**Description:** This package allows the MGC to request the MG to pause the playout of a particular signal. This is a generic package that may be applied to a diverse range of signals.

**Version:** 1

**Extends:** None

### 13.1 Properties

None

### 13.2 Events

None

### 13.3 Signals

#### 13.3.1 Pause

**Signal Name:** Pause

**SignalID:** pause (0x0001)

**Description:** This signal allows the MGC to request a MG to pause the playout of signals.

**SignalType:** On/Off

**Duration:** Not applicable to On/Off signals



### 13.3.1.1 Additional parameters

#### 13.3.1.1.1 Signal Identity

<b>Parameter Name:</b>	Signal Identity
<b>ParameterID:</b>	sigid (0x0001)
<b>Description:</b>	The Signal Identity parameter allows a MGC to pause the playout of a Signal with the indicated signal identity.
<b>Type:</b>	Octet String
<b>Optional:</b>	Yes
<b>Possible values:</b>	For text encoding a Package Name / Signal ID encoded as per <b>pkgdName</b> in Annex B.2/[ITU-T H.248.1].  For binary encoding a Package Name / Signal ID encoded as per <b>SignalName</b> in Annex A.2/[ITU-T H.248.1].
<b>Default:</b>	None

#### 13.3.1.1.2 Signal List Identity

<b>Parameter Name:</b>	Signal List Identity
<b>ParameterID:</b>	listid (0x0002)
<b>Description:</b>	The Signal List Identity parameter allows a MGC to pause the playout of a Signal List with the indicated signal list identity.
<b>Type:</b>	Integer
<b>Optional:</b>	Yes
<b>Possible values:</b>	0 to 65535
<b>Default:</b>	None

#### 13.3.1.1.3 Media Resource Identifier

<b>Parameter Name:</b>	Media Resource Identifier
<b>ParameterID:</b>	mri (0x0003)
<b>Description:</b>	The Media Resource Identifier parameter allows the MGC to indicate the media resource that a pause should be applied to.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per <b>RTSPMediaResourceSpec</b> of RTSP Media Resource Syntax ( <i>rmrs</i> ) package.  Optionally <b>AnnouncementSpec</b> in section 6.2.5/[ITU-T H.248.9] may be supported in addition.
<b>Default:</b>	None

#### 13.3.1.1.4 Pause Range

<b>Parameter Name:</b>	Pause Range
<b>ParameterID:</b>	pr (0x0004)

<b>Description:</b>	This parameter allows the MGC to request the MG to return the point at which the playout of a signal was interrupted and what part of the signal remains unplayed.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	<b>Range = ranges-list [exec-time]</b>  The ABNF syntax is defined in Section 19.2.3/[IETF RFC RTSP2].  Note: The above syntax omits <b>"Range" HCOLON</b> as it is unnecessary for H.248 encoding.
<b>Default:</b>	None

#### 13.3.1.1.5 Range Format

<b>Parameter Name:</b>	Range Format
<b>ParameterID:</b>	rf (0x0005)
<b>Description:</b>	This parameter indicates the range information format that shall be used with this signal.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per the Format Type property of the Range Format Support package ( <i>rfs/ft</i> ).  Note: The use of type String allows the use of extension tokens without the need to open the Package.
<b>Default:</b>	<i>"NPT"</i>

### 13.4 Statistics

None

### 13.5 Error Codes

#### 13.5.1 Unable to pause the playout of the signal

**Error Code #:** 475

**Name:** Unable to pause the playout of the signal

**Definition:** The MG has been unable to pause the playout of the signal referenced by the Pause signal of the Signal Pause package.

**Error Text in the Error Descriptor:** The signal identity of the applicable signal encoded as per section 13.3.1.1.1.

**Comment:** The signal referenced by the Pause signal continues to play out.

## 13.6 Procedures

### 13.6.1 Pausing Signal Playout

A MGC may be requested by a client entity to halt the delivery of a media component in such a way that the media is paused at a particular point in order for the media delivery to start again from that point at some time in the future.

The use of Stream mode set to “RecvOnly” fulfils the objective of stopping media flow but does not maintain this playout state information. Stopping a signal by turning a signal off or replacing the Signals descriptor has the effect of stopping the media flow but does not maintain the playout state information either.

In order to halt media delivery (which was started as a result of the operating of certain Signal) and maintain the pause point information, the MGC shall send the Pause signal of the Signal Pause Package (*sp/pause*) to the MG. The MGC shall include existing Signals/SignalLists as well as the *sp/pause* signal in the Signal Descriptor in order to maintain the playout (albeit paused) of the Signal. This makes use of the H.248 capability where multiple Signals are played simultaneously (see section 7.1.11/[H.248.1]).

If the *sp/pause* signal is set by the MGC at a Termination or Stream level without the Signal Identity (*sigid*), Signal List Identity (*listid*) or Media Resource Identifier (*mri*) parameter then the MG shall pause the playout of all signals on that Termination or Stream.

If the *sp/pause* signal is set by the MGC at a Termination or Stream level with the *sigid* or *listid* parameter then the MG shall pause the playout of the signal indicated by the *sigid* parameter or the entire signal list indicated by the *listid* parameter on that Termination or Stream.

If the *sp/pause* signal is set by the MGC with the *mri* parameter then the MG shall pause the playout of the signal(s) associated with the media resource.

If the *sp/pause* signal is set by the MGC with the *mri* parameter and the *sigid* or *listid* parameter then the MG shall pause the playout of the signal(s) associated with the media resource and indicated by the *sigid* or *listid* parameter.

If the MG detects a mismatch between the *sigid/listid* parameter and the Signal/SignalList playout on that Termination/Stream or associated with the media resource indicated by the *mri* parameter then it should return error code 473 “Conflicting Property Values”.

Note 1: In some cases there may be more than one instance of a Signal Identity or Signal List Identity for a Termination/Stream in these cases the MGC should try to use the *mri* parameter to uniquely identify the signal instance.

Note 2: A MGC may determine that Media Resource Resource syntax that is supported by a MG/Termination through auditing packages. If the “RTSP Media Resource Syntax (*rmrs*)” package is supported the MG can assume that the RTSP URI/IRI syntax may be used to describe a media resource. If the “Basic Announcement Syntax (*bannsyx*)” Package is supported announcement syntax may be also used to describe a media resource.

The MG should not release media resources associated with the signal(s) that are paused. However the MGC may stop the playing Signal(s) if it determines it is necessary. In this case the MGC should remove the playing Signal(s) as well as the *sp/pause* signal.

If the MG is unable to pause the signal(s) indicated by the *sp/pause* signal then it should respond with error code 475 “Unable to pause the playout of the signal”. The referenced signal(s) should continue to play out.

### 13.6.2 Requesting Pause Information

An MGC may be requested to provide information associated with the pause point and the range regarding the media yet to playout. This information can then be used in later communication to restart the playout from the pause point or at a point later in the remaining media range. To request the pause information the MGC should do a “CHOOSE (\$)” wildcard on the Pause Range (*pr*) parameter. The MG shall then return the range information in the format indicated by the Range Format (*rf*) parameter. See section 11.5/[IETF RFC RTSP2] for an example use of Pause Point information. If multiple media resources/streams are in use, this may need to multiple pause point information being returned. If the *sp/pause* signal affects multiple media resources and the *pr* parameter is requested then the MG should return the common range information for all the media resource. If the MG is unable to determine which *pr* parameter values should be returned, it should issue error code 473 “Conflicting Property Values”.

### 13.6.3 Restarting after a Pause

When the MGC wants resume the playout of the signal(s) from the pause point it should remove the relevant instance of the *sp/pause* signal from the Signal Descriptor. The MG shall then continue to play the signal(s) related to the removed *sp/pause* signal from the saved pause point.

The MGC may also request that playout should resume from another point, in this case the MGC should remove the *sp/pause* signal and the signal(s) related to the removed *sp/pause* signal and re-issue the signal(s) with new range information.

## 14 Data Delivery Speed Adjustment Package

<b>Package Name:</b>	Data Delivery Speed Adjustment
<b>PackageID:</b>	ddsa (0x00??)dc
<b>Description:</b>	This package allows the MGC to request the MG to alter the data delivery speed of a particular signal. This is a generic package that may be applied to a diverse range of signals related to media playout.
<b>Version:</b>	1
<b>Extends:</b>	None

### 14.1 Properties

None

### 14.2 Events

None

### 14.3 Signals

#### 14.3.1 Speed

<b>Signal Name:</b>	Speed
<b>SignalID:</b>	spd (0x0001)
<b>Description:</b>	This signal allows the MGC to alter the data delivery speed of a particular signal.
<b>SignalType:</b>	Brief
<b>Duration:</b>	Not applicable to Brief signals

### 14.3.1.1 Additional parameters

#### 14.3.1.1.1 Signal Identity

<b>Parameter Name:</b>	Signal Identity
<b>ParameterID:</b>	sigid (0x0001)
<b>Description:</b>	The Signal Identity parameter allows a MGC to alter the data delivery speed to the playout of a Signal with the indicated signal identity.
<b>Type:</b>	Octet String
<b>Optional:</b>	Yes
<b>Possible values:</b>	For text encoding a Package Name / Signal ID encoded as per <b>pkgdName</b> in Annex B.2/[ITU-T H.248.1].  For binary encoding a Package Name / Signal ID encoded as per <b>SignalName</b> in Annex A.2/[ITU-T H.248.1].
<b>Default:</b>	None

#### 14.3.1.1.2 Signal List Identity

<b>Parameter Name:</b>	Signal List Identity
<b>ParameterID:</b>	listid (0x0002)
<b>Description:</b>	The Signal List Identity parameter allows a MGC to alter the data delivery speed to the playout of a Signal List with the indicated identity.
<b>Type:</b>	Integer
<b>Optional:</b>	Yes
<b>Possible values:</b>	0 to 65535
<b>Default:</b>	None

#### 14.3.1.1.3 Media Resource Identifier

<b>Parameter Name:</b>	Media Resource Identifier
<b>ParameterID:</b>	mri (0x0003)
<b>Description:</b>	The Media Resource Identifier parameter allows the MGC to indicate the media resource whose data delivery speed should be altered.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per <b>RTSPMediaResourceSpec</b> of RTSP Media Resource Syntax ( <i>rmrs</i> ) package.  Optionally <b>AnnouncementSpec</b> in section 6.2.5/[ITU-T H.248.9] may be supported in addition.
<b>Default:</b>	None

#### 14.3.1.1.4 Range

<b>Parameter Name:</b>	Range
------------------------	-------

<b>ParameterID:</b>	rng (0x0004)
<b>Description:</b>	This parameter is used to indicate the adjusting range information of the media resource associated with the signal.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	<b>Range = ranges-list [exec-time]</b> The ABNF syntax is defined in Section 19.2.3/[IETF RFC RTSP2]. Note: The above syntax omits <b>"Range" HCOLON</b> as it is unnecessary for H.248 encoding.
<b>Default:</b>	None

#### 14.3.1.1.5 Range Format

<b>Parameter Name:</b>	Range Format
<b>ParameterID:</b>	rf (0x0005)
<b>Description:</b>	This parameter indicates the range information format that shall be used with this signal.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per the Format Type property of the Range Format Support package ( <i>rfs/ft</i> ). Note: The use of type String allows the use of extension tokens without the need to open the Package.
<b>Default:</b>	<i>"NPT"</i>

#### 14.3.1.1.6 Data Speed

<b>Parameter Name:</b>	Data Speed
<b>ParameterID:</b>	ds (0x0006)
<b>Description:</b>	This parameter allows the MGC to instruct the MG to deliver the media resource at an adjusted data speed. The bandwidth required to deliver the media resource may need to be altered. For more information on data delivery speed see section 14.40/[IETF RFC RTSP2].
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	<b>[ "-" ] 1*DIGIT [ "." *DIGIT ]</b> A ratio of the normal data delivery speed.
<b>Default:</b>	1

### 14.4 Statistics

None

## 14.5 Error Codes

### 14.5.1 Unable to adjust the data delivery speed of the signal

**Error Code #:** 476

**Name:** Unable to adjust the data delivery speed of the signal

**Definition:** The MG has been unable to adjust the data delivery speed of the signal referenced by the Speed signal of the Data Delivery Speed Adjustment package.

**Error Text in the Error Descriptor:** The signal identity of the applicable signal encoded as per section 14.3.1.1.1.

**Comment:** The signal referenced by the Speed signal continues to play out.

## 14.6 Procedures

### 14.6.1 Adjusting Data Delivery Speed

A MGC may be requested by a client entity to adjust the data delivery speed (i.e. delivery bandwidth) of a playing media resource associated with a particular signal.

The MGC may audit packages to determine if data delivery speed adjustment is supported by the MG.

If the MGC initiates the playout of a new signal with an altered data delivery speed, it shall use an appropriate Play signal (e.g. *rtsp/play*) that contains a Data Speed parameter. Likewise if the MGC requires a range change and a data delivery speed adjustment is shall use an appropriate Play signal.

An MGC shall use the Data Delivery Speed Adjustment (*ddsa*) package when it wants to adjust the data delivery speed of a now playing signal.

In order to change the data delivery speed of certain Signal, the MGC shall send the Speed signal of Data Delivery Speed Adjustment package (*ddsa/spd*) to the MG. The MGC shall include existing Signals/SignalLists as well as the *ddsa/spd* signal in the Signal Descriptor in order to maintain the playout (albeit with an altered data delivery speed) of the Signal. This makes use of the H.248 capability where multiple Signals are played simultaneously (see section 7.1.11/[H.248.1]).

If the *ddsa/spd* signal is set by the MGC at a Termination or Stream level without Signal Identity (*sigid*), Signal List Identity (*listid*) or Media Resource Identifier (*mri*) parameter then the MG shall alter the data delivery speed of all signals on that Termination or Stream.

If the *ddsa/spd* signal is set by the MGC at a Termination or Stream level with the *sigid* or *listid* parameter then the MG shall alter the data delivery speed of the signal indicated by the *sigid* parameter or the entire signal list indicated by the *listid* parameter on that Termination or Stream.

If the *ddsa/spd* signal is set by the MGC with the *mri* parameter then the MG shall alter the data delivery speed of the signal identified or the signal(s) associated with the media resource.

If the *ddsa/spd* signal is set by the MGC with the *mri* parameter and the *sigid* or *listid* parameter then the MG shall alter the data delivery speed of the signal(s) associated with the media resource and indicated by the *sigid* or *listid* parameter.

If the MG detects a mismatch between the *sigid/listid* parameter and the Signal/SignalList playout on that Termination/Stream or associated with the media resource indicated by the *mri* parameter then it should return error code 473 “Conflicting Property Values”.

Note 1: In some cases there may be more than one instance of a Signal Identity or Signal List Identity for a Termination/Stream in these cases the MGC should try to use the *mri* parameter to uniquely identify the signal instance.

Note 2: A MGC may determine that Media Resource Resource syntax that is supported by a MG/Termination through auditing packages. If the “RTSP Media Resource Syntax (*rmrs*)” package is supported the MG can assume that the RTSP URI/IRI syntax may be used to describe a media resource. If the “Basic Announcement Syntax (*banns*)” Package is supported announcement syntax may be also used to describe a media resource.

The MG shall alter the data delivery speed according to the Data Speed (*ds*) parameter from the MGC, and may respond with the actual data delivery speed it is using via the *ds* parameter to the MGC. See section 14.40/[RFC-RTSP2] for an example of how Speed adjustment is used. If the MG is unable to support the *ds* parameter value provided by the MGC, it may return error code 449 “Unsupported or Unknown Parameter or Property Value” or in the case the MG supports an alternate value it may return this value via the *ds* parameter in the response.

The MGC may overwrite the *ddsa/spd* signal with an updated *ds* parameter in which case the MG shall apply the new data delivery speed.

If the MG is unable to adjust the data delivery speed indicated by the *ddsa/spd* signal then it should respond with error code 476 “Unable to modify Data Delivery Speed of Signal”. The referenced signal should continue to play out in a current manner.

#### 14.6.2 Requesting Range Information

An MGC may be requested to provide range information associated with the data speed adjusted signal playout. To request the range information the MGC should do a “CHOOSE (\$)” wildcard on the Range (*rng*) parameter. The MG shall then return the time range information in the format indicated by the Range Format (*rf*) parameter. See section 11.4/[IETF RFC RTSP2] for an example use of range information. If multiple media resources/streams are in use, this may lead to multiple range information being returned. If the *ddsa/spd* signal affects multiple media resources and the *rng* parameter is requested then the MG should return the common range information for all the media resource. If the MG is unable to determine which *rng* parameter values should be returned, it should issue error code 473 “Conflicting Property Values”.

#### 14.6.3 Normal Data Delivery

When the MGC wants to revert back to the normal data delivery speed, it should remove the relevant instance of the *ddsa/spd* signal from the Signal Descriptor. The MG shall then continue to play the signal(s) related to the removed *ddsa/spd* at a normal data delivery speed.

### 15 Playback Relative Scale Adjustment Package

<b>Package Name:</b>	Playback Relative Scale Adjustment
<b>PackageID:</b>	prsa (0x00??)dd
<b>Description:</b>	This package allows the MGC to request the MG to alter the playback relative scale of a particular signal. Otherwise known as “play speed”. This is a generic package that may be applied to a diverse range of signals related to media playout.
<b>Version:</b>	1
<b>Extends:</b>	None



## 15.1 Properties

None

## 15.2 Events

None

## 15.3 Signals

### 15.3.1 Scale

<b>Signal Name:</b>	Scale
<b>SignalID:</b>	scl (0x0001)
<b>Description:</b>	This signal allows the MGC to alter the playback relative scale of a particular signal.
<b>SignalType:</b>	Brief
<b>Duration:</b>	Not applicable to Brief signals

#### 15.3.1.1 Additional parameters

##### 15.3.1.1.1 Signal Identity

<b>Parameter Name:</b>	Signal Identity
<b>ParameterID:</b>	sigid (0x0001)
<b>Description:</b>	The Signal Identity parameter allows a MGC to alter the playback relative scale of a Signal with the indicated signal identity.
<b>Type:</b>	Octet String
<b>Optional:</b>	Yes
<b>Possible values:</b>	For text encoding a Package Name / Signal ID encoded as per <b>pkgdName</b> in Annex B.2/[ITU-T H.248.1].  For binary encoding a Package Name / Signal ID encoded as per <b>SignalName</b> in Annex A.2/[ITU-T H.248.1].
<b>Default:</b>	None

##### 15.3.1.1.2 Signal List Identity

<b>Parameter Name:</b>	Signal List Identity
<b>ParameterID:</b>	listid (0x0002)
<b>Description:</b>	The Signal List Identity parameter allows a MGC to alter the playback relative scale of a Signal List with the indicated identity.
<b>Type:</b>	Integer
<b>Optional:</b>	Yes
<b>Possible values:</b>	0 to 65535
<b>Default:</b>	None

#### 15.3.1.1.3 Media Resource Identifier

<b>Parameter Name:</b>	Media Resource Identifier
<b>ParameterID:</b>	mri (0x0003)
<b>Description:</b>	The Media Resource Identifier parameter allows the MGC to indicate the media resource whose playback relative scale should be altered.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per <b>RTSPMediaResourceSpec</b> of RTSP Media Resource Syntax ( <i>rmrs</i> ) package.  Optionally <b>AnnouncementSpec</b> in section 6.2.5/[ ITU-T H.248.9] may be supported in addition.
<b>Default:</b>	None

#### 15.3.1.1.4 Range

<b>Parameter Name:</b>	Range
<b>ParameterID:</b>	rng (0x0004)
<b>Description:</b>	This parameter is used to indicate the adjusting range information of the media resource associated with the signal.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	<b>Range = ranges-list [exec-time]</b>  The ABNF syntax is defined in Section 19.2.3/[IETF RFC RTSP2].  Note: The above syntax omits <b>"Range" HCOLON</b> as it is unnecessary for H.248 encoding.
<b>Default:</b>	None

#### 15.3.1.1.5 Range Format

<b>Parameter Name:</b>	Range Format
<b>ParameterID:</b>	rf (0x0005)
<b>Description:</b>	This parameter indicates the range information format that shall be used with this signal.
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	As per the Format Type property of the Range Format Support package ( <i>rfs/ft</i> ).  Note: The use of type String allows the use of extension tokens without the need to open the Package.
<b>Default:</b>	<b>"NPT"</b>

#### 15.3.1.1.6 Playback Scale

<b>Parameter Name:</b>	Playback Scale
<b>ParameterID:</b>	ps (0x0006)
<b>Description:</b>	<p>This parameter allows the MGC to instruct the MG to deliver the media resource at an adjusted playback relative scale.</p> <p>The playback relative scale of a signal is specifiable as a positive (faster) or negative (slower) variation from the normal playback speed.</p> <p>For more information on playback scale see section 14.39/[IETF RFC RTSP2].</p>
<b>Type:</b>	String
<b>Optional:</b>	Yes
<b>Possible values:</b>	[ "-" ] 1*DIGIT [ "." *DIGIT ] A ratio of the normal playback speed.
<b>Default:</b>	1

### 15.4 Statistics

None

### 15.5 Error Codes

#### 15.5.1 Unable to adjust the playback relative scale of the signal

**Error Code #:** 477

**Name:** Unable to adjust the playback relative scale of the signal

**Definition:** The MG has been unable to adjust the playback relative scale of the signal referenced by the Scale signal of the Playback Relative Scale Adjustment package.

**Error Text in the Error Descriptor:** The signal identity of the applicable signal encoded as per section 15.3.1.1.1.

**Comment:** The signal referenced by the Scale signal continues to play out.

### 15.6 Procedures

#### 15.6.1 Adjust Playback Relative Scale

A MGC may be requested by a client entity to adjust the playback relative scale (i.e. play speed) of a playing media resource associated with a particular signal.

The MGC may audit packages to determine if playback relative scale adjustment is supported by the MG.

If the MGC initiates the playout of a new signal with an altered playback relative scale, it shall use an appropriate Play signal (e.g. *rtsp/play*) that contains a Playback Scale parameter. Likewise if the MGC requires a range change and a playback relative scale adjustment is shall use an appropriate Play signal.

An MGC shall use the Playback Relative Scale Adjustment (*prsa*) package when it wants to adjust the playback relative scale of a now playing signal.

In order to change the playback relative scale of a certain Signal the MGC shall send the Scale signal of the Playback Relative Scale Adjustment package (*prsa/scl*) to the MG. The MGC shall include existing Signals/SignalLists as well as the *prsa/scl* signal in the Signal Descriptor in order to maintain the playout (albeit with an altered playback relative scale) of the Signal. This makes use of the H.248 capability where multiple Signals are played simultaneously (see section 7.1.11/[ITU-T H.248.1]).

If the *prsa/scl* signal is set by the MGC at a Termination or Stream level without Signal Identity (*sigid*), Signal List Identity (*listid*) or Media Resource Identifier (*mri*) parameter then the MG shall alter the playback relative scale of all signals on that Termination or Stream.

If the *prsa/scl* signal is set by the MGC at a Termination or Stream level with the *sigid* or *listid* parameter then the MG shall alter the playback relative scale of the signal indicated by the *sigid* parameter or the entire signal list indicated by the *listid* parameter on that Termination or Stream.

If the *prsa/scl* signal is set by the MGC with the *mri* parameter then the MG shall alter the playback relative scale of the signal identified or the signal(s) associated with the media resource.

If the *prsa/scl* signal is set by the MGC with the *mri* parameter and the *sigid* or *listid* parameter then the MG shall alter the playback relative scale of the signal(s) associated with the media resource and indicated by the *sigid* or *listid* parameter.

If the MG detects a mismatch between the *sigid/listid* parameter and the Signal/SignalList playout on that Termination/Stream or associated with the media resource indicated by the *mri* parameter then it should return error code 473 “Conflicting Property Values”.

Note 1: In some cases there may be more than one instance of a Signal Identity or Signal List Identity for a Termination/Stream in these cases the MGC should try to use the *mri* parameter to uniquely identify the signal instance.

Note 2: A MGC may determine that Media Resource Resource syntax that is supported by a MG/Termination through auditing packages. If the “RTSP Media Resource Syntax (*rmrs*)” package is supported the MG can assume that the RTSP URI/IRI syntax may be used to describe a media resource. If the “Basic Announcement Syntax (*bannsux*)” Package is supported announcement syntax may be also used to describe a media resource.

The MG shall alter the playback relative scale according to the Playback Scale (*ps*) parameter from the MGC, and may respond with the actual playback relative scale it is using via the *ps* parameter to the MGC. See section 14.39/[RFC-RTSP2] for an example of how Scale adjustment is used. If the MG is unable to support the *ps* parameter value provided by the MGC, it may return error code 449 “Unsupported or Unknown Parameter or Property Value” or in the case the MG supports an alternate value it may return this value via the *ps* parameter in the response.

The MGC may overwrite the *prsa/scl* signal with an updated *ps* parameter in which case the MG shall apply the new playback relative scale.

If the MG is unable to adjust the playback relative scale indicated by the *prsa/scl* signal then it should respond with error code 477 “Unable to adjust the playback relative scale of the signal”. The referenced signal should continue to play out in a current manner.

### 15.6.2 Requesting Range Information

The procedures of section 14.6.2 apply with *ddsa/spd* changed to *prsa/scl*.

### 15.6.3 Normal Data Delivery

The procedures of section 14.6.3 apply with *ddsa/spd* changed to *prsa/scl*.

## 16 RTP Information Package

**Package Name:** RTP Information  
**PackageID:** rtpinfo (0x00??de)  
**Description:** This package allows the MGC to request information regarding an RTP stream from a MG.  
**Version:** 1  
**Extends:** None

### 16.1 Properties

#### 16.1.1 Synchronization Source

**Property Name:** Synchronization Source  
**PropertyID:** ssrc (0x0001)  
**Description:** This property allows the MGC to request the synchronisation source that applies to the RTP stream. See “Synchronisation Source” section 5.1/[IETF RFC3550].  
**Type:** String  
**Possible values:** **ssrc = 8 \* HEXDIG**  
Encoded as per Annex B.2/[ITU-T H.248.1].  
**Default:** None  
**Defined in:** LocalControl  
**Characteristics:** ReadOnly

#### 16.1.2 Sequence Number

**Property Name:** Sequence Number  
**PropertyID:** seq (0x0002)  
**Description:** This property allows the MGC to request the sequence number of the first packet that applies to the RTP stream. See “Sequence Number” section 5.1/[IETF RFC3550] for more information.  
**Type:** Integer  
**Possible values:** 0 - 65535  
**Default:** None  
**Defined in:** LocalControl  
**Characteristics:** ReadOnly

#### 16.1.3 RTP Timestamp

**Property Name:** RTP Timestamp  
**PropertyID:** ts (0x0003)  
**Description:** This property allows the MGC to request the RTP timestamp value corresponding to the start time that applies to the RTP stream. See “Timestamp” section 5.1/[IETF RFC3550] for more information.

**Type:** String  
**Possible values:** **ssrc = 8 \* HEXDIG**  
Encoded as per Annex B.2/[ITU-T H.248.1].  
**Default:** None  
**Defined in:** LocalControl  
**Characteristics:** ReadOnly

## 16.2 Events

None

## 16.3 Signals

None

## 16.4 Statistics

None

## 16.5 Error Codes

None

## 16.6 Procedures

An MGC may be required to provide RTP related information regarding a particular media stream to a client. A MGC may request the following information by issuing a “CHOOSE (\$)” wildcard on the relevant property on the relevant stream:

- Synchronisation Source (*rtpinfo/ssrc*)
- Sequence Number (*rtpinfo/seq*)
- Timestamp (*rtpinfo/ts*)

This information returned by the MG as a result is as per section 14.38/[IETF RFC RTSP2]. If the MG does not have sufficient information regarding the details of the stream (i.e. lacking information in the Local and Remote descriptors), the MG may return error code 472 “Required Information Missing”.

If the MGC requires that the RTP information be scoped against a particular media resource (e.g. URL) then it should set the Specification property of the Media Resource Identifier package (*mri/spec*) to that particular media resource. The MG shall then use this media resource as an input to provide the relevant RTP information.

## 17 RTP Interleaving Package

**Package Name:** RTP Interleaving  
**PackageID:** *rtpint* (0x00???)df  
**Description:** This package allows the MGC to request that media stream packets be routed through the MGC instead of being transported directly between the MG and a remote endpoint of a particular media connection.  
**Version:** 1  
**Extends:** None

## 17.1 Properties

None

## 17.2 Events

### 17.2.1 Outgoing Data

**Event Name:** Outgoing Data  
**EventID:** od (0x0001)  
**Description:** This event indicates to the MG that outgoing media stream packets should be sent to the MGC rather than sent directly to the remote endpoint of a particular media connection.

#### 17.2.1.1 EventsDescriptor parameters

##### 17.2.1.1.1 Channel Number

**Parameter Name:** Channel Number  
**ParameterID:** cn (0x0001)  
**Description:** This parameter indicates the Channel Number/s that should be used when generating the interleaved data blocks. See “Interleaved” in section 14.45/[IETF RFC RTSP2].  
**Type:** String  
**Optional:** No  
**Possible values:** cn = channel [ "-" channel ]  
channel = 1\*3DIGIT  
**Default:** None

#### 17.2.1.2 ObservedEventsDescriptor parameters

##### 17.2.1.2.1 Data Block

**Parameter Name:** Data Block  
**ParameterID:** db (0x0001)  
**Description:** This parameter contains the data block sent from the MG to the MGC.  
**Type:** Octet String  
**Optional:** No  
**Possible values:** The octet string is first encoded as per section 12/[IETF RFC RTSP2], i.e.

```

0                               1                               2                               3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+++++
| "$" = 24          | Channel ID      | Length in bytes          |
+++++
: Length number of bytes of binary data                               :
+++++
```

For Text Encoded H.248, section B.3/[ITU-T H.248.1] is then applied.

**Default:** None

#### 17.2.1.2.2 Channel Number

**Parameter Name:** Channel Number

**ParameterID:** cn (0x0002)

**Description:** This parameter indicates the Channel Number/s that actually be used when generating the interleaved data blocks. See “Interleaved” in section 14.45/[IETF RFC RTSP2].

**Type:** String

**Optional:** Yes

**Possible values:** cn = channel [ "-" channel ]  
channel = 1\*3DIGIT

**Default:** None

### 17.3 Signals

#### 17.3.1 Incoming Data

**Signal Name:** Incoming Data

**SignalID:** id (0x0001)

**Description:** This signal indicates to the MG that incoming media stream packets should be received via the MGC rather than received directly from the local endpoint of a particular media connection.

**Signal Type:** Brief

**Duration:** Not applicable to Brief signals

##### 17.3.1.1 Additional parameters

###### 17.3.1.1.1 Data Block

**Parameter Name:** Data Block

**ParameterID:** d (0x0001)

**Description:** This parameter contains the data block received via the MGC to the MG.

**Type:** Octet String

**Optional:** No

**Possible values:** The octet string is first encoded as per section 12/[IETF RFC RTSP2]. See 17.2.1.2.1 for an example. For Text Encoded H.248, section B.3/[ITU-T H.248.1] is then applied.

**Default:** None

###### 17.3.1.1.2 Channel Number

**Parameter Name:** Channel Number

**ParameterID:** cn (0x0002)



<b>Description:</b>	This parameter indicates the Channel Number/s that should be used when parsing the interleaved data blocks. See “Interleaved” in section 14.45/[IETF RFC RTSP2].
<b>Type:</b>	String
<b>Optional:</b>	No
<b>Possible values:</b>	<code>cn = channel [ "-" channel ]</code> <code>channel = 1*3DIGIT</code>
<b>Default:</b>	None

#### 17.4 Statistics

None

#### 17.5 Error Codes

None

#### 17.6 Procedures

Using H.248 to transport Media Stream Data via an MGC with the peer endpoint of a media connection incurs considerable processing overhead. Therefore it is not recommended that this method be used. A MGC may audit packages in order to determine if a MG supports this functionality.

When the MGC needs to indicate the MG that the a media stream (e.g. RTP data) should be embedded into the control stream (i.e. H.248 message) to transport, it shall set the Outgoing Data event of RTP Interleaving package (*rtspint/od*) and the Incoming Data signal of RTP Interleaving package (*rtspint/id*) respectively for the media stream data outgoing from and incoming to the MG.

When the MGC has determined that media stream data outgoing from a Termination of the MG should be sent to the MGC rather than sent directly to the remote of the media connection, it shall set the *rtspint/od* event on the Termination. If there are multiple streams associated with the Termination, the MGC shall set the event with the StreamID of the stream that the embedding applies to. The MGC shall also set the Channel Number (*cn*) parameter to indicate the channels number that should be used by the MG in the generating/encoding the interleaved data block.

On reception of the *rtspint/od* event the MG shall send all related outgoing media stream data (i.e. RTP and RTCP packets) to the MGC via the ObservedEvent instead of sending it directly to the remote endpoint of a particular media connection. The MG shall generate/encode the related outgoing media stream data into the Data Block (*db*) parameter using the Channel Number indicated by the *cn* parameter from the MGC according to section 12/[IETF RFC RTSP2]. The MG shall also return the actual used Channel Number via *cn* parameter to the MGC if it is different to the one requested by the MGC.

If the *rtspint/od* event is removed then media stream data sending reverts back to normal.

When the MGC has determined that media stream data incoming to a Termination of the MG should be received via the MGC rather than received directly from the local endpoint of a particular media connection, it should send the *rtspint/id* signal to the Termination. Where there are multiple streams associated with the Termination, the MGC shall set the signal with the StreamID of the stream that the embedding applies to. The MGC shall use the Data Block (*db*) parameter to contain the related incoming media stream data, and if necessary the Channel Number (*cn*) parameter to indicate the channels number should be used by the MG in the parsing/decoding the interleaved

data block. The MG shall then parse/decode the related incoming media stream data with the Channel Number indicated by the cn parameter from the MGC according to section 12/[IETF RFC RTSP2].

If the *rtspint/id* signal is removed then media data reception reverts back to normal.

Normally both the incoming and the outgoing media stream data are embedded into the control stream to transport or not. However there may be some exceptions.

---