Internet Engineering Task Force (IETF)
Request for Comments: 6064
Category: Informational
ISSN: 2070-1721

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January 2011

SDP and RTSP Extensions Defined for 3GPP Packet-Switched Streaming Service and Multimedia Broadcast/Multicast Service

Abstract

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

Status of This Memo

This document is not an Internet Standards Track specification; it is published for informational purposes.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Not all documents approved by the IESG are a candidate for any level of Internet Standard; see Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6064.

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1. Introduction

3GPP has specified the Packet-switched Streaming Service (PSS) that uses both RTSP [RFC2326] and SDP [RFC4566]. The service is specified in technical specifications TS 26.233 [PSS-233] and TS 26.234 [PSS-234] in Release 4 and subsequent releases. The basic service defined in Release 4 is enhanced in Release 5 with capability exchange, and in Release 6 with a number of features, such as adaptation, digital rights management (DRM), progressive download, as well as a streaming server file format defined in [PSS-3GP]. Fast start-up and content switching are addressed in Release 7.

3GPP has also specified the Multimedia Broadcast/Multicast Service (MBMS) that uses SDP. The IP-layer protocols used by this service are specified in technical specification TS 26.346 Release 6 [MBMS]. Release 7 extends the MBMS User Service to also work with unicast bearers for interactive and streaming traffic classes.

In the process of defining these services, there has occasionally been a need to extend both SDP and RTSP functionalities. These extensions have mostly been in the form of SDP attributes and RTSP headers and option tags. 3GPP uses the name "feature tags" (like RTSP 2.0 for what RTSP 1.0 calls "option tags"); "option tag" is the name that will be used in this document. The purpose of this informational document is to register these SDP and RTSP extensions, in order to avoid future conflicts, and also to raise the awareness of their existence within IETF.

In Section 5.4, this document defines three SDP protocol identifiers used in MBMS to enable the usage of block-based FEC. The SDP protocol identifiers require an RFC to be defined and registered. As this is an RFC from the IETF stream, any semantic change will require a new IETF-approved RFC. The other SDP and RTSP extensions registered by this document are not normatively defined in this document. Instead, the normative definitions are referenced by the registrations. 3GPP can update the normative definition in future versions of their specifications. However, to ensure that such a change is visible in the IETF, at minimum, IANA should be notified and the reference to the 3GPP specification updated, and preferably an updated version of this RFC published.

The document begins with two sections presenting the SDP extensions for PSS and MBMS, respectively. They are followed by a section noting that offer/answer considerations are not applicable here. The subsequent section presents the extensions of RTSP for PSS. The IANA registration of SDP attributes and protocol identifiers is given in

Section 8.1, and the RTSP headers and option tags in Section 8.2. For normative descriptions of all SDP and RTSP extensions, we refer to TS 26.234 [PSS-234] and TS 26.346 [MBMS].

1.1. Requirements Language

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 [RFC2119].

2. Glossary

3GP: 3GPP file format, a multimedia file format based on the ISO base media file format, existing in different profiles intended for multimedia messages, direct playback on clients, progressive download, usage on servers to deliver on-demand multimedia sessions in PSS, or servers sending MBMS sessions.

3GPP: Third Generation Partnership Project; see http://www.3gpp.org for more information about this organization.

FEC: Forward Error Correction

MBMS: Multimedia Broadcast/Multicast Service, a service defined by 3GPP that utilizes broadcast or multicast technology in combination with unicast for delivery of a wide range of content to mobile terminals.

PSS: Packet-switched Streaming Service, a unicast-based streaming service for delivery of on-demand or live streaming multimedia content to mobile terminals.

RTSP: Real Time Streaming Protocol; see [RFC2326].

SDP: Session Description Protocol; see [RFC4566].

SRTP: Secure Real-time Transport Protocol; see [RFC3711].

QoE: Quality of Experience, the quality level of the user experience of a service. In PSS, this is estimated by a combination of application-level metrics.

QoS: Quality of Service, the quality (properties) that the network provides toward the upper-layer service.

3. Applicability Statement

This document describes 3GPP-defined extensions to SDP [RFC4566] and RTSP [RFC2326] and registers attributes that are normatively defined in 3GPP technical specifications 26.234, 26.244, and 26.346, up to the referenced versions of the respective documents.

The SDP and RTSP extensions have only been defined for usage with the 3GPP service in mind. The applicability for usage outside of these services has not been considered nor addressed. Usage of these attributes in other contexts may require further definitions or clarifications. For example, all SDP attributes lack offer/answer usage rules [RFC3264], which currently makes it impossible to use them with offer/answer. Please note that change control of these SDP and RTSP extensions belongs to 3GPP.

4. PSS SDP Extensions

The PSS specification [PSS-234] defines a number of different SDP attributes for different purposes. They are listed below, grouped by their purpose. The text is intentionally not specific enough to allow implementation from this document. The normative definition is in the 3GPP technical specification cited.

4.1. Video Buffering Attributes

The following attributes are used to provide parameters for the video buffer model provided in Annex G and Section 5.3.3.2 of [PSS-234]. The attributes were defined in Release 5 as "X-" attributes and, at the time, were not considered for registration. In hindsight, however, they should not have been "X-" attributes, and they should have been registered, as the registration rules of SDP [RFC4566] point out. Changing their names today is impossible due to the deployed base of millions of mobile handsets supporting PSS, and therefore they are registered in their current form.

All attributes are defined at media level.

- The "a=X-predecbufsize" attribute provides the size of the pre-decoder buffer in bytes.

- The "a=X-initpredecbufperiod" attribute provides the time during which a receiver should initially buffer, in 90 kHz ticks, before starting to consume the data in the buffer in order to ensure that underflow does not occur, assuming correct data delivery.

- The "a=X-initpostdecbufperiod" attribute provides the initial buffering period, in 90 kHz ticks, for the post-decoder buffer present in H.263 and MPEG-4 Visual.

- The "a=X-decbyterate" attribute indicates the maximum peak byte-decoding rate used in the verification of the Annex G buffer model expressed in bytes per second.

- The "a=3gpp-videopostdecbufsize" attribute is used to indicate the value used in determining the H.264 video post-decoder buffer size.

Note that complete descriptions of these attributes can be found in Section 5.3.3.2 of [PSS-234].

4.2. Video Frame Size Attribute

This media-level attribute provides the receiver with the largest picture size that a specific H.263 payload type will carry within the session. The attribute has the following form (see Section 5.3.3.2 of [PSS-234]):

"a=framesize:<payload type number> <width>-<height>"

4.3. Integrity-Protection Configuration Attributes

These attributes are all used to configure the integrity-protection mechanism defined in Annex K (Sections K.2.2.1, K.2.2.2, and K.2.2.3) of [PSS-234].

- The session-level attribute "a=3GPP-Integrity-Key" carries the integrity key used to derive SRTP master keys for integrity protection. The key is protected in different ways depending on a method identifier. When using Open Mobile Alliance (OMA) DRM key management, the key is encrypted using AES [AES] before it is base64 encoded [RFC4648].

- The media-level attribute "a=3GPP-SRTP-Config" is used to configure SRTP for integrity protection and contains an integrity nonce, a key salt used in deriving the SRTP master key from the integrity key, and any SRTP configuration parameters, such as the integrity tag length.

- The session-level attribute "a=3GPP-SDP-Auth" is used to carry an authentication tag calculated over certain parts of the SDP to prevent manipulation of the security attributes.

4.4. The Alternative Attributes

Two media-level and one session-level attributes are used in a mechanism for providing alternative SDP lines. One or more SDP lines at media level can be replaced, if desired, by alternatives. The mechanism is backwards compatible in the way that a receiver that does not support the attributes will get the default configuration. The different alternatives can be grouped using different attributes that can be specified hierarchically with a top and a lower level. 3GPP Release 6 supports grouping based on bit-rate, according to the SDP bandwidth modifiers AS [RFC4566] and TIAS [RFC3890], and language.

The SDP attributes (see Sections 5.3.3.3 and 5.3.3.4 of [PSS-234]) are:

- The media-level attribute "a=alt:<id>:<SDP-Line>" carries any SDP line and an alternative identifier.

- The media-level attribute "a=alt-default-id:<id>" identifies the default configuration to be used in groupings.

- The session-level attribute "a=alt-group" is used to group different recommended media alternatives. This allows providing aggregated properties for the whole group according to the grouping type. Language and bit-rate are two defined grouping types.

4.5. Adaptation Attribute

The media-level SDP attribute "a=3GPP-Adaptation-Support" (see Section 5.3.3.5 in [PSS-234]) is defined as part of the negotiation procedure of the PSS adaptation mechanism. The attribute carries a single value indicating how often the RTCP "Next Application Data Unit" (NADU) APP packet shall be included in sent RTCP compound packets. The adaptation mechanism allows the client to provide the server with information on the available transmission bit-rate and receiver buffer status.

4.6. Quality of Experience Attribute

The session- and media-level attribute "a=3GPP-QoE-Metrics" (see Section 5.3.3.6 of [PSS-234]) is used to negotiate the usage of the QoE metrics. The included parameters indicate which metrics should be used, over which duration there should be measurements, and how often reports should be sent.

4.7. Asset Information Attribute

The session- and media-level attribute "a=3GPP-Asset-Information" (see Section 5.3.3.7 of [PSS-234]) can exist in multiple instances in a description and describes different types of asset information. The different asset classes defined in Release 6 are Title, Description, Copyright, Performer, Author, Genre, Rating, Classification, Keywords, Location, Album, and Recording Year. The different assets are described with a base64-encoded asset box from the 3GP file format [PSS-3GP].

5. MBMS SDP Extensions

The MBMS specification [MBMS] defines a number of different SDP attributes for different purposes. They are informatively listed below.

5.1. MBMS Bearer Mode Declaration Attribute

The session- and media-level attribute "a=mbms-mode" (see Section 7.3.2.7 of [MBMS]) is used to describe MBMS broadcast mode media. The attribute may be used at the session level to set the default for all media and at the media level to specify differences between media. However, the attribute is never used at the session level when the session includes MBMS multicast mode media, nor at the media level to describe MBMS multicast mode media.

5.2. FEC Flow ID Attribute

The media-level attribute "a=mbms-flowid" (see Section 8.3.1.9 of [MBMS]) maps one or more FEC source block flow IDs to their corresponding destination IP addresses and UDP port numbers. It is present in each SDP media block for repair packet streams.

5.3. MBMS Repair Attribute

The session- and media-level attribute "a=mbms-repair" (see Section 8.3.1.8 of [MBMS]) is used to provide FEC repair packets with non-FEC specific parameters. For Release 6, one such parameter is defined to specify the required minimum receiver buffer time.

5.4. SDP Protocol Identifiers for FEC

MBMS defines a mechanism to provide block-based FEC for UDP-based traffic. This solution uses the SDP protocol "proto" identifier to identify the media streams that use the FEC shim layer. The media

streams may be either source streams or repair streams. As required by SDP [RFC4566], these protocol identifiers are normatively defined in this document in accordance with their usage specified by 3GPP.

5.4.1. RTP Protocol Identifiers

For FEC-protected RTP streams, the following two "proto" identifiers are defined:

- UDP/MBMS-FEC/RTP/AVP
- UDP/MBMS-FEC/RTP/SAVP

They indicate the usage of UDP [RFC0768] with MBMS FEC source packet formats, as defined in Section 8.2.2.4 of [MBMS], that transport RTP packets in accordance with the AVP [RFC3551] or SAVP (Secure RTP) [RFC3711] profiles, respectively. These protocol identifiers SHALL use the media formats ("fmt") namespace rules that are used for RTP/AVP and RTP/SAVP, respectively.

5.4.2. FEC Repair Data Identifier

A media stream carrying MBMS FEC repair information over UDP requires its own "proto" identifier. Protocol identifier "UDP/MBMS-REPAIR" identifies the FEC repair packet containing the protocol combination of UDP [RFC0768], FEC repair payload ID, and repair symbols as specified in Section 8.2.2.5 of [MBMS]. The "fmt" namespace is not used and SHALL be set to "*".

5.5. Video Buffering Attribute

The PSS media-level buffer attribute "a=X-initpredecbufperiod" (see Section 4.1) that specifies an initial buffering time is also used for MBMS in Release 7. It is mainly intended for video streams, but may be used for other media types as well (see Section 8.3.1.1 of [MBMS]).

6. SDP Offer/Answer Consideration

The usage of the SDP attributes in an offer/answer [RFC3264] context is not defined. These SDP attributes are defined for use in a declarative context, and for PSS specifically in the RTSP [RFC2326] context.

7. PSS RTSP Extensions

The RTSP extensions for PSS consist of a number of new RTSP headers and option tags and a narrowing of URI usage in regards to 3GP files. The headers and option tags are informatively described here; see [PSS-234] for the normative declaration.

7.1. 3GPP-Link-Char Header

The "3GPP-Link-Char" header (see Section 5.3.2.1 of [PSS-234]) is used by clients to provide the server with QoS information about the wireless link it is currently using. The header can be used to provide the server with three different QoS parameters:

- Guaranteed Bandwidth
- Maximum Bandwidth
- Maximum Transfer Delay

The header may be included in RTSP requests using either of the methods SETUP, PLAY, OPTIONS, or SET_PARAMETER.

7.2. 3GPP-Adaptation Header

The "3GPP-Adaptation" header (see Section 5.3.2.2 of [PSS-234]) is used by the client to provide the server with adaptation-related parameters and to indicate support of the adaptation function. The header carries the resource identification as a URI, the client’s buffer size, and the desired target time.

The header may be included in requests using the methods SETUP, PLAY, OPTIONS, and SET_PARAMETER. The response to a request using this method shall include this header.

7.3. 3GPP-QoE-Metrics Header

The "3GPP-QoE-Metrics" header (see Section 5.3.2.3.1 of [PSS-234]) is used to negotiate the usage of the QoE metrics (see Section 11 of [PSS-234]).

The header may be included in requests and responses using the SETUP, SET_PARAMETER, OPTIONS, or PLAY method.

7.4. 3GPP-QoE-Feedback Header

The "3GPP-QoE-Feedback" header (see Section 5.3.2.3.2 of [PSS-234]) is used to carry QoE metrics from the client to the server when it reports, which happens either during or at the end of the media delivery.

The header may be included in requests using the SET_PARAMETER, PAUSE, or TEARDOWN method.

7.5. Video Buffer Headers

PSS uses several headers to provide the client with the different buffer parameters. They provide the buffer status at the point of a stream from which a PLAY request plays. These headers may only be used in PLAY responses. See Section 5.3.2.4 and Annex G of [PSS-234] for normative definitions.

The three "x-" headers were defined in 3GPP Release 5. When it was realized that they should not have been given "x-" names, it was too late to rename them due to deployment.

The RTSP headers are:

- x-predecbufsize
- x-initpredecbufperiod
- x-initpostdecbufperiod
- 3gpp-videopostdecbufsize

7.6. Integrity Protection

The integrity-protection mechanism defined in PSS Annex K uses the "3GPP-Freshness-Token" RTSP header (see Section K.2.2.4 of [PSS-234]) to carry a freshness token in DESCRIBE requests.

7.7. RTSP URI Extension

The PSS specification also defines syntax for referencing tracks within the 3GP file format [PSS-3GP]. The 3GP format is based on the ISO base media file format and is defined in several different profiles, including a streaming-server profile, in Release 6.

This syntax is fully contained within the generic URI syntax defined for RTSP URIs. It is only a syntax restriction that server manufacturers follow to allow clients or proxies to understand what encodes the track number in the URI. This is provided for information only.

To identify a track within a 3GP file, the last URI segment has to contain a structure that is <alpha string>=<track nr>. (See Section 5.3.3.1 of [PSS-234].)

7.8. Fast Start-Up and Content Switching

Release 7 of PSS defines a number of extensions in terms of headers and option tags (see Section 5.5 of [PSS-234]) for support of fast start-up and switching of content for on-demand and live applications built on top of PSS. Clients are enabled to reuse the existing RTSP control session and RTP resources while switching to new content.

The RTSP headers are:

- Switch-Stream
- SDP-Requested
- Pipelined-Requests

The RTSP option tags are:

- 3gpp-pipelined
- 3gpp-switch
- 3gpp-switch-req-sdp
- 3gpp-switch-stream

8. IANA Considerations

8.1. SDP Registrations

IANA has registered the SDP attributes listed below in the "Session Description Protocol (SDP) Parameters" registry available from http://www.iana.org/.

The contact person for this registration is Magnus Westerlund (email: magnus.westerlund@ericsson.com; phone: +46 8 719 0000).

SDP Protocol Identifiers ("proto"):

Name:	UDP/MBMS-FEC/RTP/AVP
Long form:	3GPP MBMS FEC-protected RTP/AVP over UDP
Type of name:	proto
Purpose:	3GPP MBMS defines a mechanism to provide block-based FEC for UDP-based traffic. This solution uses the SDP protocol "proto" identifier to identify the media streams that use the FEC shim layer. This protocol identifier indicates that the FEC-protected data is RTP using the AVP profile.
Reference:	RFC 6064, 3GPP TS 26.346

Name:	UDP/MBMS-FEC/RTP/SAVP
Long form:	3GPP MBMS FEC-protected RTP/SAVP over UDP
Type of name:	proto
Purpose:	3GPP MBMS defines a mechanism to provide block-based FEC for UDP-based traffic. This solution uses the SDP protocol "proto" identifier to identify the media streams that use the FEC shim layer. This protocol identifier indicates that the FEC-protected data is RTP using the Secure AVP profile (SAVP).
Reference:	RFC 6064, 3GPP TS 26.346

Name:	UDP/MBMS-REPAIR
Long form:	3GPP MBMS FEC repair symbols over UDP
Type of name:	proto
Purpose:	3GPP MBMS defines a mechanism to provide block-based FEC for UDP-based traffic. This solution uses the SDP protocol "proto" identifier to identify the media streams that use the FEC shim layer. This protocol identifier indicates that the FEC repair data is sent over UDP.
Reference:	RFC 6064, 3GPP TS 26.346

SDP Attribute ("att-field"):

Attribute name:	X-predecbufsize
Long form:	Pre-decoder buffer size
Type of name:	att-field
Type of attribute:	Media level only
Subject to charset:	No
Purpose:	See Section 4.1
Reference:	3GPP TS 26.234, Section 5.3.3.2
Values:	See Reference

```
Attribute name:     X-initpredecbufperiod
Long form:          Pre-decoder initial buffering period
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.1
Reference:          3GPP TS 26.234, Section 5.3.3.2
Values:             See Reference

Attribute name:     X-initpostdecbufperiod
Long form:          Post-decoder initial buffering period
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.1
Reference:          3GPP TS 26.234, Section 5.3.3.2
Values:             See Reference

Attribute name:     X-decbyterate
Long form:          Peak decoding rate in bytes per second
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.1
Reference:          3GPP TS 26.234, Section 5.3.3.2
Values:             See Reference

Attribute name:     3gpp-videopostdecbufsize
Long form:          Post decoder buffer size
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.1
Reference:          3GPP TS 26.234, Section 5.3.3.2
Values:             See Reference

Attribute name:     framesize
Long form:          Maximum Video Frame Size
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.2
Reference:          3GPP TS 26.234, Section 5.3.3.2
Values:             See Reference
```

```
Attribute name:     3GPP-Integrity-Key
Long form:          3GPP DRM Integrity Key
Type of name:       att-field
Type of attribute:  Session level only
Subject to charset: No
Purpose:            See Section 4.3
Reference:          3GPP TS 26.234, Sections 5.3.3.2 and K.2.2.1
Values:             See Reference

Attribute name:     3GPP-SRTP-Config
Long form:          3GPP DRM SRTP Configuration
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.3
Reference:          3GPP TS 26.234, Sections 5.3.3.2 and K.2.2.2
Values:             See Reference

Attribute name:     3GPP-SDP-Auth
Long form:          3GPP DRM Integrity SDP Authentication
Type of name:       att-field
Type of attribute:  Session level only
Subject to charset: No
Purpose:            See Section 4.3
Reference:          3GPP TS 26.234, Sections 5.3.3.2 and K.2.2.3
Values:             See Reference

Attribute name:     alt
Long form:          Alternative SDP line
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.4
Reference:          3GPP TS 26.234, Section 5.3.3.3
Values:             See Reference

Attribute name:     alt-default-id
Long form:          Default alternative ID
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.4
Reference:          3GPP TS 26.234, Section 5.3.3.3
Values:             See Reference
```

```
Attribute name:     alt-group
Long form:          Grouping of SDP Line alternatives
Type of name:       att-field
Type of attribute:  Session level only
Subject to charset: No
Purpose:            See Section 4.4
Reference:          3GPP TS 26.234, Section 5.3.3.4
Values:             See Reference

Attribute name:     3GPP-Adaptation-Support
Long form:          3GPP Adaptation Support
Type of name:       att-field
Type of attribute:  Media level only
Subject to charset: No
Purpose:            See Section 4.5
Reference:          3GPP TS 26.234, Section 5.3.3.5
Values:             See Reference

Attribute name:     3GPP-QoE-Metrics
Long form:          3GPP Quality of Experience Metrics
Type of name:       att-field
Type of attribute:  Session and Media level
Subject to charset: No
Purpose:            See Section 4.6
Reference:          3GPP TS 26.234, Section 5.3.3.6
Values:             See Reference

Attribute name:     3GPP-Asset-Information
Long form:          3GPP Asset Information
Type of name:       att-field
Type of attribute:  Session and Media level
Subject to charset: No
Purpose:            See Section 4.7
Reference:          3GPP TS 26.234, Section 5.3.3.7
Values:             See Reference

Attribute name:     mbms-mode
Long form:          MBMS Bearer Mode Declaration
Type of name:       att-field
Type of attribute:  Session and Media level
Subject to charset: No
Purpose:            See Section 5.1
Reference:          3GPP TS 26.346, Section 7.3.2.7
Values:             See Reference
```

```
Attribute name:     mbms-flowid
Long form:          FEC Flow ID
Type of name:       att-field
Type of attribute:  Media level
Subject to charset: No
Purpose:            See Section 5.2
Reference:          3GPP TS 26.346, Section 8.3.1.9
Values:             See Reference

Attribute name:     mbms-repair
Long form:          MBMS Repair
Type of name:       att-field
Type of attribute:  Session and Media level
Subject to charset: No
Purpose:            See Section 5.3
Reference:          3GPP TS 26.346, Section 8.3.1.8
Values:             See Reference
```

8.2. RTSP Registrations

IANA has registered the RTSP headers listed below in the RTSP/1.0 Headers table of the "Real Time Streaming Protocol (RTSP)/1.0 Parameters" registry available from http://www.iana.org/.

Note: This registry requires a Standards document, preferably an IETF RFC. The document that defines the registered headers below is a technical standards document from 3GPP, although the request for registration is submitted using this document to achieve further information spreading within IETF.

The contact person for this registration is Magnus Westerlund (email: magnus.westerlund@ericsson.com; phone: +46 8 719 0000).

```
Header Name:     3GPP-Freshness-Token
Purpose:         See Section K.2 of 3GPP TS 26.234
Methods:         DESCRIBE Requests
Reference:       Section K.2.2.4 of 3GPP TS 26.234
Values:          See Reference

Header Name:     3GPP-Link-Char
Purpose:         See Section 5.3.2.1 of 3GPP TS 26.234
Methods:         SETUP, PLAY, OPTIONS, or SET_PARAMETER Requests
Reference:       Section 5.3.2.1 of 3GPP TS 26.234
Values:          See Reference
```

Header Name:	3GPP-Adaptation
Purpose:	See Section 5.3.2.2 of 3GPP TS 26.234
Methods:	SETUP, PLAY, OPTIONS, or SET_PARAMETER Requests and Responses
Reference:	Section 5.3.2.2 of 3GPP TS 26.234
Values:	See Reference

Header Name:	3GPP-QoE-Metrics
Purpose:	See Section 5.3.2.3.1 of 3GPP TS 26.234
Methods:	SETUP, PLAY, OPTIONS, or SET_PARAMETER Requests and Responses
Reference:	Section 5.3.2.3.1 of 3GPP TS 26.234
Values:	See Reference

Header Name:	3GPP-QoE-Feedback
Purpose:	See Section 5.3.2.3.2 of 3GPP TS 26.234
Methods:	SET_PARAMETER, PAUSE, or TEARDOWN Requests
Reference:	Section 5.3.2.3.2 of 3GPP TS 26.234
Values:	See Reference

Header Name:	Switch-Stream
Purpose:	See Section 5.5.4.2 of 3GPP TS 26.234
Methods:	PLAY Requests and Responses
Reference:	Section 5.5.4.2 of 3GPP TS 26.234
Values:	See Reference

Header Name:	SDP-Requested
Purpose:	See Section 5.5.4.4 of 3GPP TS 26.234
Methods:	PLAY Requests
Reference:	Section 5.5.4.4 of 3GPP TS 26.234
Values:	See Reference

Header Name:	Pipelined-Requests
Purpose:	See Section 5.5.3 of 3GPP TS 26.234
Methods:	SETUP and PLAY Requests
Reference:	Section 5.5.3 of 3GPP TS 26.234
Values:	See Reference

Header Name:	x-predecbufsize
Purpose:	See Section 5.3.2.4 of 3GPP TS 26.234
Methods:	PLAY Response
Reference:	Section 5.3.2.4 of 3GPP TS 26.234
Values:	See Reference

Header Name:	x-initpredecbufperiod
Purpose:	See Section 5.3.2.4 of 3GPP TS 26.234
Methods:	PLAY Response
Reference:	Section 5.3.2.4 of 3GPP TS 26.234
Values:	See Reference

Header Name:	x-initpostdecbufperiod
Purpose:	See Section 5.3.2.4 of 3GPP TS 26.234
Methods:	PLAY Response
Reference:	Section 5.3.2.4 of 3GPP TS 26.234
Values:	See Reference

Header Name:	3gpp-videopostdecbufsize
Purpose:	See Section 5.3.2.4 of 3GPP TS 26.234
Methods:	PLAY Response
Reference:	Section 5.3.2.4 of 3GPP TS 26.234
Values:	See Reference

Header Name:	Supported
Purpose:	See Section 5.5.2.2.2 of 3GPP TS 26.234
Methods:	Any Request and Response
Reference:	Section 5.5.2.2.2 of 3GPP TS 26.234
Values:	See Reference

IANA has registered the RTSP Option tags (option tags) listed below in the RTSP/1.0 Option Tags table of the "Real Time Streaming Protocol (RTSP)/1.0 Parameters" registry available from http://www.iana.org/.

Option tag:	3gpp-pipelined
Purpose:	See Section 5.5.3 of 3GPP TS 26.234
Applies to:	Client and Server
Reference:	Section 5.5.3 of 3GPP TS 26.234
Values:	See Reference

Option tag:	3gpp-switch
Purpose:	See Section 5.5.4.2 of 3GPP TS 26.234
Applies to:	Client and Server
Reference:	Section 5.5.4.2 of 3GPP TS 26.234
Values:	See Reference

Option tag:	3gpp-switch-req-sdp
Purpose:	See Section 5.5.4.4 of 3GPP TS 26.234
Applies to:	Client and Server
Reference:	Section 5.5.4.4 of 3GPP TS 26.234
Values:	See Reference

Option tag:	3gpp-switch-stream
Purpose:	See Section 5.5.4.5 of 3GPP TS 26.234
Applies to:	Client and Server
Reference:	Section 5.5.4.5 of 3GPP TS 26.234
Values:	See Reference

9. Security Considerations

SDP attributes are subject to modification by an attacker unless they are integrity protected and authenticated. The security considerations of the SDP specification [RFC4566] should be reviewed in this regard. The registered SDP attributes are vulnerable to modification attacks or removal, which may result in problems of a serious nature, including failure to use service and reduced quality.

The registered RTSP headers are also vulnerable to insertion, deletion, or modification attacks similar to SDP attributes. Also in this case, attacks can result in failure of the service or reduced quality of streaming content.

The three SDP protocol identifiers do not by themselves introduce any additional security threats that don’t exist for other protocol identifiers in SDP. The media stream and the used protocols identified and configured by the SDP protocol identifier may, however, contain security issues by themselves.

10. References

10.1. Normative References

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10.2. Informative References

[AES] NIST, "Advanced Encryption Standard (AES)", FIPS PUB 197, <http://www.nist.gov/itl/fipscurrent.cfm>.

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[RFC3264] Rosenberg, J. and H. Schulzrinne, "An Offer/Answer Model with Session Description Protocol (SDP)", RFC 3264, June 2002.

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