SDP and RTSP extensions defined for 3GPP Packet-switched Streaming Service and Multimedia Broadcast/Multicast Service
<draft-westerlund-mmusic-3gpp-sdp-rtsp-04.txt>

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Abstract

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

1.1. Glossary

3GP - 3GPP file format
3GPP - Third Generation Partnership Project
FEC - Forward Error Correction
MBMS - Multimedia Broadcast/Multicast Service
PSS - Packet-switched Streaming Service
RTSP - Real Time Streaming Protocol
SDP - Session Description Protocol
SRTP - Secure Real-time Transport Protocol
QoE - Quality of Experience
QoS - Quality of Service

2. 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 later 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, progressive download as well as a streaming server file-format defined in [PSS-3GP].

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].

In the process of defining these services, there has occasionally been the need to extend both SDP and RTSP functionality. These extensions have mostly been in the form of SDP attributes and RTSP headers. 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.

The document begins with two chapters presenting the different extensions of SDP for PSS and MBMS, respectively, 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 7.1, and the RTSP headers in section 7.2. For normative descriptions of all SDP and RTSP extensions we refer to TS 26.234 [PSS-234] and TS 26.346 [MBMS].
3. PSS SDP Extensions

The PSS specification [PSS-234] defines a number of different SDP attributes for different purposes. They are informatively listed below grouped by purpose.

3.1. 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 were at the time 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.
- The "a=X-initpredecbufperiod" attribute provides the time during which a receiver should initially buffer 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 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.
- The "a=3gpp-videopostdecbufsize" attribute is used to indicate the size of the H.264 video post-decoder buffer.

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

3.2. Video Frame Size attribute

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

"a=framesize:<payload type number> <width>-<height>"
3.3. Integrity Protection Configuration Attributes

These attributes are all used to configure the integrity-protection mechanism defined in Annex K (section 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. They key is protected in different ways depending on a method identifier.
- 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.

3.4. The Alternative Attributes

Two media 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 and TIAS, and language.

The SDP attributes (see 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.

3.5. Adaptation Attribute

The media-level SDP attribute "a=3GPP-Adaptation-Support" (see 5.3.3.5 of [PSS-234]) is defined as part of the negotiation procedure of the PSS adaptation mechanism. The adaptation mechanism allows the client to provide the server with information on the available transmission bit-rate and receiver buffer status.
3.6. Quality of Experience Attribute

The session and media-level attribute "a=3GPP-QoE-Metrics" (see 5.3.3.6 of [PSS-234]) is used to negotiate the usage of the quality of experience metrics. The included parameters indicate metrics and parameters that are desirable to use.

3.7. Asset Information Attribute

The session and media-level attribute "a=3GPP-Asset-Information" (see 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].

4. MBMS SDP Extensions

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

4.1. MBMS Bearer Mode Declaration Attribute

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

4.2. FEC Flow ID Attribute

The media-level attribute "a=mbms-flowid" (see 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.

4.3. MBMS Repair Attribute

The session and media-level attribute "a=mbms-repair" (see 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, specifying the required minimum receiver buffer time.
4.4. 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 both source streams and repair streams.

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

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

Both are defined in Section C.1 of 3GPP TS 26.346 [MBMS]. They indicate the usage of UDP with MBMS FEC Source packet formats that transport RTP packets in accordance with the AVP or SAVP (Secure RTP) profiles, respectively.

Section C.2 of TS 26.346 [MBMS] defines an SDP "proto" identifier "UDP/MBMS-REPAIR" for indication of a media stream of MBMS FEC repair packets. MBMS FEC repair packets are repair symbols with the necessary framing sent as UDP packets.

5. 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 being used in a declarative context, and for PSS specifically in RTSP [RFC2326].

6. PSS RTSP Extensions

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

6.1. 3GPP-Link-Char Header

The 3GPP-Link-Char header (see 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 and SET_PARAMETER.
6.2. 3GPP-Adaptation Header

The 3GPP-Adaptation header (see 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.

6.3. 3GPP-QoE-Metrics Header

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

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

6.4. 3GPP-QoE-Feedback Header

The 3GPP-QoE-Feedback header (see 5.3.2.3.2 of [PSS-234]) is used to carry QoE metrics from the client to the server when it reports, which happen 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.

6.5. 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 that a PLAY request plays from. 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 rename them due to deployment.

The RTSP headers are:
- x-predecbufsize
- x-initpredecbufperiod
- x-initpostdecbufperiod
- 3gpp-videopostdecbufsize
6.6. Integrity Protection

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

6.7. 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 defined in several different profiles, including a streaming-server profile, in Release 6.

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

7.1. SDP Registrations

IANA is requested to register the SDP attributes listed below in the registry at http://www.iana.org/assignments/sdp-parameters. The contact person for this registration is Magnus Westerlund (magnus.westerlund@ericsson.com) Phone number +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 TS 26.346
Reference: 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 TS 26.346
Reference: 3GPP TS 26.346

Name: UDP/MBMS-REPAIR
Long form: 3GPP MBMS FEC repair symbols over UDP
Type of name: proto
Purpose: 3GPP TS 26.346
Reference: 3GPP TS 26.346

SDP Attribute ("att-field"):

Attribute name: X-precedbufsize
Long form: Pre-decoder buffer size
Type of name: att-field
Type of attribute: Media level only
Subject to charset: No
Purpose: See Section 3.1
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 3.1
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 3.1
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 3.1
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 3.1
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 3.2
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 3.3
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 3.3
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 3.3
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 3.4
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 3.4
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 3.4
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 3.5
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 3.6
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 3.7
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 4.1
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 4.2
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 4.3
Reference: 3GPP TS 26.346, Section 8.3.1.8
Values: See Reference
7.2. RTSP Registrations

IANA is requested to register the RTSP headers listed below in the RTSP 1.0 registry at:


The contact person for this registration is Magnus Westerlund (magnus.westerlund@ericsson.com) Phone number +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: 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
8. Informative References


[PSS-3GP] 3GPP TS 26.244, "Transparent end-to-end packet switched streaming service (PSS); 3GPP file format (3GP)", version 6.5.0 (2006-06), 3rd Generation Partnership Project (3GPP).


Any 3GPP document can be downloaded from the 3GPP webserver, "http://www.3gpp.org/", see specifications.
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This Internet-Draft expires in April 2007.

RFC Editor Considerations

None