Timed Metadata for HTTP Live Streaming

Developer

Contents

1.0 Introduction

HTTP Live Streaming supports inclusion of timed metadata in ID3 format, carried in the MPEG-2 transport stream.

This document describes how ID3 (reference "[3]" (page 10)) metadata is carried as timed metadata in MPEG-2 Transport Streams (reference "[1]" (page 10)) as used by the HTTP Live Streaming protocol (reference "[2]" (page 10)). See section 3.0, References, for the relevant specifications.

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2.0 Details

2.1 Overview

Metadata is carried in MPEG-2 transport streams as described in section 2.12 of reference "[1]" (page 10). HTTP Live Streaming metadata is carried in an elementary stream (PES) instead of, for example, in a carousel. The metadata stream must be in the same program as the main program material (i.e. the audio/video content).

ID3 metadata is self-describing and needs no configuration information, so the provisions for metadata decoder configuration data are not used.

The remainder of section 2 of this specification describes the details of the syntax and field values from section 2 of reference "[1]" (page 10) for ID3 format metadata used with HTTP Live Streaming.

In the syntax tables in section 2.3.2 of this specification, the syntax structure (left column) is shown with only the names of fields and the part of the outline that is in effect for ID3 metadata as described in this specification. Conditional blocks for which a condition is false are omitted. The right column in the syntax tables indicates the value needed for each field in this context, or contains an explanation of that field.

The MPEG-2 specification "[1]" (page 10) should be consulted for the complete syntax, field sizes, and acceptable values.

2.2 Summary of the Code Points Used

ID3 defines both a format and a semantic, and so the same registered `format_identifier` is used for both `metadata_format_identifier` and `metadata_application_format_identifier`.

The registered value for these, at the registration authority (reference "[4]" (page 10)), is the four-character string `'ID3 '` (the characters `I D 3 space`, or `0x49 0x44 0x33 0x20`).

To indicate that a registered value is used, the `metadata_format` and `metadata_application_format` fields take the values `0xff` and `0xffff` respectively.

The ID3 metadata is carried in a private stream, not a stream formatted as metadata Access Units (MAUs) as defined in 12.4 of "[1]" (page 10). The `stream_id` value used for the stream is therefore `private_stream_id_1`, `0xbd`, as specified in 2.12.3 of "[1]" (page 10). The `stream_type` is set to `0x15`, indicating carriage of metadata in a PES stream, as specified in 2.12.9.1 of "[1]" (page 10).

Since only one metadata stream is normally carried, the `metadata_service_id` is normally set to `0`; however, any suitable value can be used to distinguish this metadata stream from other metadata streams, if present.

2.3 Descriptors Used

2.3.1 Introduction

The format and content of the metadata descriptors is documented in sections 2.6.58 to 2.6.61 of "[1]" (page 10).

2.3.2 Descriptor Loop of the PMT for the Program

To declare the presence of the metadata stream, a `metadata_pointer_descriptor` (2.6.58 of "[1]" (page 10)) is placed in the PMT, in the `program_info` loop for the program. The metadata must be in the same program as the main program (audio/video) content; the use of this descriptor to refer to another program is not supported.

Syntax	Value
`Metadata_pointer_descriptor () {`	
`descriptor_tag`	`37 (decimal) – Metadata_pointer_descriptor tag`
`descriptor_length`	`– the length of the descriptor`
`metadata_application_format`	`0xFFFF`
`if (metadata_application_format==0xFFFF) {`	
`metadata_format_identifier`	`'ID3 ' (0x49 0x44 0x33 0x20)`
`}`	
`metadata_format`	`0xFF`
`if (metadata_format==0xFF) {`	
`metadata_format_identifier`	`'ID3 ' (0x49 0x44 0x33 0x20)`
`}`	

Syntax	Value
metadata_service_id	– any ID, typically 0
metadata_locator_record_flag	0
MPEG_carriage_flags	0
reserved	0x1f
if (MPEG_carriage_flags == 0|1|2) {	
program_number	– program number of the program whose es descriptor loop contains the metadata_descriptor
}	
}	

The elementary stream carrying the metadata needs to be declared in the loop of elementary streams, in the program map (section 2.4.4.8 of "[1]" (page 10)):

Field	Value
stream_type	0x15
reserved	0x7
elementary_PID	– pid of the elementary stream carrying the metadata
reserved	0xf
ES_info_length	– length of the elementary stream info descriptor loop, including the metadata_descriptor

2.3.3 Descriptor Loop of the PMT for the Elementary Stream

To declare the format of the metadata stream, a `metadata_descriptor` (2.6.60 of "[1]" (page 10)) is placed in the PMT, in the `es_info` loop for the elementary stream.

Syntax	Value
Metadata_descriptor () {	

Syntax	Value
descriptor_tag	38 (decimal) – Metadata_descriptor tag
descriptor_length	– the length of the descriptor
metadata_application_format	0xFFFF
if (metadata_application_format==0xFFFF) {	
metadata_application_format_identifier	'ID3 ' (0x49 0x44 0x33 0x20)
}	
metadata_format	0xFF
if (metadata_format==0xFF) {	
metadata_format_identifier	'ID3 ' (0x49 0x44 0x33 0x20)
}	
metadata_service_id	– any ID, typically 0
decoder_config_flags	0
DSM-CC_flag	0
reserved	0xf

2.4 PES Stream Format

ID3 metadata is stored as a complete ID3v4 frame in a PES packet, including a complete ID3 header.

The ID3 tag must start immediately after the PES header; this PES header must contain a PTS (`PTS_DTS_flags` set to `'10'`). The PTS must be on the same timeline as the audio and video frames. The `data_alignment` bit must be set to `1`. The PES header must contain a `PES_packet_length` that is non-zero.

If an ID3 tag is longer than 65535 bytes, it must have more than one PES header. The second and following PES headers must have `data_alignment` set to `0`, and should have the `PTS_DTS_flags` set to `'00'` (and hence no PTS).

The PES header is formatted as documented in 2.4.3.7 of "[1]" (page 10).

PES Syntax	Value
PES_Packet () {	
packet_start_code_prefix	0x00 0x00 0x01
stream_id	0xbd – private_stream_id_1
PES_packet_length	– length of the packet, which must not be 0
if (…) {	– a large test which is true in this case
'10'	'10'
PES_scrambling_control	0
PES_priority	0
data_alignment_indicator	1 for the packet containing start of the ID3 header, else 0
copyright	0
original_or_copy	0
PTS_DTS_flags	if(data_alignment==1)‘10’ else ‘00’
ESCR_flag	0
ES_rate_flag	0
DSM_trick_mode_flag	0
additional_copy_info_flag	0
PES_CRC_flag	0
PES_extension_flag	0
PES_header_data_length	– the length of the data; padding may be used
}	
}	

The metadata stream is incorporated into a transport stream in the same way as audio or video is. For example, in a `transport_packet()` (see 2.4.3.2 of "[1]" (page 10)) the `payload_unit_start_indicator` is set to `1` only when a PES header follows. (The PES header, in turn, indicates whether the start of the ID3 data follows, or whether that has been divided into multiple PES packets).

3.0 References

The following documents are cited in this specification

[1]

ISO/IEC 13818-1:2007 Information technology – Generic coding of moving pictures and associated audio information: Systems

[2]

IETF Internet Draft draft-pantos-http-live-streaming “HTTP Live Streaming”

[3]

http://www.id3.org/id3v2.3.0, "The ID3 audio file data tagging format" version 2.3.0, M. Nilsson

[4]

http://www.smpte-ra.org/mpegreg/mpegreg.html SMPTE registration for ID3 format identifier.

Document Revision History

This table describes the changes to *Timed Metadata for HTTP Live Streaming*.

Date	Notes
2011-04-28	Changed title from Carriage of ID3 Formatted Metadata as Timed Metadata in MPEG-2 Transport Streams.
2010-12-15	Modified text of legal disclaimer.
2010-11-15	New document describing data format of timed metadata in MPEG2 streams as used in HTTP Live Streaming.

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