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Marlin Adaptive Streaming Specification
- Simple Profile

Version 1.0.1
Final

Source	Marlin Developer Community
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1 Introduction

This document describes how to use Adaptive Streaming with Marlin.

1.1 Document Organization

This document is organized as follows:

- (This) introduction, including abbreviations, definitions and references.
- MPEG DASH
- HTTP Live Streaming
- ANNEX: XML Schema for MPD Extension

1.2 Conformance Conventions

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this specification are to be interpreted as described in IETF RFC 2119 [RFC2119].

These capitalized key words are used to unambiguously specify requirements and behavior that affect the interoperability and security of implementations. When these key words are not capitalized they are meant in their natural-language sense.

All Elements of this specification are considered **Normative** unless specifically marked **Informative**. All Normative Elements are **Mandatory** to implement, except where such an element is specifically marked **OPTIONAL**. Finally, where **Normative** elements are described as **OPTIONAL**, they MAY be omitted from an implementation, but when implemented, they MUST be implemented as described.

1.3 Namespaces and Identifiers

This specification defines schemas conforming to XML Schemas [Schema] and normative text to describe the syntax and semantics of XML-encoded objects and protocol messages. In cases of disagreement between the schema documents and the schema listings in this specification the schema documents take precedence.

Note that in some cases the normative text of this specification imposes constraints beyond those indicated by the schema documents.

1.3.1 Namespaces and Notation

The following table summarizes the normative schema defined by this specification and their XML namespace URIs. These URIs MUST be used by implementations of this specification:

Prefix	XML Namespace	Description
mas:	urn:marlin:mas:1-0:services:schemas:mpd	See §4

1.4 References

1.4.1 Normative references

[8pus]	Octopus DRM Technology Platform Specifications, Version 1.0
[BBTS]	Marlin Broadband Transport Stream Specification, Version 1.1

[DASH]	ISO/IEC 23001-6, Information technology - MPEG systems technologies — Part 6: Dynamic adaptive streaming over HTTP (DASH)
[HLS]	IETF Internet Draft draft-pantos-http-live-streaming-05
[MBB]	Marlin Broadband Delivery System Specification, Version 1.2
[MCS]	Marlin – Core System Specification, Version 1.3
[MP4CENC]	ISO/IEC 23001-7 Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media file format files
[MS3]	Marlin – Simple Secure Streaming Specification, Version 1.0
[MURIT]	URI Templates for Marlin, Version 1.0
[OMADCF]	Open Mobile Alliance DRM Content Format Approved Version 2.1 – 14 Oct 2008 OMA-TS-DRM-DCF-V2_1-20081014-A
[OMArin]	OMArin Specification, Version 1.0
[RFC2119]	S. Bradner, Key words for use in RFCs to Indicate Requirement Levels, IETF RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt .
[Schema]	XML Schema Part 1: Structures. W3C Recommendation. D. Beech, M. Maloney, N. Mendelsohn, H. Thompson. May 2001. http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

1.4.2 Informative references

Marlin	http://www.marlin-community.com/
--------	---

1.5 Terms and Definitions

Marlin Content ID	As defined in [8pus] §2.2, the ID that uniquely identifies a Marlin content object
Marlin Content Key	As defined in [MCS] §1.5, the symmetric key that encrypts the payload of the Marlin content.
Marlin License	As defined in [8pus] §2.2, the consolidated form of content governance objects that are used to protect the content and associate usage rules to the protected content.

2 MPEG DASH

This section defines how to use Marlin with MPEG DASH [DASH] and its relative media container formats (ISO Base Media File Format ISO/IEC 14496-12 and MPEG-2 Transport Stream ISO/IEC 13818-1).

2.1 Baseline Mode

Under the baseline mode, the MPEG DASH MPD (Media Presentation Description) SHALL conform to §2.2. The media container format of the media presentation SHALL conform to either §2.3 (for ISO Base Media File Format ISO/IEC 14496-12), or Marlin Broadband Transport Stream [BBTS] (for MPEG-2 Transport Stream ISO/IEC 13818-1).

For the baseline mode, the `schemeIdUri` attribute of the `<ContentProtection>` element defined in §2.2 SHALL be `urn:uuid:5E629AF5-38DA-4063-8977-97FFBD9902D4`.

2.2 Extensions to Media Presentation Description

This section defines the semantics of the attributes and elements within the `<ContentProtection>` element defined in [DASH] §5.6, which are specific for Marlin. The normative schema definition is given in Annex: XML Schema for MPD Extension.

Table 1 - Semantics of ContentProtection Element

Element or Attribute Name	Use	Description
ContentProtection	0...N	Provides Marlin-specific information about the use of content protection for this Representation or Group of Representation.
<code>@schemeIdUri</code>	M	Provides a URI to indicate that the protection scheme is Marlin.
FormatVersion	0...1	The version number of the compliant specification.
<code>@major</code>	M	The major version number.
<code>@minor</code>	M	The minor version number.
MarlinContentIds	0...1	Contains <code><MarlinContentId></code> elements.
MarlinContentId	1...N	Contains a Marlin Content Id associated with the presentation.
MarlinBroadband	0...1	Provides information specific for Marlin BB.
SilentRightsUrl	0...1	Contains a <code>marlin-silent-rights-url</code> .
PreviewRightsUrl	0...1	Contains a <code>marlin-preview-rights-url</code> .
RightsIssuerUrl	0...1	Contains a <code>RightsIssuerURL</code> .
MS3	0...1	Provides information specific for MS3.
URIsAreTemplated	0...1	Indicates whether the URIs referenced in the MPD contains place holder for URI Template.
Legend: For attributes: M=Mandatory, O=Optional, OD=Optional with Default Value, CM=Conditionally Mandatory. For elements: <code><minOccurs>...<maxOccurs></code> (N=unbounded) Elements are bold ; attributes are non-bold and preceded with an @.		

2.2.1 Media Presentation Description Mapping

For both of Marlin BB and MS3, in order to enable the client to locate and evaluate any required license prior to the start of the presentation, the MPD MAY include one or more <ContentProtection> elements, with the following child elements:

- <FormatVersion> with attributes @major and @minor, each of type xsd:nonNegativeInteger. @major indicates the major version number, and @minor the minor version. If this element is not present, the default is for the major version to be 1 and the minor version to be 0. If present, the major version SHALL always be 1, and the minor version increments to indicate compatible changes. Documents compliant with this specification correspond to major version 1 and minor version 0. If a MPD contains more than one <ContentProtection> elements, the major and minor version in all <ContentProtection> elements SHALL be identical. Note that the schema allows <ContentProtection> to have child elements not defined in this version of this specification. Such elements, if present, MUST be ignored.
- <MarlinContentIds> element, which includes one or more <MarlinContentId> child elements, each with a text child specifying a Marlin Content ID. It SHOULD be possible to obtain a Marlin License or MS3 SAS governing a superset of all the content IDs associated with a single media presentation. If a Representation element is contained in a Group element, this <MarlinContentIds> element SHALL be present on either the Group level or the Representation level, but not on both. If this element is present on the Group level, it shall contain the all content IDs associated with the Representations contained in that Group.

2.2.1.1 With Marlin BB

For Marlin BB, a <MarlinBroadband> element MAY be present as a child of the <ContentProtection> element if one or more of following elements are used:

- <SilentRightsUrl> of type xs:string containing a marlin-silent-rights-url as defined in [OMArin] §4.2.1
- <PreviewRightsUrl> of type xs:string containing a marlin-preview-rights-url as defined in [OMArin] §4.2.2
- <RightsIssuerUrl> of type xs:string containing a RightsIssuerURL as defined in [OMADCF] §5.2.1.9

The following is an example of <ContentProtection> element.

```
<ContentProtection schemeldUri="urn:uuid:5E629AF5-38DA-4063-8977-97FFBD9902D4">
  <mas:FormatVersion major="1" minor="0"/>
  <mas:MarlinContentIds>
    <mas:MarlinContentId>urn:marlin:organization:foo:contentid:001
  </mas:MarlinContentId>
</mas:MarlinContentIds>
<mas:MarlinBroadband>
  <mas:RightsIssuerUrl>https://foo.bar/123456789/</mas:RightsIssuerUrl>
</mas:MarlinBroadband>
  .....
</ContentProtection>
```

2.2.1.2 With Marlin MS3

For MS3, a <MS3> element MAY be present as a child of the <ContentProtection> element if one or more of following elements are used:

- <URIsAreTemplated> of type xs:Boolean indicating, if the value is True, that the URIs referenced in the MPD SHALL be resolved using the MS3 engine because they MAY contain a place holder for URI Template [MURIT]. Only the MS3 authenticator placeholder MAY be used in URI templates.

The following is an example of <ContentProtection> element.

```
<ContentProtection schemeldUri="urn:uuid:5E629AF5-38DA-4063-8977-97FFBD9902D4">
  <mas:MarlinContentIds>
    <mas:MarlinContentId> urn:marlin:organization:foo:contentid:001
  </mas:MarlinContentId>
</mas:MarlinContentIds>
<mas:MS3>
  <mas:URIsAreTemplated>true</mas:URIsAreTemplated>
</mas:MS3>
  .....
</ContentProtection>
```

2.3 Extensions to MP4 Common Encryption Format

This section defines the Marlin specific extensions that are required to use the Common Encryption scheme defined in[MP4CENC].

2.3.1 Implicit Content ID Mapping

Implicit mapping is used when all of the following conditions are met:

- The file is signaled to be Marlin-protected (with a method in or out of Marlin scope)
- The file is protected with the 'cenc' Common Encryption protection scheme
- The file doesn't contain a MarlinKidMappingTableBox('mkid') defined in §2.3.2.2

In the implicit mapping mode, the Marlin Content IDs are derived from KIDs (key identifiers) by converting the 16-byte KID to a URN with the following syntax:
urn:marlin:kid:<KID-in-hex>

where <KID-in-hex> is the lowercase hexadecimal representation of the 16 bytes of the KID.

Example: urn:marlin:kid:1586f237d6a6aadd992e4948297e4567

2.3.2 Explicit Content ID Mapping

In the explicit mapping mode, the Marlin Content IDs are mapped to KIDs using a mapping table. The mapping table is included in a MarlinKidMappingTableBox ('mkid'), child of a Protection System Specific Header box ('pssh') included in the Movie ('moov') and/or Movie Fragment ('moof').

The SystemID UUID for the Protection System Specific Header box is 69F908AF-4816-46EA-910C-CD5DCCCB0A3A. This box contains a MarlinSystemSpecificHeaderBox.

241 **2.3.2.1 MarlinSystemSpecificHeaderBox**
 242 Box Type: 'marl'
 243 Container: The Data field of the Protection System Specific Header box
 244 Mandatory: Yes
 245 Quantity: One
 246
 247 aligned(8) class MarlinSystemSpecificHeaderBox extends
 248 Box('marl')
 249 {
 250 }

251 **2.3.2.2 MarlinKidMappingTableBox**
 252 Box Type: 'mkid'
 253 Container: Marlin System Specific Header box ('marl')
 254 Mandatory: No
 255 Quantity: Zero or one
 256
 257 aligned(8) class MarlinKidMappingTableBox extends
 258 FullBox('mkid', 0, 0) {
 259 unsigned int(32) entry_count;
 260 for (i = 1; i <= entry_count; i++)
 261 {
 262 unsigned int(32) entry_size;
 263 unsigned int(8)[16] KID;
 264 unsigned char(8) content_id[];
 265 }
 266 }
 267
 268 entry_size is the size of the following KID and content_id in bytes
 269 entry_count is the number of mapping entries
 270 KID is a 16-byte key identifier
 271 content_id is the Marlin Content ID associated with the preceding key identifier,
 272 encoded using UTF-8, and no null-termination.
 273
 274

3 HTTP Live Streaming

This section defines how to use Marlin with HTTP Live Streaming [HLS]. Two variants are defined here: bulk encryption and packet encryption (BBTS). In addition, this protocol can be used in combination with MS3 [MS3] or Marlin Broadband [MBB]. EXT-X-KEY parameters defined in following sections SHALL be present at a top level playlist so that these parameters also apply to subsequent child playlists.

3.1 Bulk Encryption

In this variant, the encryption of the segments is performed according to the method defined in [HLS].

The standard EXT-X-KEY parameters apply:

- METHOD=AES-128 (MANDATORY) as specified in [HLS], §3.2.3
- IV (OPTIONAL) as specified in [HLS], §5.2
- CID="<ContentId>" (MANDATORY) content identifier for the content

In this case, the URI parameter is URI="urn:marlin-drm" (MANDATORY) indicating that the key is protected by the Marlin DRM (BB or MS3).

3.2 Packet Encryption

In this variant, the encryption of the segments is performed according to [BBTS]

The following EXT-X-KEY parameters apply:

- METHOD=MARLIN-BBTS (MANDATORY)
- CID="<ContentId>" (MANDATORY) content identifier for the content

3.3 Usage with MS3

When used with MS3, the following additional EXT-X-KEY parameter MAY be added:

- A URIS-ARE-TEMPLATED parameter MAY be added as a parameter of the EXT-X-KEY-TAG. Possible values for this parameter are TRUE or FALSE. If the value is TRUE, the URIs referenced in the Playlist (and child playlists) SHALL be resolved using the MS3 engine because they MAY contain an {s:authenticator} place holder.

3.4 Usage with Marlin BB

When used with Marlin Broadband, the following additional EXT-X-KEY parameters MAY be added:

- SILENT-RIGHTS-URL="<SilentRightsUrl>" (OPTIONAL) Url for Silent Rights Acquisition
- PREVIEW-RIGHTS-URL="<PreviewRightsUrl>" (OPTIONAL) Url for Preview Rights Acquisition
- RIGHTS-ISSUER-URL="<RightsIssuerUrl>" (OPTIONAL) Url for the Rights Issuer

4 Annex: XML Schema for MPD Extension

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
```

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```
-->
```

```
<xsd:schema xmlns="urn:marlin:mas:1-0:services:schemas:mpd"
  targetNamespace="urn:marlin:mas:1-0:services:schemas:mpd"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
```

```
<!-- FormatVersion -->
```

```
<xsd:element name="FormatVersion" type="FormatVersionType"/>
<xsd:complexType name="FormatVersionType">
  <xsd:attribute name="major" type="xsd:nonNegativeInteger"/>
  <xsd:attribute name="minor" type="xsd:nonNegativeInteger"/>
</xsd:complexType>
```

```
<!-- MarlinContentIds -->
```

```
<xsd:element name="MarlinContentId" type="xsd:string"/>
```

```

<!-- MarlinContentIds -->
<xsd:element name="MarlinContentIds" type="MarlinContentIdsType"/>
<xsd:complexType name="MarlinContentIdsType">
  <xsd:sequence>
    <xsd:element ref="MarlinContentId" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>

<!-- URIsAreTemplated -->
<xsd:element name="URIsAreTemplated" type="xsd:boolean"/>

<!-- SilentRightsUrl -->
<xsd:element name="SilentRightsUrl" type="xsd:string"/>

<!-- PreviewRightsUrl -->
<xsd:element name="PreviewRightsUrl" type="xsd:string"/>

<!-- RightsIssuerUrl -->
<xsd:element name="RightsIssuerUrl" type="xsd:string"/>

<!-- MarlinBroadband -->
<xsd:element name="MarlinBroadband" type="MarlinBroadbandType"/>
<xsd:complexType name="MarlinBroadbandType">
  <xsd:sequence>
    <xsd:element ref="SilentRightsUrl" minOccurs="0"/>
    <xsd:element ref="PreviewRightsUrl" minOccurs="0"/>
    <xsd:element ref="RightsIssuerUrl" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

<!-- MS3 -->
<xsd:element name="MS3" type="MS3Type"/>
<xsd:complexType name="MS3Type">
  <xsd:sequence>
    <xsd:element ref="URIsAreTemplated" minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>
</xsd:schema>

```