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Marlin Adaptive Streaming Specification - Full Profile

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25 Version 1.0.1
26 Final

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Source	Marlin Developer Community
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Contents

1   Introduction

This document describes the extensions to "Marlin Adaptive Streaming Specification - Simple Profile, Version 1.0" ([MAS]).

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
maf:	urn:marlin:maf:1-0:services:schemas:mpd	See §4

1.4   References

1.4.1   Normative references

[ISOBMFF]	ISO/IEC 14496-12 : Information technology — Coding of audio-visual objects — Part 12: ISO base media file format
[MAS]	Marlin Adaptive Streaming Specification - Simple Profile, Version 1.0
[MFFS]	Marlin – File Formats Specification, Version 1.1.3
[MP4CENC]	ISO/IEC 23001-7 Information technology -- MPEG systems technologies -- Part 7: Common encryption in ISO base media file format files

[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.
[RFC3394]	J. Schaad, R. Housley. *Advanced Encryption Standard (AES) Key Wrap Algorithm*. IETF RFC 3394. September 2002. http://www.ietf.org/rfc/rfc3394.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/

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1.4.2   Informative references

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

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2   MPEG DASH

2.1   Full Mode

The full mode allows the following extensions to the baseline mode defined in [MAS] §2.1.

- An optional <EncryptionFormat> element MAY be included the MPEG DASH MPD to signal the encryption format of the media (§2.2)
- IPMP defined in [MFFS] §2.3 MAY be used as the media container format for ISO Base Media File Format ISO/IEC 14496-12
- Protection Scheme Information Boxes ('sinf') with Marlin specific extensions (§2.3.2) MAY be included in the MP4 Common Encryption Format

If one or more of these extension are used, the schemeIdUri attribute of the <ContentProtection> element defined in §2.2 SHALL be urn:uuid:D1612C79-D9E1-4D3B-8919-7967F55F9375 to indicate the full mode.

2.2   Extensions to Media Presentation Description

An <EncryptionFormat> element MAY be included in the <ContentProtection> element described in [MAS] §2.2. Table 1 gives the semantics of the <EncryptionFormat> element, which is to be added at the end of Table 1, [MAS] §2.2. The normative schema definition is given in Annex: XML Schema for MPD Extension.

Table 1 - Semantics of EncryptionFormat Element under ContentProtection Element

EncryptionFormat	0...1	Provides encryption format information of the media.

2.2.1   Extensions to Media Presentation Description Mapping

For both of Marlin BB and MS3, the MPD MAY include the following child element(s) in the <ContentProtection> element described in [MAS] §2.2.1:

- <EncryptionFormat> element provides encryption format information of the media. The value is of type xs:string specifying one of the following Schemes:
    - "BBTS-AES" : Media Presentation is in the form of BBTS, with AES encryption algorithm
    - "BBTS-CSA" : Media Presentation is in the form of BBTS, with DVB-CSA encryption algorithm
    - "BBTS-SKL" : Media Presentation is in the form of Single-key-layer BBTS
    - "ACBC" : Media Presentation is in the form of IPMP, with scheme type "ACBC"
    - "ACGK" : Media Presentation is in the form of IPMP, with scheme type "ACGK"
    - "CENC-CTR" : Media Presentation is in the form of MP4 Common Encryption described in §2.3, without scheme type "MCEG"
    - "CENC-CGK" : Media Presentation is in the form of Common Encryption described in §2.3, with scheme type "MCEG"

2.2.1.1 Examples

The following is an example of <ContentProtection> element under the full mode, for both Marlin BB and MS3.

```
<ContentProtection schemeIdUri="urn:uuid:D1612C79-D9E1-4D3B-8919-
7967F55F9375">
    <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>
    <mas:MS3>
        <mas:URIsAreTemplated>true</mas:URIsAreTemplated>
    </mas:MS3>
    <mas:EncryptionFormat>ACBC</mas:EncryptionFormat>
    ……….
</ContentProtection>
```

185

2.3 Extensions to MP4 Common Encryption Format

187 This section defines the Marlin specific extensions that are required to use the MP4
188 Common Encryption scheme defined in [MP4CENC]. The extensions include:
189   • Mapping rules from KID to Marlin Content ID (§2.3.1)
190   • Marlin specific Protection System Specific Header (§2.3.2)
191   • Marlin specific Protection Scheme Information Box (§2.3.3)
192
193 A content file is identified as Marlin-protected if it contains a Marlin specific Protection
194 System Specific Header or a Marlin specific Protection Scheme Information Box.
195

2.3.1 Mapping rules from KID to Marlin Content ID

197 The mapping rules described in [MAS] §2.3.1 and §2.3.2 apply, with the extensions
198 below:
199

2.3.1.1 Extensions to Explicit Content ID Mapping

201 The MarlinKidMappingTableBox ('mkid') described in [MAS] §2.3.2 MAY be included
202 in a Protection Scheme Information Box ('sinf') defined in §2.3.3.
203

2.3.1.1.1 Extensions to MarlinKidMappingTableBox

205 Container: Marlin System Specific Header box ('marl') or Protection Scheme
206 Information Box ('schi')
207

2.3.2 Marlin Specific Protection System Specific Header

209 This section describes the Marlin specific extensions to the Protection System
210 Specific Header Box ('pssh') defined in [MP4CENC] §8.1. The Protection System
211 Specific Header box MAY be included in the Movie ('moov') and/or Movie Fragment
212 ('moof'). The SystemID UUID for the Protection System Specific Header box is
213 69F908AF-4816-46EA-910C-CD5DCCCB0A3A. The box structure is shown in Table
214 2. Note that boxes other than those described below may be defined in the future
215 versions of this specification. In such a case, they shall be treated as boxes of
216 unknown types and ignored.
217

Table 2 - Marlin Specific Protection System Specific Header

Box			Section	Description
pssh			[MP4CENC] §8.1	*Protection Scheme Information Box (optional)*
	marl		[MAS], §2.3.2.1	*Marlin System Specific Header Box (optional)*
		mkid	[MAS], §2.3.2.2	*Marlin Kid Mapping Table Box (optional)*
		8bdl	[MFFS], §2.3.2.14	*Octopus Bundle Box (optional)*

218 Note that the mandatory boxes are marked with an asterisk (*).
219

2.3.3   Marlin Specific Protection Scheme Information Box

221 This section describes the Marlin specific extensions to the Protection Scheme
222 Information Box ('sinf') defined in [ISOBMFF], §8.12.1.1.
223 The Scheme Type and Version SHALL be:
224   Scheme Type: 'MCEC' or 'MCEG'
225   Scheme Version: 1.0 (0100h)
226

227 The box structure is shown in Table 3 and Table 4. When the scheme_type is set to
228 'MCEG', the Marlin Group Key Box ('gkey') defined in §2.3.3.1 SHALL appear in this
229 box in addition to all the boxes defined for 'MCEC' scheme_type. Note that boxes
230 other than those described below may be defined in the future versions of this
231 specification. In such a case, they shall be treated as boxes of unknown types and
232 ignored.
233

Table 3 - Protection Scheme Information Box (with scheme_type is 'MCEC')

Box							Section	Description
sinf							This section	*Protection Scheme Information Box*
	schm					*	[ISOBMFF], §8.12.5.1	*Scheme Type Box*
	schi					*	[ISOBMFF], §8.12.6.1	*Scheme Information Box*
		tenc				*	[MP4CENC] §8.2	*Track Encryption Box*
		mkid					§2.3.1.1.1	*Marlin Kid Mapping Table Box (optional)*
		satr				*	[MFFS], §2.3.2.7	*Marlin Security Attributes*
			styp			*	[MFFS], §2.3.2.8	*Stream Type*
			sgna				[MFFS], §2.3.2.9	*Signed Attributes (optional)*
				rurl			[MFFS], §2.3.2.10	*Rights URL (optional)*
			asig				[MFFS], §2.3.2.11	*Attribute Signature (optional)*
			cert				[MFFS], §2.3.2.12	*Certificate (optional)*
		hmac				*	[MFFS], §2.3.2.13	*HMAC value*
		8bdl					[MFFS], §2.3.2.14	*Octopus Bundle Box (optional)*

234 Note that the mandatory boxes are marked with an asterisk (*).
235

Table 4 - Protection Scheme Information Box (with scheme_type is 'MCEG')

Box						Section	Description
sinf						This section	*Protection Scheme Information Box*
	schm				*	[ISOBMFF], §8.12.5.1	*Scheme Type Box*
	schi				*	[ISOBMFF], §8.12.6.1	*Scheme Information Box*
		tenc			*	[MP4CENC] §8.2	*Track Encryption Box*
		mkid				§2.3.1.1.1	*Marlin Kid Mapping Table Box (optional)*
		gkey			*	§2.3.3.1	*Group Key Box*
		satr			*	[MFFS], §2.3.2.7	*Marlin Security Attributes*
			styp		*	[MFFS], §2.3.2.8	*Stream Type*
			sgna			[MFFS], §2.3.2.9	*Signed Attributes (optional)*
				rurl		[MFFS], §2.3.2.10	*Rights URL (optional)*
			asig			[MFFS], §2.3.2.11	*Attribute Signature (optional)*
			cert			[MFFS], §2.3.2.12	*Certificate (optional)*
		hmac			*	[MFFS], §2.3.2.13	*HMAC value*
		8bdl				[MFFS], §2.3.2.14	*Octopus Bundle Box (optional)*

236 Note that the mandatory boxes are marked with an asterisk (*).
237

2.3.3.1 Marlin Group Key Box

239 ### *2.3.3.1.1 Definition*
240 Box Type: 'gkey'
241 Container: Scheme Information Box ('schi')
242 Mandatory: No
243 Quantity: Zero or exactly one
244
245 This box contains an encrypted form of the content key directly encrypting the media samples.
246 The content key is encrypted with the key of the Content Key object of the Marlin License
247 bundle which is associated with the Content ID derived from the KID in the same Security
248 Scheme Information Box ('schi'). The encryption algorithm is AES Key Wrap Algorithm
249 [RFC3394]. This box MAY appear only when scheme_type of Scheme Type Box ('schm') is
250 set to 'MCEG'.

251 ### *2.3.3.1.2 Syntax*

```
252   aligned(8) class GroupKeyBox extends FullBox('gkey', 0, 0){
253       bit(192)                encrypted_ckey;
254   }
```

255

256 ### *2.3.3.1.3 Semantics*
257 **encrypted_ckey**   This field contains a content key directly encrypting associated media
258   samples. The content key is encrypted with the key in the Marlin License bundle associated
259   with Content ID, which is derived from the KID in the same Security Scheme Information
260   Box ('schi'). The encryption algorithm of the key is AES Key Wrap Algorithm [RFC3394].

261
262
263

264 3 HTTP Live Streaming

265 3.1 Extensions to Packet Encryption

266 An ENC-FORMAT attribute MAY be included in the EXT-X-KEY tag described in
267 [MAS] §3.2.
268

269 • ENC-FORMAT="<Format>" (OPTIONAL), where <Format> is one of the
270   followings to indicate the encryption algorithm.
271   o BBTS-AES
272   o BBTS-CSA
273   o BBTS-SKL
274

4   Annex: XML Schema for MPD Extension

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

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

  <!—Import -->
  <xsd:import namespace="urn:marlin:mas:1-0:services:schemas:mpd"
schemaLocation="./Mas_SimpleProfile.xsd"/>

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

</xsd:schema>
```