SMPTE STANDARD

D-Cinema Operations – Facility List Message Exchange Protocol

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Approved
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Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual. This SMPTE Engineering Document was prepared by Technology Committee 21DC.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Engineering Document. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

The Facility List Message eXchange protocol (FLM-x) is a client-server protocol for publishing FLM documents (see SMPTE ST 430-16) on a network. FLM-x is based on HTTP (see IETF RFC 7230) and uses REST principles (see Fielding, 2000).

FLM-x is intended to be used by any entity that wishes to host FLM documents, including D-Cinema integrators, exhibitors, service providers, etc. FLM data is constantly changing (as devices are swapped out and new screens become digital), and FLM-x lets clients stay up-to-date with this ever-changing data with minimal network and load requirements.

An FLM-x server makes available at a given URI (the SiteList URI) a SiteList document that lists all available FLM documents offered by the FLM-x server. For instance, assuming an FLM-x server makes a SiteList available at the URI "`https://example.org/FLM/`", an FLM-x client would retrieve the SiteList document using the HTTP GET method (see Section 6.1), which would return, for example:

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet href="/static/sitelist-to-xhtml.xsl" type="text/xsl"?>
<SiteList xmlns="http://www.smpte-ra.org/ns/430-15/2017/SiteList"
       xmlns:xlink="http://www.w3.org/1999/xlink">
  <Originator>https://example.org/FLM/</Originator>
  <SystemName>malcoy</SystemName>
  <DateTimeCreated>2010-04-16T11:26:05-07:00</DateTimeCreated>
  <FacilityList>
  <Facility id="tag:example.org,2015:facilities/882345" modified="2010-04-16T10:55:17-07:00"
                     xlink:href="882345" xlink:type="simple"/>
  <Facility id="tag:example.org,2015:facilities/100883" modified="2010-04-12T16:12:32-07:00"
                     xlink:href="100883" xlink:type="simple"/>
  <Facility id="tag:example.org,2015:facilities/562999" modified="2010-04-10T04:32:01-07:00"
                     xlink:href="562999" xlink:type="simple"/>
  </FacilityList>
</SiteList>
```

Each of the Facility elements within a SiteList document corresponds to a single D-Cinema facility, and thus a single FLM document. The FLM documents are not contained within the SiteList document itself, and but instead accessed through an FLM URI, which is generated using an Xlink `href` attribute included with each Facility. This allows the SiteList document to remain small even if it contains large number of facilities.

For example, a client interested in retrieving the FLM for the facility with identifier "`tag:example.org,2015:facilities/562999`" would use the HTTP GET method on the following FLM URI (see Section 7.1):

```
https://example.org/FLM/562999
```

The response from such a request would be the FLM document itself, assuming it exists.

By design, FLM-x clients do not retrieve FLM documents based on modification or creation date, but instead retrieve the entire SiteList document, which contains the last modification date for individual FLM documents. Note that FLM-x clients can avoid repeatedly retrieving the entire SiteList document by caching the `Last-Modified` HTTP response header and using that date in an `If-Modified-Since` HTTP request header.

A benefit of basing the FLM-x protocol on REST principles and using XML documents is that it functions naturally with web browsers. For example, if a FLM URI is typed into a browser, that FLM will be displayed. Since the XML document is served with a "`Content-Type: application/xml`" HTTP header, most modern browsers will allow the user to explore the XML tree interactively.

An FLM-x server can make the data even more human-friendly by supplying XSL style sheets, e.g. for SiteList, FLM, or Error documents, to transform the XML document into human-friendly XHTML.

1 Scope

This document specifies a protocol to efficiently publish, retrieve, synchronize and submit aggregate Extended Facility List Message (FLM) instances over HTTP.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; then formal languages; then figures; and then any other language forms.

3 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this engineering document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this engineering document are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

IETF RFC 3986, Uniform Resource Identifier (URI): Generic Syntax

IETF RFC 2617, HTTP Authentication: Basic and Digest Access Authentication

IETF RFC 5246, The Transport Layer Security (TLS) Protocol, Version 1.2

IETF RFC 7230, Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing

IETF RFC 7231, Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content

IETF RFC 7232, Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests

IETF RFC 7234, Hypertext Transfer Protocol (HTTP/1.1): Caching

SMPTE ST 430-16:201Y, D-Cinema Operations – Extended Facility List Message

World Wide Web Consortium (W3C) (2010, May 6). XML Linking Language (XLink) Version 1.1

4 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

4.1 FLM

Extended Facility List Message, as defined in SMPTE ST 430-16.

4.2 FLM-x protocol

The Facility List Message eXchange protocol (FLM-x) specified in this document.

4.3 FLM-x server

A FLM-x server is an entity that implements at least one of the requests specified in this document.

4.4 FLM-x client

A FLM-x client is an entity that performs at least one of the requests specified in this document.

5 General

5.1 HTTP

An FLM-x server shall support the HTTP 1.1 protocol as specified in IETF RFC 7230, IETF RFC 7231, IETF RFC 7232 and IETF RFC 7234

A persistent connection, as specified in Section 6.3 of IETF RFC 7230, should be maintained.

NOTE: Section 3.3.2 of RFC 7230 specifies the various means by which the length of a message can be transmitted.