

SMPTE REGISTERED DISCLOSURE DOCUMENT

Acquisition Metadata Sets for Video Camera Parameters



Page 1 of 28 pages

The attached document is a Proposed Registered Disclosure Document prepared by the proponent identified below. It has been examined by the appropriate SMPTE Technology Committee and is believed to contain adequate information to satisfy the objectives defined in the Scope, and to be technically consistent.

This document is NOT a Standard, Recommended Practice or Engineering Guideline, and does NOT imply a finding or representation of the Society.

Errors in this document should be reported to the proponent identified below, with a copy to eng@smpte.org.

All other inquiries in respect of this document, including inquiries as to intellectual property requirements that may be attached to use of the disclosed technology, should be addressed to the proponent identified below.

Proponent contact information:

Hiroshi Nakano
Sony Corporation
4-14-1 Asahi-cho, Atsugi
Kanagawa, 243-0014
Japan
Email: hiroshi.nakano@jp.sony.com

Introduction

This document defines metadata that is intended to capture camera acquisition parameters associated with each individual frame of the captured video. Such camera metadata can be used to provide user accessible information that enables optimization of various parameters during acquisition. The metadata can also be stored or carried with the picture signal to form a record of the shooting parameters used in the shoot. The metadata values are created individually for the shoot to provide a dynamic record for each camera parameter.

The metadata in this document is composed of three distinct groups – Lens Unit metadata, Camera Unit metadata and User Defined Acquisition metadata. The Lens Unit metadata provides a set of metadata items that define the lens parameter values during a shoot. Likewise, the Camera Unit metadata is a set of metadata items that define the camera parameter values during a shoot. The User Defined Acquisition metadata may be defined by users.

These three groups are coded as KLV coded metadata sets with each set containing individual metadata items.

This document defines the KLV coded metadata sets and each KLV coded metadata item in full for the purpose of interoperability.

The final section provides guidance for the carriage of these KLV metadata sets through different transport mechanisms to allow the metadata sets to be successfully transported between applications using V-Anc packets on serial digital interfaces such as those complying with SMPTE ST 291 and in the essence containers of MXF files such as those complying with SMPTE ST 379-2.

Table of Contents

1	Scope	4
2	Normative References	4
3	Acronyms	4
4	Definition of the Metadata Sets	5
4.1	Set Keys	5
4.2	Set Length	5
4.3	Set Value	5
4.4	Extending the Acquisition Metadata Sets	12
4.5	Basic Set Rules	12
5	Acquisition Metadata Definitions	12
5.1	Common Distance Format	12
5.2	Instance UID	13
5.3	Items of Lens Unit Metadata Set	13
5.4	Items of Camera Unit Metadata Set	16
6	Carriage of the Acquisition Metadata Sets	25
6.1	Carriage in the MXF Generic Container	25
6.2	Carriage in Vertical Ancillary Data Packets	26
Annex A	Bibliography (Informative)	28

1 Scope

This document describes metadata sets for the grouping of professional video camera acquisition parameters with frame granularity. The metadata sets are coded using the SMPTE KLV coding protocol as defined by SMPTE ST 336. Coding the metadata sets as KLV packets is intended to ensure maximum acceptability across a wide range of application areas.

2 Normative References

Note: All references in this document to other SMPTE documents use the current numbering style (e.g. SMPTE ST 336:2007) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as SMPTE 336M-2007). Documents with the same root number (e.g. 336) and publication year (e.g. 2007) are functionally identical.

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

SMPTE ST 336:2007, Data Encoding Protocol Using Key-Length-Value

SMPTE ST 395:2003, Television — Metadata Groups Registry Structure

SMPTE ST 400:2004, Television — SMPTE Labels Structure

SMPTE RP 210, Metadata Dictionary Registry of Metadata Element Descriptions

SMPTE RP 224, SMPTE Labels Register

IETF RFC 4122, A Universally Unique Identifier (UUID) URN Namespace

3 Acronyms

Acronyms used in this document are listed below.

BER: Binary Encoding Rules

ID: Identifier

KLV: Key Length Value

MXF: Material Exchange Format

N/A: Not Applicable

UID: Unique Identifier

UL: Universal Label

UUID: Universally Unique Identifier

4 Definition of the Metadata Sets

The Acquisition Metadata sets are KLV coded according to SMPTE ST 336. All metadata item values in the sets described in this document are associated with a given frame of video and values may change on a frame-by-frame basis.

There are three metadata sets; a Lens Unit Metadata set, a Camera Unit Metadata set and a User Defined Acquisition Metadata set.

4.1 Set Keys

The set Key is as per Table 1.

Table 1 – The Acquisition Metadata Set Key Value

Byte No.	Description	Value (hex)	Meaning
1~4	SMPTE UL Identifier	06.0E.2B.34h	See SMPTE ST 336
5	Category Designator	02h	SMPTE Groups
6	Registry Designator	53h	Local set with 2-byte Length and 2-byte Local Tag values
7	Structure Designator	01h	Complies with register structure variant 1
8	Version Number	vv (01h)	Version of the register at set registration
9	Compound class	0Ch	Identifies the Compound class in SMPTE ST 395
10	Production Metadata	02h	Identifies metadata sets created at point of creation or capture.
11	Acquisition Metadata	01h	Identifies metadata sets associated with a video camera
12	Frame-based Acquisition Metadata	01h	01: Frame-based metadata set
13	Acquisition Set Kind	yyh	A non-zero value used to identify the specific camera acquisition set kind 01: Lens Unit Metadata set (Local set) 02: Camera Unit Metadata set (Local set) 03-7E: Reserved 7F: User Defined Acquisition Metadata ¹
14	Acquisition Metadata Version 1	01h	Backwards compatible version number of this Acquisition Metadata set
15	Null	00h	Zero value
16	Null	00h	Zero value

¹ The 'User Defined Acquisition Metadata' set kind may be used for private user defined ('dark') metadata. The local tags and values for this set are assigned with tag value ranges from E0.00h to FF.FFh. If this set is inside MXF header metadata, local tags are allocated dynamically. The mapping of the sets inside MXF header metadata is beyond the scope of this document.

4.2 Set Length

The set Length field is BER encoded using long-form encoding as specified by SMPTE ST 336. The Length field is 4-bytes in length.

4.3 Set Value

The contents of the Acquisition Metadata sets are as defined in Tables 2a and 2b.

All items in each set are encoded in the order shown in Tables 2a and 2b.

The local tag values used in the metadata sets below are considered unique only within the confines of this specification.

Any new items added to either of the sets described by Tables 2a and 2b should increment the local tag value within that set.

No new items should be added to these sets without a revision of this document.

4.3.1 Lens Unit Metadata Set

The Lens Unit Metadata set contents are as defined in Table 2a. Byte 13 of the set Key has the value of 01h.

Table 2a – Definition of the Lens Unit Metadata Set

Item Name	Type	Len	Local Tag ²	Item UL	Req ?	Meaning
Lens Unit Metadata	Set Key (UL)	16		See Table 1	Req	Lens Unit Metadata Set Key 06.0E.2B.34.02.53.01.01. 0C.02.01.01.01.01.00.00
Length	BER Length	4			Req	Set length
Instance UID	UUID	16	3C.0A	06.0E.2B.34 01.01.01.01 01.01.15.02 00.00.00.00	Opt	Unique ID of the instance of this data set [defined in SMPTE RP 210]
Iris F-Number	UInt16	2	80.00	06.0E.2B.34 01.01.01.0D 04.20.02.02 01.00.00.00	Opt	Iris position value calculated from the “F-number” that is a measure of the amount of light transmitted through the lens.
Iris T-Number	UInt16	2	80.08	06.0E.2B.34 01.01.01.0E 04.20.02.02 08.00.00.00	Opt	Iris position value calculated from the “T-number” that is a measure of the amount of light transmitted through the lens in practice
Iris Ring Position	UInt16	2	80.09	06.0E.2B.34 01.01.01.0E 04.20.02.02 09.00.00.00	Opt	Iris ring rotation angle in unsigned integer. 0 is for full open, and FFFFh for close
Focus Position From Image Plane	Half Float (lens serial)	2	80.01	06.0E.2B.34 01.01.01.0D 04.20.02.02 02.00.00.00	Opt	Distance in meters between the image plane and the object in focus.
Focus Position From Front Lens Vertex	Half Float (lens serial)	2	80.02	06.0E.2B.34 01.01.01.0D 04.20.02.02 03.00.00.00	Opt	Distance in meters between the front of the lens and the object in focus.
Focus Ring Position	UInt16	2	80.0A	06.0E.2B.34 01.01.01.0E 04.20.02.02 0A.00.00.00	Opt	Focus ring rotation angle in unsigned integer. 0 is for near-end, FFFFh for infinity

Item Name	Type	Len	Local Tag ²	Item UL	Req ?	Meaning
Macro Setting	Boolean	1	80.03	06.0E.2B.34 01.01.01.0D 04.20.02.02 04.00.00.00	Opt	Specifies by a flag, whether the macro is activate. TRUE: on FALSE: off
Lens Zoom 35mm Still Camera Equivalent	Half Float (lens serial)	2	80.04	06.0E.2B.34 01.01.01.0D 04.20.02.02 05.00.00.00	Opt	Focal length in meters
Lens Zoom Actual Focal Length	Half Float (lens serial)	2	80.05	06.0E.2B.34 01.01.01.0D 04.20.02.02 06.00.00.00	Opt	Focal length in meters
Zoom Ring Position	UInt16	2	80.0B	06.0E.2B.34 01.01.01.0E 04.20.02.02 0B.00.00.00	Opt	Zooming ring rotation angle in unsigned integer. 0 is for wide-end, and FFFFh is for tele-end
Optical Extender Magnification	UInt16	2	80.06	06.0E.2B.34 01.01.01.0D 04.20.02.02 07.00.00.00	Opt	Magnification factor setup of an optical extender or conversion lens where present
Lens Attributes	UTF8 String	var	80.07	06.0E.2B.34 01.01.01.0D 03.02.03.02 02.10.01.00	Opt	Informative description of additional attributes about the lens in use (as a text string). The string length is less than 64 bytes.

² If this set is inside MXF header metadata, local tags are allocated dynamically.

4.3.2 Camera Unit Metadata Set

The Camera Unit Metadata set contents are as defined in Table 2b. Byte 13 of the set Key has the value of 02h.

Table 2b – Definition of the Camera Unit Metadata Set

Item Name	Type	Len	Local Tag ³	Item UL	Req ?	Meaning
Camera Unit Metadata	Set Key (UL)	16		See Table 1	Req	Camera Unit Metadata Set Key 06.0E.2B.34.02.53.01.01. 0C.02.01.01.02.01.00.00
Length	BER Length	4			Req	Set length
Instance UID	UUID	16	3C.0A	06.0E.2B.34 01.01.01.01 01.01.15.02. 00.00.00.00	Opt	Unique ID of the instance of this data set [defined in SMPTE RP 210]

Item Name	Type	Len	Loca l Tag ³	Item UL	Req ?	Meaning
Auto Exposure Mode	Label	16	81.00	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.01.00.00	Opt	Describes the setup mode the camera uses for automatic exposure. Each value is a SMPTE Label and registered in SMPTE RP 224
Exposure Index of Photo Meter	UInt16	2	81.15	06.0E.2B.34 01.01.01.0E 04.20.01.03 01.0C.00.00	Opt	Setting of the photo meter in ISO number
Auto Focus Sensing Area Setting	UInt8	1	81.01	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.02.00.00	Opt	Describes the selected areas used for the auto focus. Each value is a registered code.
Color Correction Filter Wheel Setting	UInt8	1	81.02	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.03.00.00	Opt	Specifies the setting of the attenuation ratio of the built-in optical density (ND) filter. Each value is a registered code.
Neutral Density Filter Wheel Setting	UInt16	2	81.03	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.04.00.00	Opt	Describes the reciprocal of the attenuation ratio of the built-in optical density (ND) filter as an integer value where the value 1 means a clear filter.
Image Sensor Dimension Effective Width	UInt16	2	81.04	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.05.00.00	Opt	Width of effective image area in micro meters
Image Sensor Dimension Effective Height	UInt16	2	81.05	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.06.00.00	Opt	Height of effective image area in micro meters
Capture Frame Rate	Rational	8	81.06	06.0E.2B.34 01.01.01.0D 04.01.03.01 03.01.00.00	Opt	Capture Frame Rate in fps (e.g. 50:1, 60000:1001). The rate at which the video is captured in frames per second.
Image Sensor Readout Mode	UInt8	1	81.07	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.07.00.00	Opt	Image sensor Readout mode defined as a registered code.
Shutter Speed (Angle)	UInt32	4	81.08	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.08.00.00	Opt	Shutter speed as an angle defining the shutter speed (angle) in minutes relative to a completely open shutter angle of 360 degrees.
Shutter Speed (Time)	Rational	8	81.09	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.08.01.00	Opt	Shutter speed as a time defining the shutter speed (time) in seconds.

Item Name	Type	Len	Loca l Tag ³	Item UL	Req ?	Meaning
Camera Master Gain Adjustment	Int16	2	81.0A	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.09.00.00	Opt	Master Gain Control setting in 0.01 decibel units
ISO Sensitivity	UInt16	2	81.0B	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.0A.00.00	Opt	Sensitivity to light in ISO exposure index
Color Matrix	Array of Rational	8 + 9x8	81.18	06.0E.2B.34 01.01.01.0E 04.20.01.03 01.0D.00.00	Opt	Specifies the setting of the color balance of the camera with the ordered elements (R to R, G to R, B to R, R to G, G to G, B to G, R to B, G to B, B to B)
Electrical Extender Magnification	UInt16	2	81.0C	06.0E.2B.34 01.01.01.0D 04.20.01.03 01.0B.00.00	Opt	Expresses the magnification setup of the picture size in percent where 100% (64h) represents the original picture size
Auto White Balance Mode	UInt8	1	81.0D	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.01.00.00	Opt	Auto White Balance Mode defined as a registered code.
White Balance	UInt16	2	81.0E	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.02.00.00	Opt	White Balance value defined by the temperature in Kelvin
Camera Master Black Level	Int16	2	81.0F	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.03.00.00	Opt	Level of the master black level of the camera expressed as a percentage in relation to the white value. Defined in 0.1 % units.
Camera Knee Point	UInt16	2	81.10	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.04.00.00	Opt	Level of the knee point in the camera transfer characteristic expressed as a percentage defined in 0.1 % units. Specifies the level in the white signal above which a nonlinear signal processing is active.
Camera Knee Slope	Rational	8	81.11	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.05.00.00	Opt	Slope of the transfer characteristic above the knee point.
Camera Luminance Dynamic Range	UInt16	2	81.12	06.0E.2B.34 01.01.01.0D 04.20.01.03 02.06.00.00	Opt	Luminance Dynamic Range expressed as a percentage in reference to the nominal white level. Defined in 0.1 % units.