SMPTE STANDARD

MXF Descriptive Metadata Scheme for Compatible Time Labels (DMS-TLC)

Table of Contents

50 Main St., Suite 1000, White Plains, NY 10606, (914) 761-1100
Approved January 29, 2025

Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices, and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

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 31FS File Formats and Systems.

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 clause 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.

Introduction

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

The Descriptive Metadata Scheme for Compatible Time Labels (DMS-TLC) defined in this document is intended for use in systems that encode, decode or modify SMPTE ST 377-1 MXF files or transcode MXF files to or from other formats (including binary KLV and text XML or JSON) using MXF Descriptive Metadata Schemes as described by SMPTE EG 42. MXF Descriptive Metadata.

An MXF file containing DMS-TLC is illustrated in Figure 1.

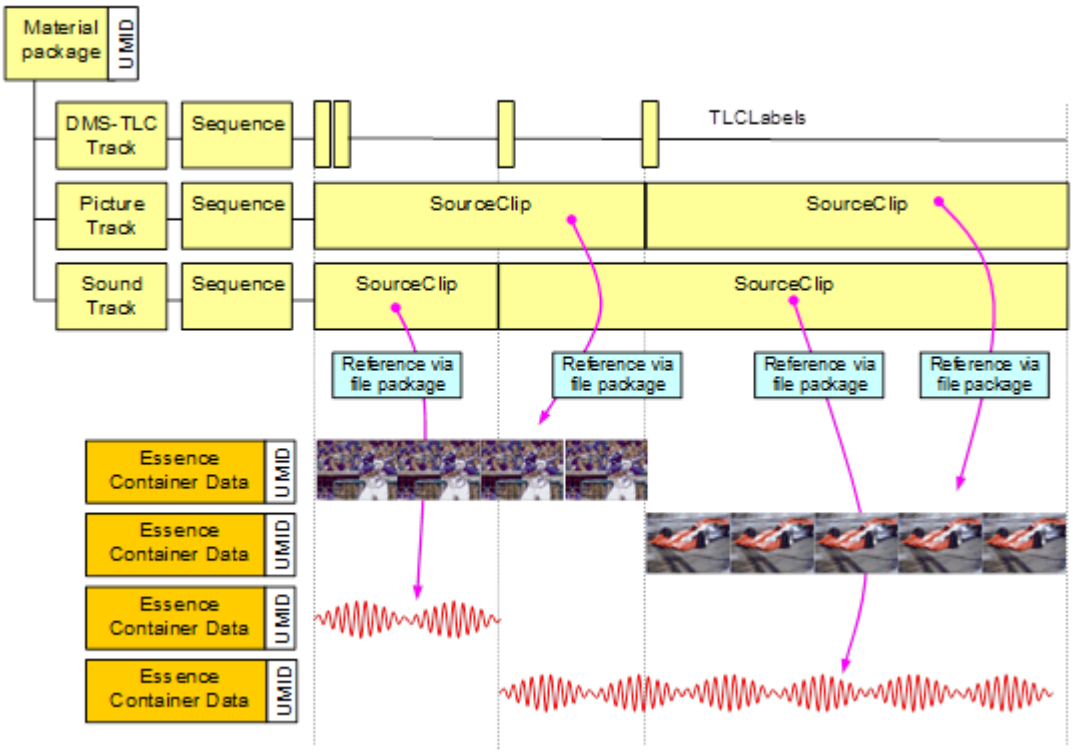

Figure 1 — MXF file containing DMS-TLC

The purpose of DMS-TLC is to permit the incorporation into SMPTE ST 377-1 MXF of time labels that are more comprehensive than the timecodes defined by the SMPTE ST 12 suite as used in MXF Timecode Tracks.

MXF defines Timecode and TimecodeTracks that are extensively used to convey time labels compliant with a subset of SMPTE ST 12. MXF permits these classes to be extended to address additional label formats rates and details: however, the large installed base of MXF applications would not swiftly or willingly adopt any extension that might destabilize existing deployed systems. Also, the installed base typically expects TimecodeTracks to use the same EditRate as the accompanying Essence. Additionally, some applications such as IMF recommend that Timecode Tracks be omitted to reduce interoperability issues they can cause in componentized workflows.

MXF also defines Descriptive Metadata Schemes (DMSes) that provide for time-varying annotation of files. Several standard DMSes have been developed and published, and are in use. Private commercial implementations of DMSes are also extensively deployed.

MXF also provides for multiple DMSes of diverse specifications to be present in any file and to be separable from each other and from the Essence. DMSes can provide Event-based time-varying metadata, whereas TimecodeTracks are limited to Timeline-based metadata.

Therefore, DMS-TLC defines an Event-based CompatibleTimeLabelTrack (TLCTrack) and CompatibleTimeLabel (TLCLabel) containing fixed or instantaneous or time-varying CompatibleTimeItems. (TLCItem). These classes are defined according to the provisions of SMPTE ST 377-1:2019 Clauses 9.8 Descriptive Metadata Plugins, including B.27.2 Event Track (DM) and B.32 DM Segment. As with other DMSes, DMS-TLC subclasses these.

The structure and all Properties of DMS-TLC are registered in the SMPTE Metadata Registry.

DMS-TLC also defines the classes using the provisions of SMPTE ST 377-2 KXS, which enables applications that implement SMPTE ST 377-2:2019 to incorporate TLC MetaDefinitions within the optional MXF Extensions Header.

The Properties and subclasses of TLCItem are intended to be compatible with, if not identical to, the definition of TLXItem, currently under development by TC 32NF. DMS-TLC gives precedence to provisions and known practices of MXF. It is hoped that any disconnects will be resolved prior to FCD of either specification.

A design requirement is that all MXF TimecodeTrack (ST 377-1:2019 Clause B.15) TimecodeSequence (ST 377-1:2019 Clause B.16) or TimecodeComponent (ST 377-1:2019 Clause B.17) can be translated into a corresponding TLC object without loss of data or precision. It is not a design requirement that all TLCTracks, TLCSequences or TLCItem can be losslessly converted to corresponding Timecode objects.

In addition to the carriage of DMS-TLC in SMPTE ST 377-1 MXF, instances of DMS-TLC can be represented as an XML document following the provisions of SMPTE ST 2001-1 RegXML.

It is intended that Instances of DMS-TLC can also be represented as a JSON document.

A system employing MXF and XML or JSON or KLV is illustrated in Figure 2.

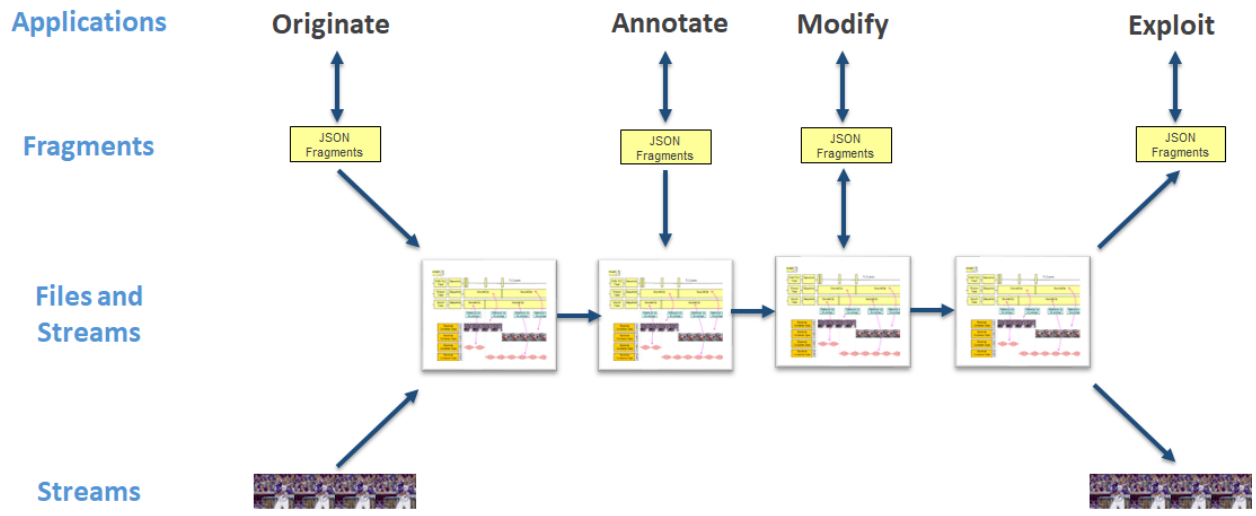

Figure 2 — DMS-TLC in Systems

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.

1 Scope

This document defines an MXF Descriptive Metadata Scheme for Compatible Time Labels (DMS-TLC). DMS-TLC is intended for use in systems that encode, decode or modify MXF files or transcode MXF files to or from other formats including binary KLV and text XML or JSON.

DMS-TLC follows the provisions of SMPTE ST 377-1:2019 MXF, specifically Clause 9.8 Descriptive Metadata Plugins. It also follows the provisions of SMPTE ST 377-2 KXS. Instances of DMS-TLC comply with the provisions of SMPTE ST 335, SMPTE ST 395, SMPTE ST 2003, SMPTE ST 400, and SMPTE EG 42.

Instances of DMS-TLC can be represented in KLV within MXF Header Metadata. Instances of DMS-TLC can also be represented in KLV as a stream of KLV Packets independent of an MXF File. Instances of DMS-TLC can also be represented in XML as a SMPTE ST 2001-1 RegXML document or as a fragment within other XML Documents.

2 Normative References

The following standard contains provisions that, through reference in this text, constitute provisions of this standard. Dated references require that the specific edition cited shall be used as the reference. Undated citations refer to the edition of the referenced document (including any amendments) current at the date of publication of this document. All standards are subject to revision, and users of this engineering document are encouraged to investigate the possibility of applying the most recent edition of any undated reference.

IEEE Std 1588-2008, *Precision Time Protocol (PTP)*

IETF RFC 5905 – *Network Time Protocol Version 4*

IETF RFC 6557 – *Procedures for Maintaining the Time Zone Database*

ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

SMPTE EG 42:2015, *Material Exchange Format (MXF) — MXF Descriptive Metadata*. https://doi.org/10.5594/SMPTE.EG42.2015

SMPTE ST 12-1:2014, *Time and Control Code*. https://doi.org/10.5594/SMPTE.ST12-1.2014

SMPTE ST 12-2:2014, *Transmission of Time Code in the Ancillary Data Space*. https://doi.org/10.5594/SMPTE.ST12-2.2014

SMPTE ST 12-3:2016, *Time Code for High Frame Rate Signals and Formatting in the Ancillary Data Space*. https://doi.org/10.5594/SMPTE.ST12-3.2016

SMPTE ST 258:2004, *Television – Transfer of Edit Decision Lists*. https://doi.org/10.5594/SMPTE.ST258.2004

SMPTE ST 309:2012, *Transmission of Date and Time Zone Information in Binary Groups of Time and Control Code*. https://doi.org/10.5594/SMPTE.ST309.2012

SMPTE ST 330:2011, *Unique Material Identifier (UMID)*. https://doi.org/10.5594/SMPTE.ST330.2022

SMPTE ST 335:2012, *Metadata Element Dictionary Structure*. https://doi.org/10.5594/SMPTE.ST335.2012

SMPTE ST 335, *Metadata Element Dictionary Structure – Amendment 1*
https://doi.org/10.5594/SMPTE.ST335.2012Am1.2019

SMPTE ST 336:2017, *Data Encoding Protocol Using Key-Length-Value*.
https://doi.org/10.5594/SMPTE.ST336.2017

SMPTE ST 377-1:2019, *Material Exchange Format (MXF) – File Format Specification*.
https://doi.org/10.5594/SMPTE.ST377-1.2019

SMPTE ST 377-2:2019, *MXF KLV-Encoded Extension Syntax (KXS)*.
https://doi.org/10.5594/SMPTE.ST377-2.2019

SMPTE ST 395:2014, *Metadata Groups Register*. https://doi.org/10.5594/SMPTE.ST395.2014

SMPTE ST 400:2012, *SMPTE Labels Structure*. https://doi.org/10.5594/SMPTE.ST400.2012

SMPTE ST 2001-1:2015, *XML Representation of SMPTE Registered Data (Reg-XML) — Mapping Rules*.
https://doi.org/10.5594/SMPTE.ST2001-1.2015

SMPTE ST 2003:2012, *Types Dictionary Structure*. https://doi.org/10.5594/SMPTE.ST2003.2012

SMPTE ST 2021-2:2019, *Broadcast Exchange Format (BXF) Schema Documentation*.
https://doi.org/10.5594/SMPTE.ST2021-2.2019

SMPTE ST 2059-1:2021, *Generation and Alignment of Interface Signals to the SMPTE Epoch*.
https://doi.org/10.5594/SMPTE.ST2059-1.2021

SMPTE ST 2059-2:2021, *SMPTE Profile for Use of IEEE-1588 Precision Time Protocol in Professional Broadcast Applications*. https://doi.org/10.5594/SMPTE.ST2059-2.2021

3 Terms and Definitions

For the purposes of this document, the terms and definitions given in Clause 2 Normative References apply.

4 DMS-TLC

4.1 DMS-TLC Introduction

DMS-TLC defines an MXF Descriptive Metadata Scheme that follows the provisions of SMPTE ST 377-1:2019 MXF, including Clause 9.8 Descriptive Metadata Plugins.

DMS-TLC defines TLCTrack, TLCSequence, TLCSegment, TLCLabel, TLCItem and subclasses thereof.

DMS-TLC also defines TLCDerivedComponent, which permits instances of DMS-TLC to contain time labels that are derived from other instances, along with metadata to link to the original instance.

NOTE 1 Previous DMS specifications have not included a similar class.

DMS-TLC also defines TLCSchemeDefinition, which specifies constraints on instances of DMS-TLC. An instance of TLCSchemeDefinition can be used to specify a profile of DMS-TLC.

NOTE 2 Previous DMS specifications have not included a similar class.

4.2 DMS-TLC Overall Classes

4.2.1 Overall Class Diagram

The overall class diagram of DMS-TLC is shown in Figure 3.

This diagram shows the classes inherited from SMPTE ST 377-1 MXF and SMPTE ST 377-2 KXS unshaded.

NOTE This diagram is an overview intended to show all classes on a single page; enlarged sections of this diagram are shown in Clauses 4.3 through 4.21, 5.1 through 5.10 and 6.1 through 6.5.

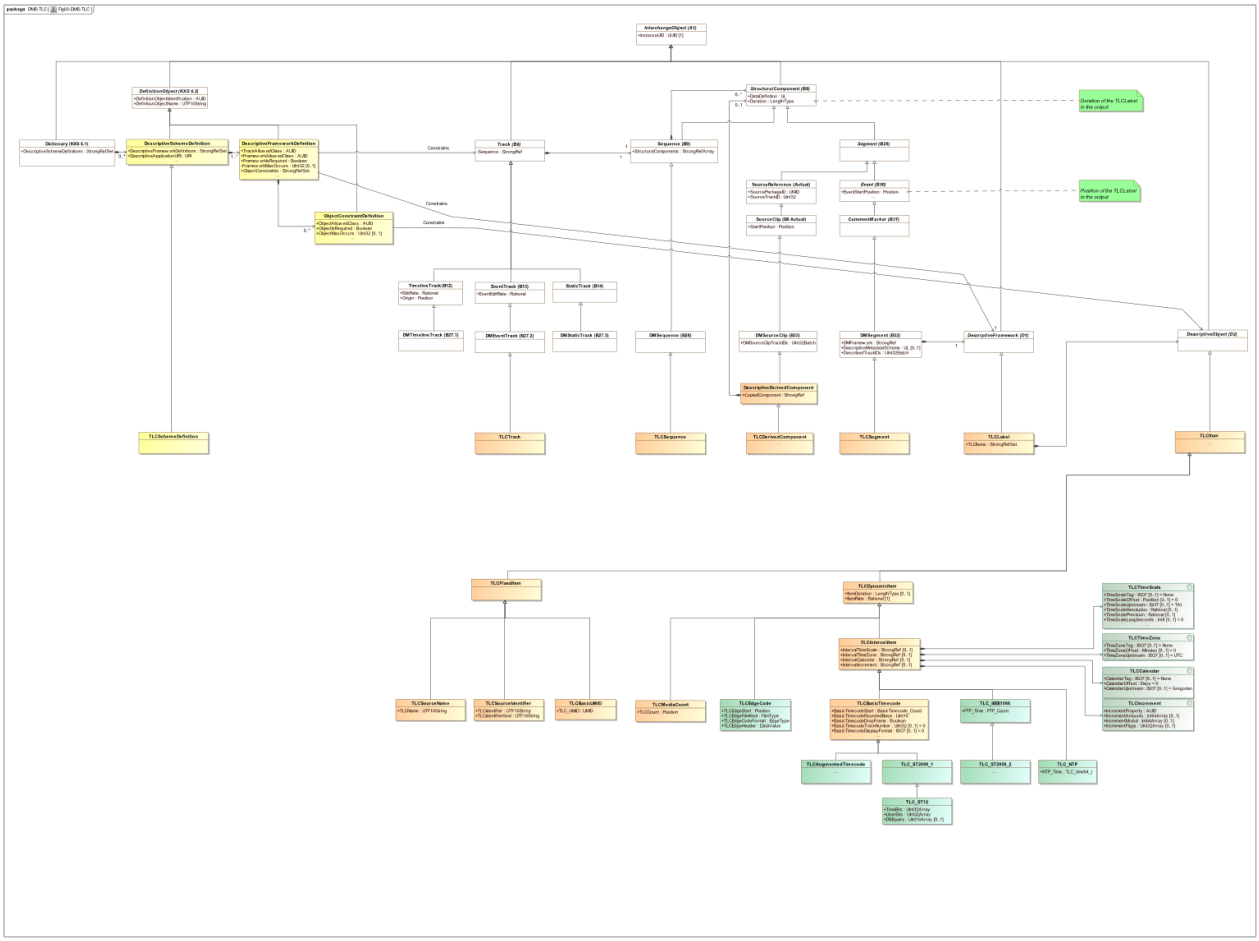

Figure 3 — DMS-TLC Overall Class Diagram

The figure shows inheritance and multiplicity of association. Inheritance is shown largely from top to bottom of Figure 3. Association and multiplicity are shown largely from left to right. The diagram also shows salient Properties of each class, but is abbreviated for clarity.

Full specifications of the classes and the Properties of each unshaded class are defined in the normative references (SMPTE ST 377-1, SMPTE ST 377-2). DMS-TLC does not change the syntax of these classes in any way.

Classes defined by this document DMS-TLC are shaded.

Classes shaded orange form the main structure of DMS-TLC and are defined in Clauses 4.3 through 4.21.

Classes shaded gray-green form mixins classes, also defined in Clause 4.

Classes shaded green form actual concrete labels. They are defined in brief in this document in Clause 5, and are expected to be developed further in additional parts of this document or related documents.

Classes shaded yellow are optional and are used to define profiles of DMS-TLC, and are defined in Clause 5.10.

Representation of the classes per SMPTE ST 377-2 KXS is specified in Clause 7.

Examples of DMS-TLC are given in Clause 8.

4.2.2 KLV Encoding of DMS-TLC

ULs are specified in the tables in Clause 4 through Clause 7.

KLV Encoding of DMS-TLC classes follows the provisions of SMPTE ST 377-1:2019 MXF Clauses 9.8.2, 9.8.3 and 9.8.4, and thus SMPTE ST 395.

Metadata set ULs are allocated under a new node DMS_TLC_Classes.

DMScheme DefinitionObject set ULs are allocated sequentially under sub-node DMS_TLC_Definition.

Structural set ULs are allocated sequentially under sub-node DMS_TLC_Structure.

Descriptive set ULs are allocated sequentially under sub-node DMS_TLC_Framework.

KLV Encoding of DMS-TLC Properties follows the provisions of SMPTE ST 335.

Property ULs are allocated sequentially under a new node DMS_TLC_Elements:

Definition Property ULs are allocated sequentially under sub-node DMS_TLC_Definition_Elements.

Structural Property ULs are allocated sequentially under sub-node DMS_TLC_Structure_Elements.

Framework Property ULs are allocated sequentially under sub-node DMS_TLC_Framework_Elements.

KLV Encoding of DMS-TLC labels follows the provisions of SMPTE ST 377-1:2019 MXF Clauses 9.8.2, 9.8.3 and 9.8.4, and thus SMPTE ST 400.

Labels are allocated under a new node DMS_TLC_Schemes under node MXFDMSStructureVersion1.

ULs for these Nodes are shown in Table 1.

KLV Encoding of DMS-TLC types follows the provisions of SMPTE ST 2003.

TypeULs are allocated sequentially under the appropriate class defined in SMPTE ST 2003.

Table 1 — TLC Node ULs

Item Name	Symbol	Kind	Item UL
DMS-TLC Classes	DMS_TLC_Classes	NODE	urn:smpte:ul:060e2b34.027f0101.0d010401.06000000
DMS-TLC Definition	DMS_TLC_Definition	NODE	urn:smpte:ul:060e2b34.027f0101.0d010401.06010000
DMS-TLC Structure	DMS_TLC_Structure	NODE	urn:smpte:ul:060e2b34.027f0101.0d010401.06020000
DMS-TLC Framework	DMS_TLC_Framework	NODE	urn:smpte:ul:060e2b34.027f0101.0d010401.06030000
DMS-TLC Elements	DMS_TLC_Elements	NODE	urn:smpte:ul:060e2b34.0101010e.04060600.00000000
DMS-TLC Definition Elements	DMS_TLC_Definition_Elements	NODE	urn:smpte:ul:060e2b34.0101010e.04060601.00000000
DMS-TLC Structure Elements	DMS_TLC_Structure_Elements	NODE	urn:smpte:ul:060e2b34.0101010e.04060602.00000000
DMS-TLC Framework Elements	DMS_TLC_Framework_Elements	NODE	urn:smpte:ul:060e2b34.0101010e.04060603.00000000
DMS-TLC Schemes	DMS_TLC_Schemes	NODE	urn:smpte:ul:060e2b34.0401010d.0d010401.06000000

4.3 Compatible Time Label Track

4.3.1 Description of the TLC Track class

The purpose of TLCTrack is to represent a sequence of collections of parts of labels that extends over a period of time.

The class diagram of CompatibleTimeLabelTrack (TLCTrack) is shown in Figure 4. Classes inherited from MXF are shown unshaded.

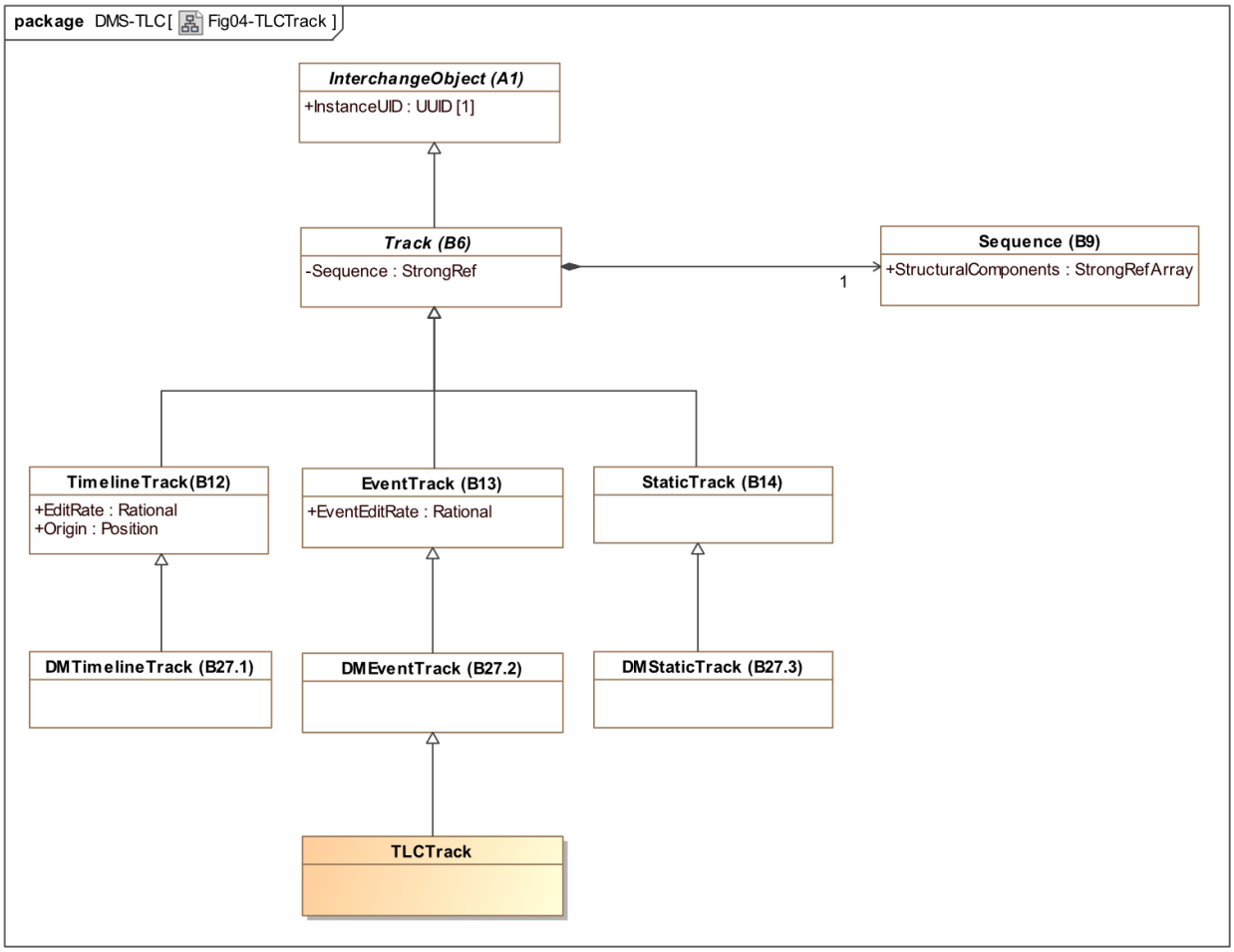

Figure 4 — TLC Track

A CompatibleTimeLabelTrack (TLCTrack) shall be a subclass of EventTrack (DM). (SMPTE ST 377-1:2019 MXF Clause B.27.2)

NOTE TimelineTrack and StaticTrack are shown for context. DMS-TLC does not use either.

4.3.2 Attributes of the TLC Track class

TLCTrack inherits all Properties of its superclasses.

Thus, a TLCTrack contains exactly one Sequence.

TLCTrack does not add any Properties.

TLCTrack obeys all normative provisions of its superclasses, and adds the following provisions:

TLCTrack::EventEditRate is inherited from EventTrack and is a required Property.

The value of EventEditRate shall not be constrained to equal the EditRate of any other Tracks within the same Package.

The preferred value of EventEditRate is {1920000000,1}, i.e., each edit unit is measured in a number of approximately 0.5 ns, which is also an integer multiple of 48kHz that is common to 24, 25 and 30 fps systems including those with fractional frame rates (1000/1001).

The value of EventEditRate may be any rational number. For example, a TLCTrack translated from a TimecodeTrack may have EventEditRate equal to TimecodeTrack::EditRate.

4.3.3 KLV Encoding of the TLC Track class

The ULs defined for TLCTrack are shown in Table 2.

The structure of the TLCTrack set is shown in Table 3.

Table 2 — TLC Track ULs

Item Name	Symbol	Kind	Item UL
TLC Track	TLCTrack	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020100

Table 3 — Elements of TLC Track Set

Symbol	Type	Len	Req?	Meaning	Default
TLCTrack	UL	16	Req	TLC Track	
Length	*BER Length*		*Req*	*Set Length*	
All items from the DMEventTrack as specified in SMPTE ST 377-1:2019 MXF Clause B.27.2					

NOTE Although SMPTE ST 377-1:2019 MXF describes EventTrack and DMEventTrack separately in Clauses B.13 and B.27.2, Table 17 in the same document gives them the same Set Key, thus they are in fact identical.

4.4 TLC Sequence

4.4.1 Description of the TLC Sequence class

The purpose of TLCSequence is to represent the sequence in which collections of parts of labels extend over a period of time.

The class diagram of TLCSequence is shown in Figure 5. Classes inherited from MXF are shown unshaded.

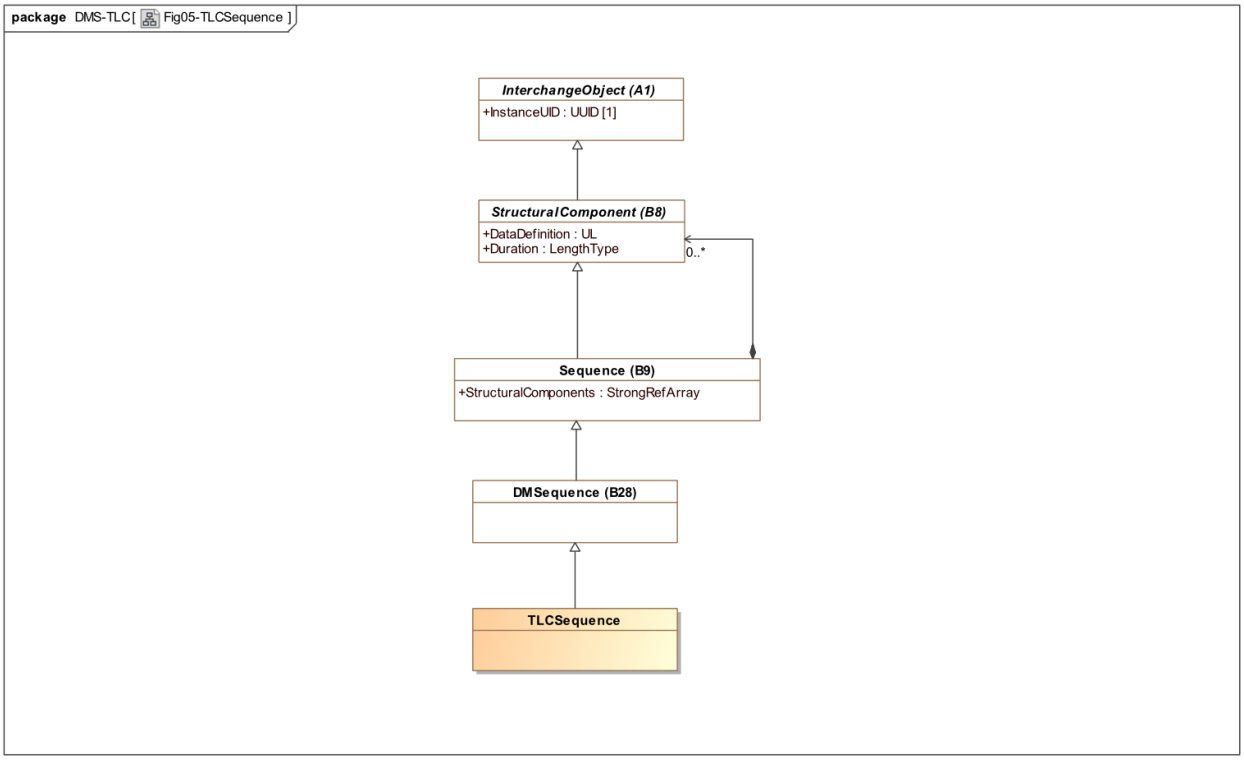

Figure 5 — TLC Sequence

TLCSequence shall be a subclass of Sequence (DM) (SMPTE ST 377-1:2019 MXF Clause B.28)

4.4.2 Attributes of the TLC Sequence class

TLCSequence inherits all Properties of its superclasses.

TLCSequence does not add any Properties.

A TLCSequence contains an ordered array of StructuralComponents.

TLCSequence adds the following constraints:

The DataDefinition Property of the TLCSequence and all StructuralComponents contained within shall be DescriptiveMetadataTrack.

The Structural Components of the Sequence shall be in ascending order of EventStartPosition.

If the Duration Property is omitted, a numeric value of 0 shall be assumed.

A numeric value of 0 shall be interpreted to mean that the Event continues until the latest EventStartPosition + Duration within the Sequence.

The following assertions shall be obeyed:

```
for( int i=0; i+1 < sizeof( TLCSequence::StructuralComponents ); i++ )

{

  assert( StructuralComponent::Duration[i] >= 0 );

  assert( Event::EventStartPosition[i+1] > Event::EventStartPosition[i] +
  StructuralComponent::Duration[i] );

}
```

NOTE Additional provisions and assertions can be added as necessary and desirable. It is important that all assertions are deterministic and can be used equally by encoders, QC tools and decoders.

4.4.3 KLV Encoding of the TLC Sequence class

The ULs defined for TLCSequence are shown in Table 4.

The structure of the TLCSequence set is shown in Table 5.

Table 4 — TLC Sequence ULs

Item Name	Symbol	Kind	Item UL
TLC Sequence	TLCSequence	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020200

Table 5 — Elements of TLC Sequence Set

Symbol	Type	Len	Req?	Meaning	Default
TLCSequence	UL	16	Req	TLC Sequence	
Length	*BER Length*		*Req*	*Set Length*	
All items from Sequence as specified in SMPTE ST 377-1:2019 MXF Clause B.9					

4.5 Descriptive Derived Component

4.5.1 Descriptive Derived Component Introduction

The purpose of DescriptiveDerivedComponent is to carry the derivation metadata that describes the provenance of a DMSegment or DMSequence and optionally to carry a copy of the Segment or Sequence.

NOTE 1 DescriptiveDerivedComponent and its contents are defined separately from TLCDerivedComponent to allow their use for other DMSes, not limited to DMS-TLC.

NOTE 2 In some applications it is desirable for the TLCLabels to be carried in several Tracks, each closely associated with the related Essence. In other applications, it is desirable for all TLCLabels to be carried in a single Track. In either case, the TLCLabels can be edited. When the SourceReference Property is used in the latter case, it permits easy update of the former case.

4.5.2 Description of the Descriptive Derived Component class

The class diagram of DescriptiveDerivedComponent is shown in Figure 6. Classes inherited from MXF are shown unshaded.

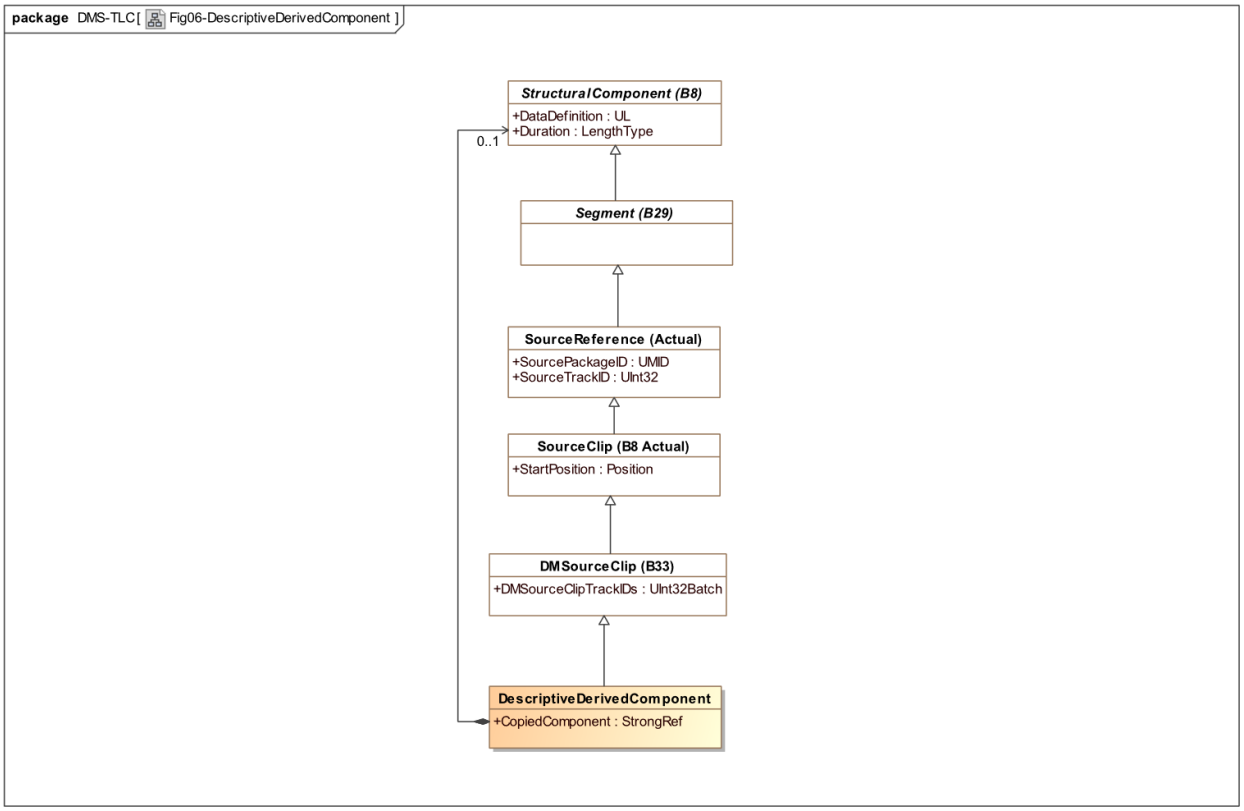

Figure 6 — Descriptive Derived Component

DescriptiveDerivedComponent shall be a subclass of DescriptiveClip as defined by SMPTE ST 377-1:2019 MXF Clause B.33.

NOTE MXF SourceClip is actually implemented in the SMPTE Groups Register as a subclass of SourceReference, which is a subclass of Segment, as shown in Figure 6.

4.5.3 Attributes of the Descriptive Derived Component class

DescriptiveDerivedComponent inherits all Properties of its superclasses.

Thus, DescriptiveDerivedComponent has DataDefinition, Duration, SourcePackageID, SourceTrackID, StartPosition and optional DMTrackIDs.

The value of StartPosition shall be interpreted relative to the edit rate of the SourcePackageID and SourceTrackID. This is in accordance with the provisions of SMPTE ST 377-1:2019 MXF Clause 9.4.2,"The MXF Timing Model."

The DataDefinition Property of DescriptiveDerivedComponent shall be DescriptiveMetadataTrack.

DescriptiveDerivedComponent adds the optional Property CopiedComponent, thus a DescriptiveDerivedComponent may contain a Component.

The value of CopiedComponent may be a DMSegment or a DMSequence.

4.5.4 KLV Encoding of the Descriptive Derived Component class

The ULs defined for DescriptiveDerivedComponent are shown in Table 6.

The structure of the DescriptiveDerivedComponent set is shown in Table 7.

Table 6 — Descriptive Derived Component ULs

Item Name	Symbol	Kind	Item UL
Descriptive Derived Component	DescriptiveDerivedComponent	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020300
Copied Component	CopiedComponent	LEAF	urn:smpte:ul:060e2b34.0101010e.04060602.02000000

Table 7 — Elements of Descriptive Derived Component Set

Symbol	Type	Len	Req?	Meaning	Default
DescriptiveDerivedComponent	UL	16	Req	DM Derived Component	
Length	*BER Length*		*Req*	*Set Length*	
All items from DescriptiveClip as specified in SMPTE ST 377-1:2019 MXF Clause B.33					
CopiedComponent	ComponentStrongReference		Opt	Component copied from original metadata	

4.6 TLC Derived Component

4.6.1 Description of the TLC Derived Component class

The purpose of TLCDerivedComponent is to carry the derivation metadata that describes the provenance of a TLCSegment or TLCSequence and optionally to carry a copy of the TLC Segment or Segments.

The class diagram of TLCDerivedComponent is shown in Figure 7. Classes inherited from MXF are shown unshaded.

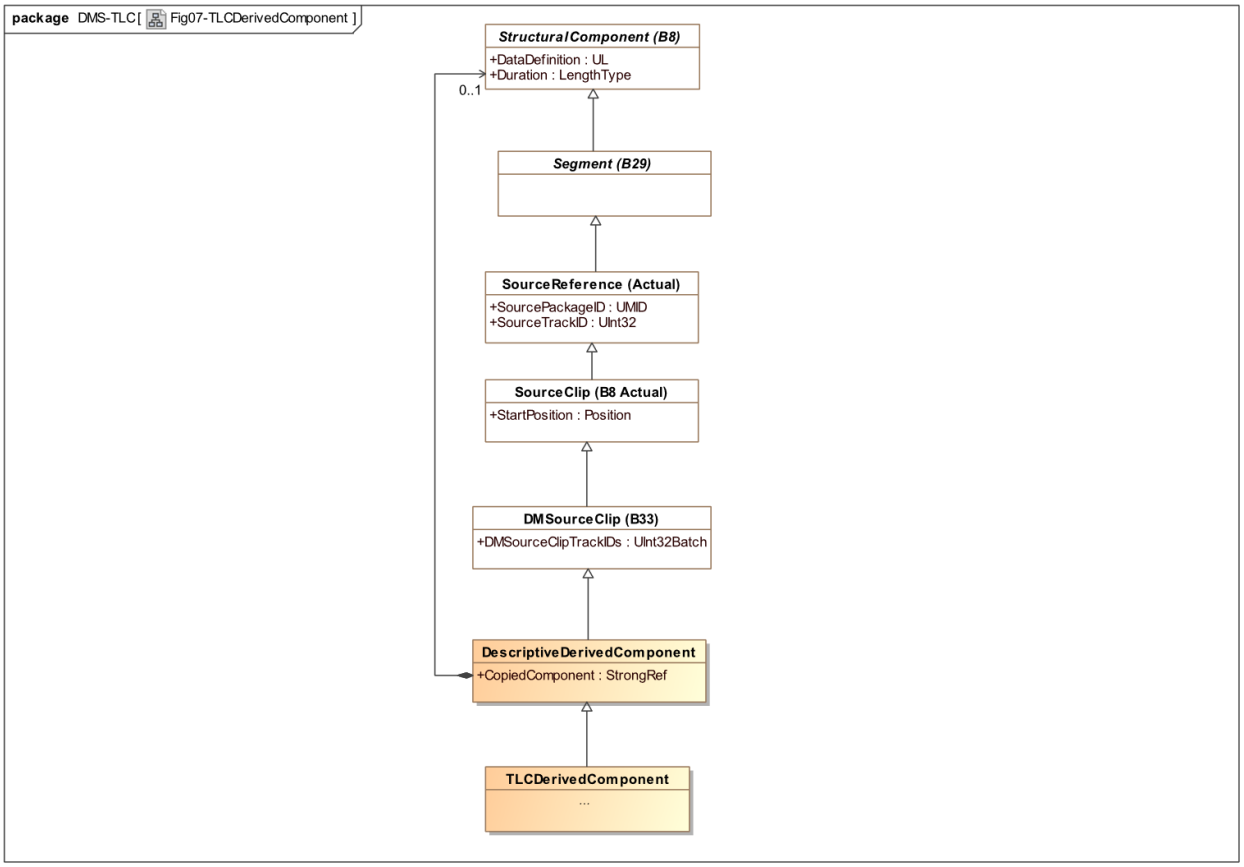

Figure 7 — TLC Derived Component

TLCDerivedComponent shall be a subclass of DescriptiveDerivedComponent.

4.6.2 Attributes of the TLC Derived Component class

TLCDerivedComponent inherits all Properties of its superclasses.

TLCDerivedComponent does not add any Properties.

If present, DescriptiveDerivedComponent::CopiedComponent shall be a StrongReference to a TLCSequence or a TLCSegment.

4.6.3 KLV Encoding of the TLC Derived Component class

The ULs defined for TLCDerivedComponent are shown in Table 8.

The structure of the TLCDerivedComponent set is shown in Table 9.

Table 8 — TLC Derived Component ULs

Item Name	Symbol	Kind	Item UL
TLC Derived Component	TLCDerivedComponent	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020400

Table 9 — Elements of TLC Derived Component Set

Symbol	Type	Len	Req?	Meaning	Default
TLCDerivedComponent	UL	16	Req	TLC Derived Component	
Length	*BER Length*		*Req*	*Set Length*	
All items from DescriptiveDerivedComponent as specified in Clause 4.5					

4.7 TLC Segment

4.7.1 Description of the TLC Segment class

The purpose of TLCSegment is to represent a collection of parts of labels.

The class diagram of TLCSegment is shown in Figure 8. Classes inherited from MXF are shown unshaded.

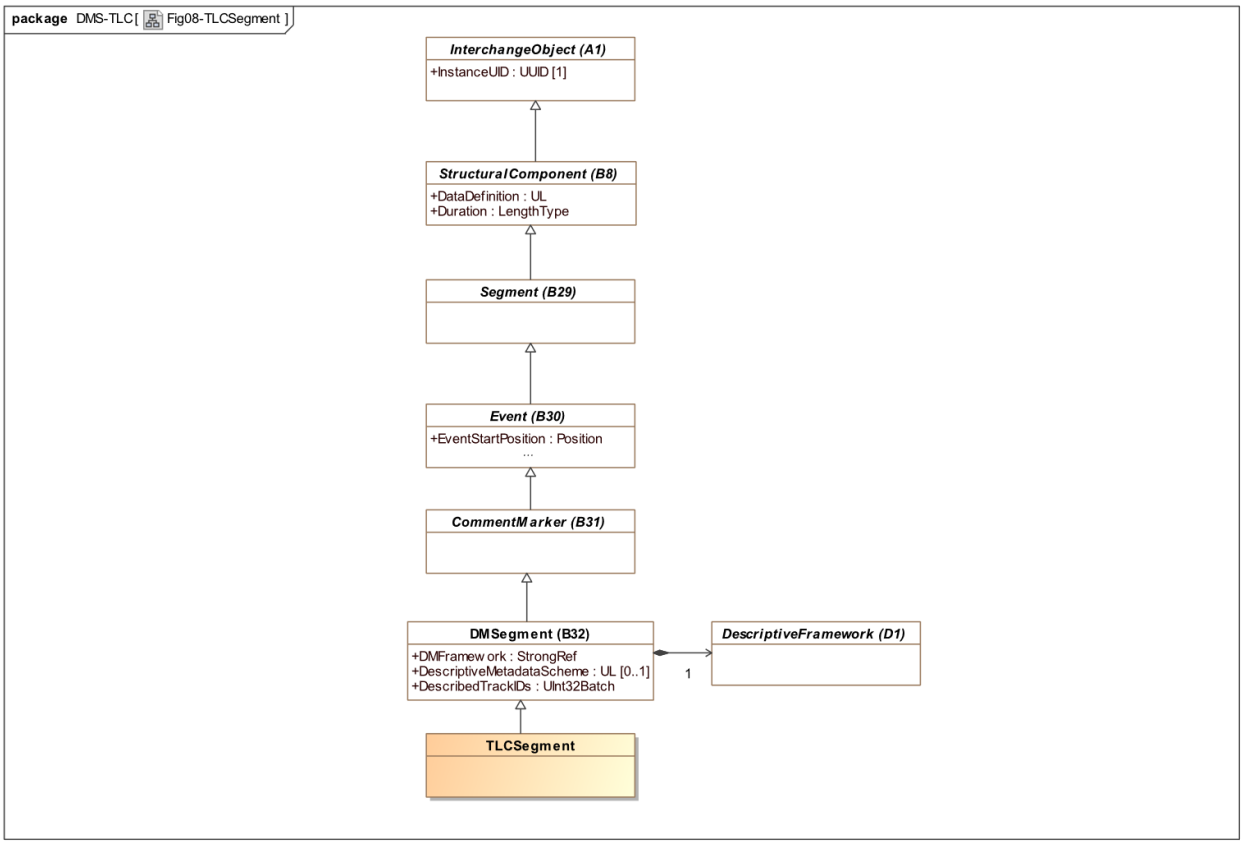

Figure 8 — TLC Segment

TLCSegment shall be a subclass of DMSegment (SMPTE ST 377-1:2019 MXF Clause B.32).

4.7.2 Attributes of the TLC Segment class

TLCSegment inherits all Properties of its superclasses.

Thus, TLCSegment has DataDefinition, Duration, EventStartPosition, DescriptiveMetadataScheme, and DescriptiveFramework Properties.

The DataDefinition Property of TLCSegment shall be DescriptiveMetadataTrack.

TLCSegment does not add any Properties.

4.7.3 KLV Encoding of the TLC Segment class

The ULs defined for TLCSegment are shown in Table 10.

The structure of the TLCSegment set is shown in Table 11.

Table 10 — TLC Segment ULs

Item Name	Symbol	Kind	Item UL
TLC Segment	TLCSegment	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020500

Table 11 — Elements of TLC Segment Set

Symbol	Type	Len	Req?	Meaning	Default
TLCSegment	UL	16	Req	TLC Segment	
Length	*BER Length*		*Req*	*Set Length*	
All items from DMSegment as specified in SMPTE ST 377-1:2019 MXF Clause B.32					

4.8 Compatible Time Label

4.8.1 Description of the TLC Label class

The purpose of TLCLabel is to represent a collection of items in labels that vary over time and that together constitute labels for Essence.

The class diagram of TLCLabel is shown in Figure 9. Cases inherited from MXF are shown unshaded.

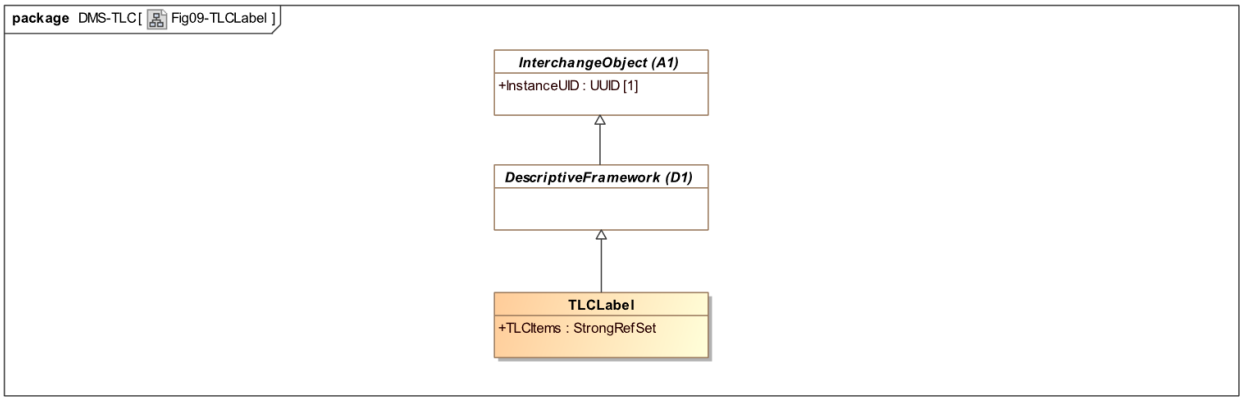

Figure 9 — TLC Label

TLCLabel shall be a subclass of DescriptiveFramework (SMPTE ST 377-1:2019 MXF Clause D.1).

4.8.2 Attributes of the TLC Label class

TLCLabel inherits all Properties of its superclasses.

TLCLabel adds a Property TLCItems of type Strong Reference Array of TLCItem.

Thus, a TLCLabel contains an unordered collection of TLCItems.

4.8.3 KLV Encoding of the TLC Label class

The ULs defined for TLCLabel are shown in Table 12.

The structure of the TLCLabel set is shown in Table 13.

Table 12 — TLC Label ULs

Item Name	Symbol	Kind	Item UL
TLC Label	TLCLabel	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020600
TLC Items	TLCItems	LEAF	urn:smpte:ul:060e2b34.0101010e.04060602.01000000

Table 13 — Elements of TLC Label Set

Symbol	Type	Len	Req?	Meaning	Default
TLCLabel	UL	16	Req	TLC Label	
Length	*BER Length*		*Req*	*Set Length*	
All items from DescriptiveFramework as specified in SMPTE ST 377-1:2019 MXF Clause D.1					
TLCItems	StrongRefArray DescriptiveObject		Req	TLC Items	

4.9 CompatibleTime Label Item

4.9.1 Description of the TLC Item class

The purpose of TLCItem is to represent portions of labels.

TLCItem shall be a subclass of DescriptiveObject (SMPTE ST 377-1:2019 MXF Clause D.2).

TLCItem inherits the Properties of its superclasses.

TLCItem does not add any Properties.

The class diagram of TLCItem is shown in Figure 10. Classes inherited from MXF are shown unshaded.

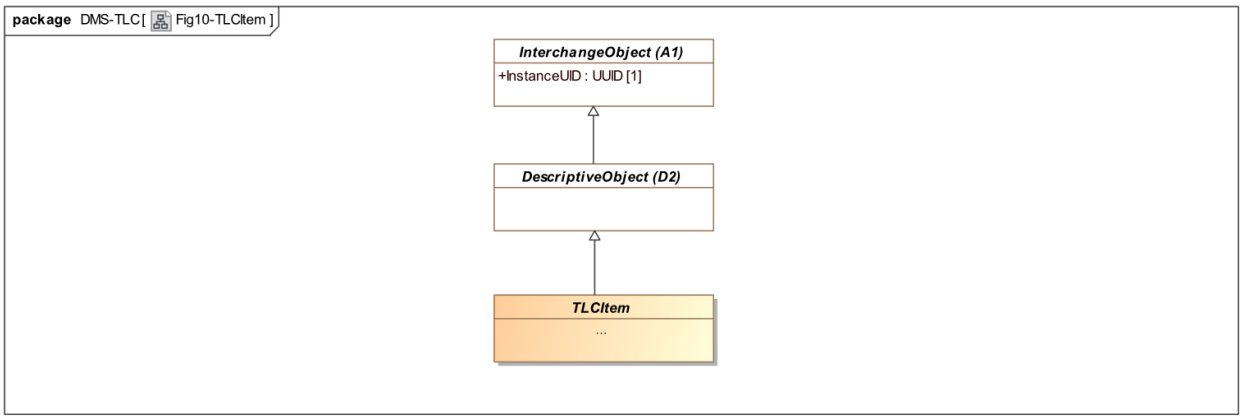

Figure 10 — TLC Item

TLCItem shall be a subclass of DescriptiveObject (SMPTE ST 377-1:2019 MXF Clause D2).

4.9.2 Attributes of the TLC Item class

TLCItem inherits all Properties of its superclasses.

TLCItem may be subclassed, and subclasses therefore inherit all Properties of TLCItem.

Subclasses may add Optional or Required Properties.

4.9.3 KLV Encoding of the TLC Item class

The ULs defined for TLCItem are shown in Table 14.

The structure of the TLCItem set is shown in Table 15.

Table 14 — TLC Item ULs

Item Name	Symbol	Kind	Item UL
TLC Item	TLCItem	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06020700

Table 15 — Elements of TLC Item Set

Symbol	Type	Len	Req?	Meaning	Default
TLCItem	UL	16	Req	TLCItem	
Length	*BER Length*		*Req*	*Set Length*	
All items from DescriptiveObject as specified in SMPTE ST 377-1:2019 MXF Clause D.2					

4.10 TLC Fixed Item

4.10.1 TLC Fixed Item Introduction

The purpose of TLCFixedItem is to represent portions of labels whose value remains unchanged throughout the duration of the event.

NOTE 1 When a TLCFixedItem is used in the Sequence of a TLCTrack, decoders can assume that the intended value remains unchanged throughout the duration of the StructuralComponent::Duration Property.

TLCFixedItem may be subclassed. Subclasses may add Optional or Required Properties.

NOTE 2 Subclasses are the place to match concrete TLXItems.

NOTE 3 The name of the subclass can be used to indicate the role that a TLCFixedItem has. For example, a subclass might be named TLCSourceName

4.10.2 Description of the TLC Fixed Item class

The class diagram of TLCFixedItem is shown in Figure 11. Classes inherited from MXF are shown unshaded.

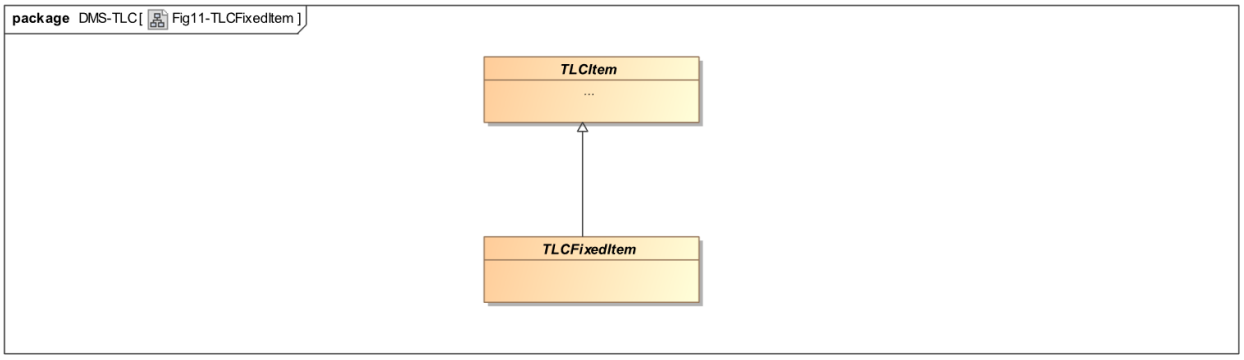

Figure 11 — TLC Fixed Item

TLCFixedItem shall be a subclass of TLCItem.

4.10.3 Attributes of the TLC Fixed Item class

TLCFixedItem inherits all Properties of its superclasses.

TLCFixedItem does not add any Properties.

4.10.4 KLV Encoding of the TLC Fixed Item class

The ULs defined for TLCFixedItem are shown in Table 16.

The structure of the TLCFixedItem set is shown in Table 17.

Table 16 — TLC Fixed Item ULs

Item Name	Symbol	Kind	Item UL
TLC Fixed Item	TLCFixedItem	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030100

Table 17 — Elements of TLC Fixed Item Set

Symbol	Type	Len	Req?	Meaning	Default
TLCFixedItem	UL	16	Req	TLC Fixed Item	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCItem as specified in Clause 4.9					

4.11 TLC Source Name

4.11.1 TLC Source Name Introduction

The purpose of TLCSourceName is to carry a source name obtained from encoder input.

TLCSourceName shall be a subclass of TLCFixedItem.

4.11.2 Description of the TLC Source Name class

The class diagram of TLCSourceName is shown in Figure 12. Classes inherited from MXF are shown unshaded.

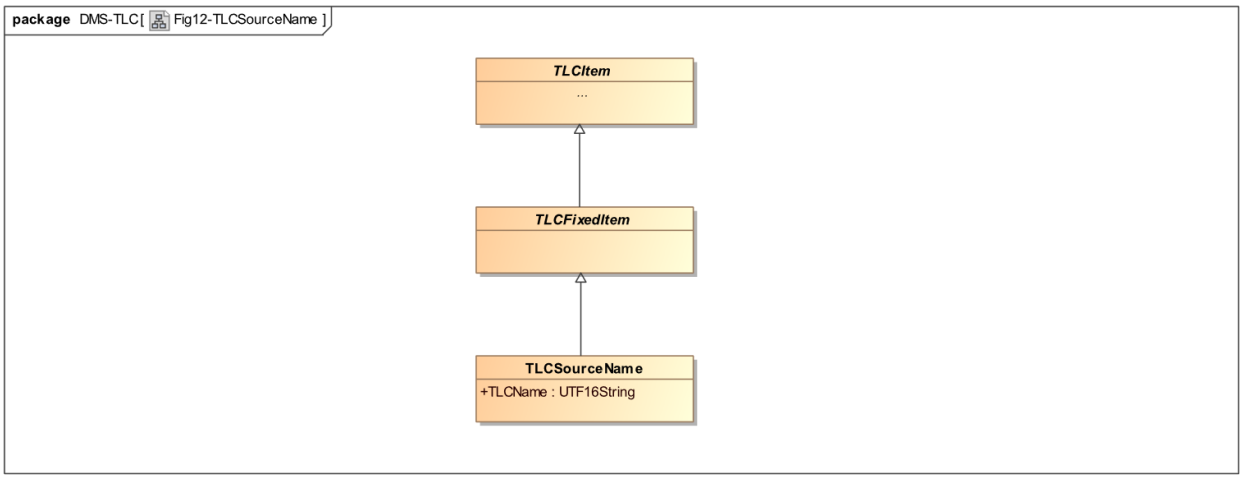

Figure 12 — TLC Source Name

TLCSourceName shall be a subclass of TLCFixedItem.

4.11.3 Attributes of the TLC Source Name class

TLCSourceName inherits all Properties of its superclasses.

TLCSourceName adds the following Property:

TLCName – type UTF16String – the source name.

4.11.4 KLV Encoding of the TLC Source Name class

The ULs defined for TLCSourceName are shown in Table 18.

The structure of the TLCSourceName set is shown in Table 19.

Table 18 — TLC Source Name ULs

Item Name	Symbol	Kind	Item UL
TLC Source Name	TLCSourceName	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030200
TLC Name	TLCName	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.01000000

Table 19 — Elements of TLC Source Name Set

Symbol	Type	Len	Req?	Meaning	Default
TLCSourceName	UL	16	Req	TLCSourceName	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCFixedItem as specified in Clause 4.10					
TLCName	UTF16String	Var	Req	TLC Name	

4.12 TLC Source Identifier

4.12.1 Description of the TLC Source Identifier class

The purpose of TLCSourceIdentifier is to carry a source identifier obtained from encoder input.

TLCSourceIdentifier shall be a subclass of TLCFixedItem.

The class diagram of TLCSourceIdentifier is shown in Figure 13. Classes inherited from MXF are shown unshaded.

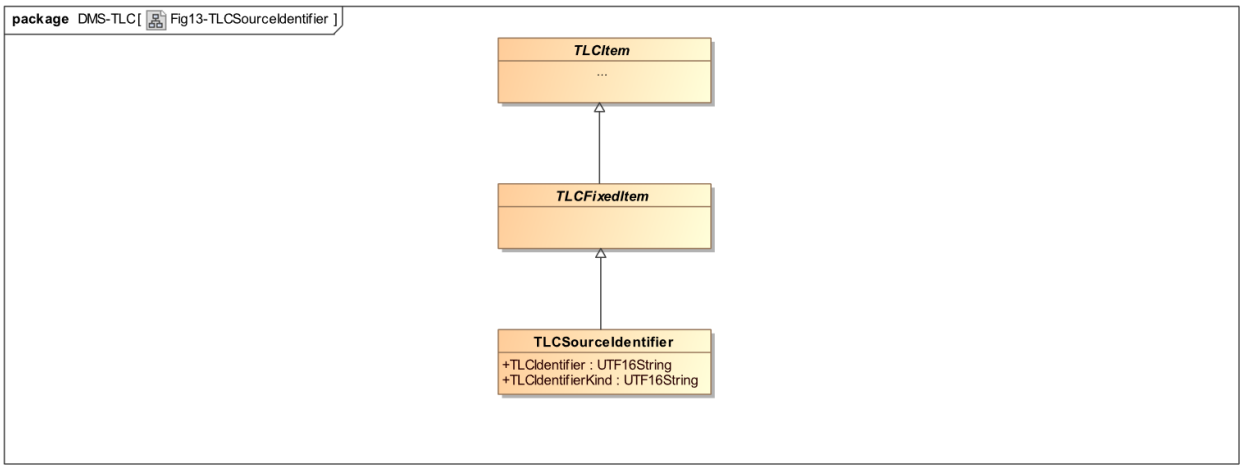

Figure 13 — TLC Source Identifier

TLCSourceIdentifier shall be a subclass of TLCFixedItem.

4.12.2 Attributes of the TLC Source Identifier class

TLCSourceIdentifier inherits all Properties of its superclasses.

TLCSourceIdentifier adds the following Properties:

TLCIdentifier – type UTF16String – the actual identifier

TLCIdentifierKind – type UTF16String – the kind of identifier

NOTE TLCSourceIdentifier is intended to carry any identifier that can be represented in SMPTE ST 2021-1 Broadcast Exchange Format.

4.12.3 KLV Encoding of the TLC Source Identifier class

The ULs defined for TLCSourceIdentifier are shown in Table 20.

The structure of the TLCSourceIdentifier set is shown in Table 21.

Table 20 — TLC Source Identifier ULs

Item Name	Symbol	Kind	Item UL
TLC Source Identifier	TLCSourceIdentifier	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030300
TLC Identifier	TLCIdentifier	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.02000000
TLC Identifier Kind	TLCIdentifierKind	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.03000000

Table 21 — Elements of TLC Source Identifier Set

Symbol	Type	Len	Req?	Meaning	Default
TLCSourceIdentifier	UL	16	Req	TLC Source Identifier	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCFixedItem as specified in Clause 4.10					
TLCIdentifier	UTF16String	16	Req	TLC Identifier	
TLCIdentifierKind	UTF16String	16	Req	TLC Identifier Kind	

4.13 TLC Basic UMID

4.13.1 Description of the TLC Basic UMID class

TLC_BasicUMID shall be a subclass of TLCFixedItem.

The class diagram of TLC_BasicUMID is shown in Figure 14. Classes inherited from MXF are shown unshaded.

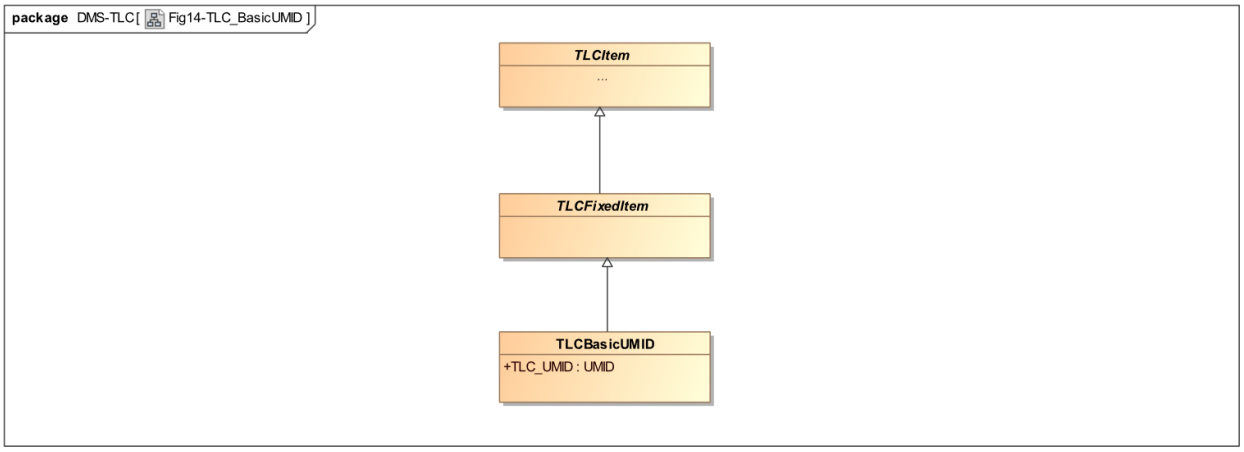

Figure 14 — TLC Basic UMID

TLC_BasicUMID shall be a subclass of TLCFixedItem.

4.13.2 Attributes of the TLC Basic UMID class

TLC_BasicUMID inherits all Properties of its superclasses.

TLC_BasicUMID adds the following Property:

TLC_UMID – type UMID – a basic UMID per SMPTE ST 330

4.13.3 KLV Encoding of the TLC Basic UMID class

The ULs defined for TLC_BasicUMID are shown in Table 22.

The structure of the TLC_BasicUMID set is shown in Table 23.

Table 22 — TLC Basic UMID ULs

Item Name	Symbol	Kind	Item UL
TLC Basic UMID	TLC_BasicUMID	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030400
TLC UMID	TLC_UMID	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.04000000

Table 23 — Elements of TLC Basic UMID Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_BasicUMID	UL	16	Req	TLC Basic UMID	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCFixedItem as specified in Clause 4.10					
TLC_UMID	UMID	32	Req	TLC UMID	

4.14 TLC Dynamic Item

4.14.1 Description of the TLC Dynamic Item class

The purpose of TLCDynamicItem is to represent time labels whose value increases regularly over the duration of the event.

The class diagram of TLCDynamicItem is shown in Figure 15. Classes inherited from MXF are shown unshaded.

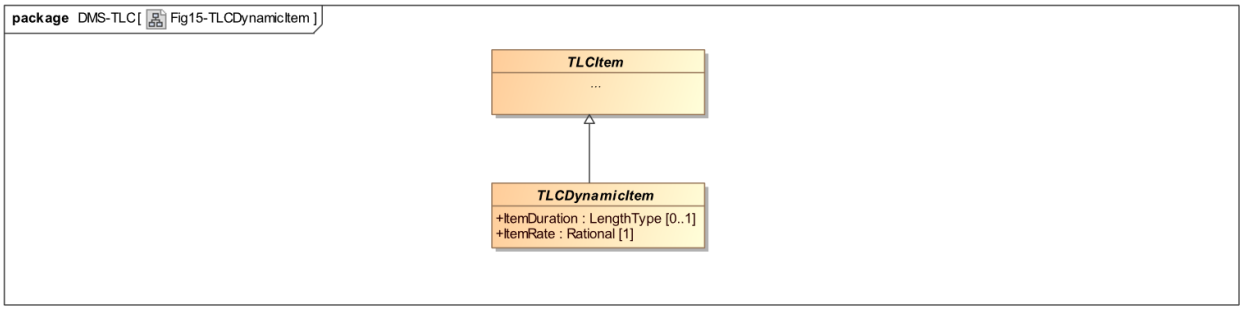

Figure 15 — TLC Dynamic Item

TLCDynamicItem shall be a subclass of TLCItem.

4.14.2 Attributes of the TLC Dynamic Item class

TLCDynamicItem inherits all Properties of its superclasses.

TLCDynamicItem adds the following Properties:

ItemRate – type Rational

ItemDuration – optional, type LengthType

The temporal duration of a TLCDynamicItem equals ItemDuration divided by ItemRate, and is therefore measured in seconds.

NOTE 1 ItemRate is independent of the TLCTrack::EventEditRate. Therefore, incrementing values (for example, SMPTE ST 12) can be used in Tracks of a higher, lower, or equal EditRate.

TLCDynamicItem may be subclassed. Subclasses may add Optional or Required Properties.

NOTE 2 Some concrete subclasses of TLCDynamicItem are specified in Clause 5. Other documents can also specify subclasses, which might match subclasses of TLXItem currently under development by 32NF.

NOTE 3 The name of the subclass can be used to indicate the role played by a TLCDynamicItem. For example, a subclass might be named TLCBasicTimecode.

NOTE 4 When a TLCDynamicItem is used in the Sequence of a TLCTrack, decoders can expect that the intended value of the ordinal Property of the concrete subclass increases by 1 at each ItemRate interval throughout the duration of the StructuralComponent::Duration.

4.14.3 KLV Encoding of the TLC Dynamic Item class

The ULs defined for TLCDynamicItem are shown in Table 24.

The structure of the TLCDynamicItem set is shown in Table 25.

Table 24 — TLC Dynamic Item ULs

Item Name	Symbol	Kind	Item UL
TLC Dynamic Item	TLCDynamicItem	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500
Item Rate	ItemRate	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.05000000
Item Duration	ItemDuration	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.06000000

Table 25 — Elements of TLC Dynamic Item Set

Symbol	Type	Len	Req?	Meaning	Default
TLCDynamicItem	UL	16	Req	TLC Dynamic Item	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCItem as specified in Clause 4.9					
ItemRate	Rational	8	Req	Item Rate	
ItemDuration	LengthType	8	Opt	Item Duration	1

4.15 TLC Media Count

4.15.1 Description of the TLC Media Count class

The purpose of TLCMediaCount is to represent time label items whose value is an incrementing integer with a specified starting number.

TLCMediaCount shall be a subclass of TLCDynamicItem.

The class diagram of TLCMediaCount is shown in Figure 16. Classes inherited from MXF are shown unshaded.

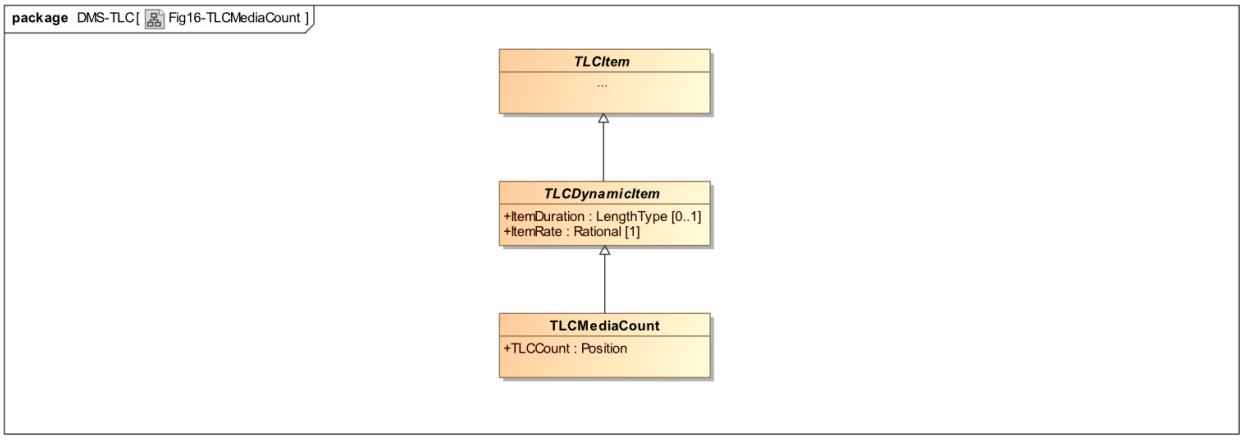

Figure 16 — TLC Media Count

TLCMediaCount shall be a subclass of TLCDynamicItem.

4.15.2 Attributes of the TLC Media Count class

TLCMediaCount inherits all Properties of its superclasses.

TLCMediaCount adds the following Property:

TLCCount – type PositionType – the actual starting count.

4.15.3 KLV Encoding of the TLC Media Count class

The ULs defined for TLCMediaCount are shown in Table 26.

The structure of the TLCMediaCount set is shown in Table 27.

Table 26 — TLC Media Count ULs

Item Name	Symbol	Kind	Item UL
TLC Media Count	TLCMediaCount	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030600
TLC Count	TLCCount	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.07000000

Table 27 — Elements of TLC Media Count Set

Symbol	Type	Len	Req?	Meaning	Default
TLCMediaCount	UL	16	Req	TLC Media Count	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCDynamicItem as specified in Clause 4.14					
TLCCount	PositionType	8	Req	TLC Count	

4.16 TLC Interval Item

4.16.1 Description of the TLC Interval Item class

The purpose of TLCIntervalItem is to represent time label items whose value is composed of several concatenated fields, and increases regularly over the duration of the event.

TLCIntervalItem shall be a subclass of TLCDynamicItem.

The class diagram of TLCIntervalItem is shown in Figure 17. Classes inherited from MXF are shown unshaded.

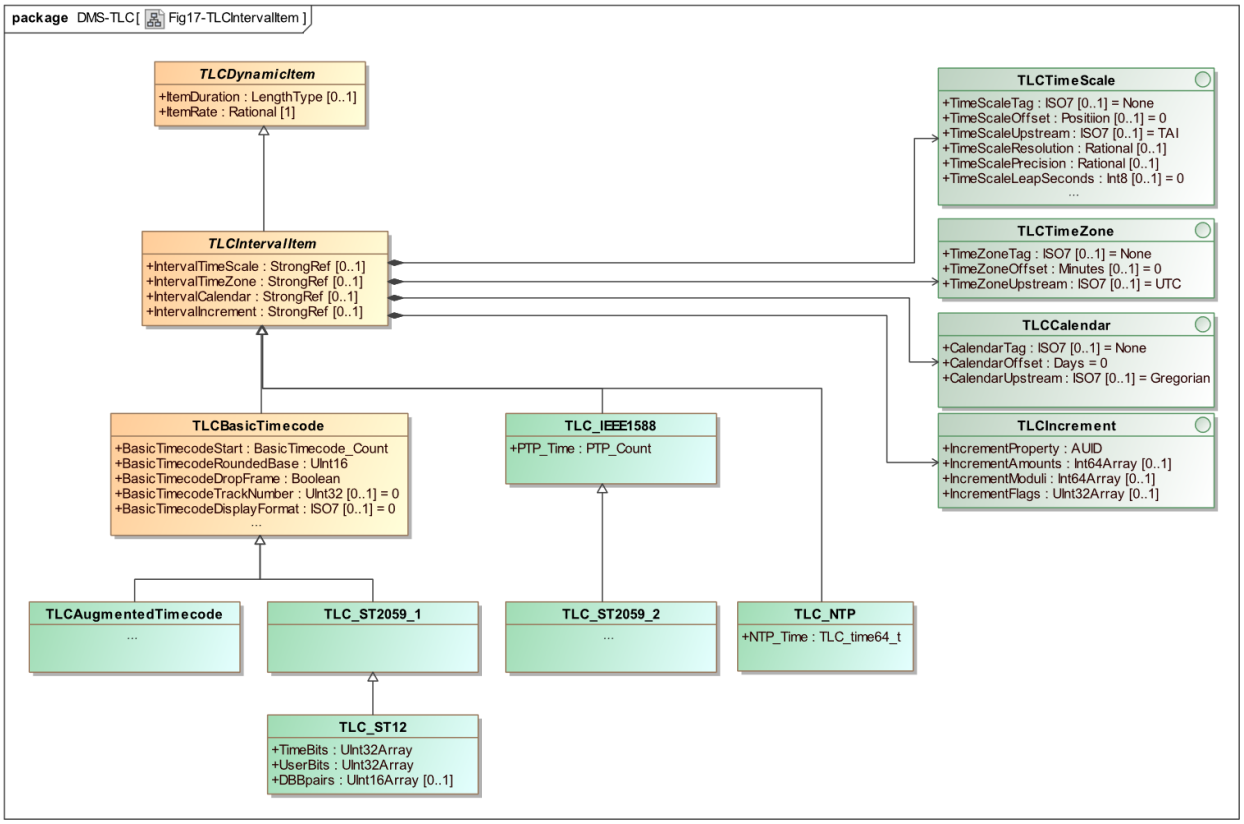

Figure 17 — TLC Interval Item

TLCIntervalItem shall be a subclass of TLCDynamicItem.

4.16.2 Attributes of the TLC Interval Item class

TLCIntervalItem inherits all Properties of its superclasses.

TLCIntervalItem adds the following optional Properties:

IntervalIncrement – optional, type TLCIncrementStrongReference.

IntervalTimeScale – optional, type TLCTimeScaleStrongReference.

IntervalTimeZone – optional, type TLCTimeZoneStrongReference.

IntervalCalendar – optional, type TLCCalendarStrongReference.

The value of the ordinal Property of the concrete subclass of TLCIntervalItem shall be stored as an offset relative to the origin of any TimeScale, TimeZone or Calendar that was known when the Item was created. If no origin is specified, the implied offset is 0.

For example, if a Timecode was created in the CET time zone at a local time of midday, with an ItemRate of 25/1, the value of BasicTimecodeStart would be 11*60*60*25.

4.16.3 KLV Encoding of the TLC Interval Item class

The ULs defined for TLCIntervalItem are shown in Table 28.

The structure of the TLCIntervalItem set is shown in Table 29.

Table 28 — TLC Interval Item ULs

Item Name	Symbol	Kind	Item UL
TLC Interval Item	TLCIntervalItem	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.060 30700
Interval Increment	IntervalIncrement	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.080 00000
Interval Time Scale	IntervalTimeScale	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.090 00000
Interval Time Zone	IntervalTimeZone	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0a0 00000
Interval Calendar	IntervalCalendar	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0b0 00000
TLC Increment Strong Reference	TLCIncrementStrong Reference	LEAF	urn:smpte:ul:060e2b34.01040101.05023700.000 00000
TLC TimeScale Strong Reference	TLCTimeScaleStrong Reference	LEAF	urn:smpte:ul:060e2b34.01040101.05023800.000 00000
TLC Time Zone Strong Reference	TLCTimeZoneStrong Reference	LEAF	urn:smpte:ul:060e2b34.01040101.05023900.000 00000
TLC Calendar Strong Reference	TLCCalendarStrong Reference	LEAF	urn:smpte:ul:060e2b34.01040101.05023a00.000 00000

Table 29 — Elements of TLC Interval Item Set

Symbol	Type	Len	Req?	Meaning	Default
TLCIntervalItem	UL	16	Req	TLC Interval Item	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCDynamicItem as specified in Clause 4.14					
IntervalTimeScale	StrongRef TLCTimeScale	16	Opt	Interval Time Scale	As defined by concrete subclass
IntervalTimeZone	StrongRef TLCTimeZone	16	Opt	Interval Time Zone	As defined by concrete subclass
IntervalCalendar	StrongRef TLCCalendar	16	Opt	Interval Calendar	As defined by concrete subclass
IntervalIncrement	StrongRef TLCIncrement	16	Opt	Interval Increment	As defined by concrete subclass

4.17 TLC Increment

4.17.1 Description of the TLC Increment class

The purpose of TLCIncrement is to specify the algorithm by which a member of a subclass of TLCIntervalItem increases regularly over the duration of the event.

TLCIncrement shall be a subclass of InterchangeObject.

The class diagram of TLCIncrement is shown in Figure 18.

Classes inherited from MXF are shown unshaded.

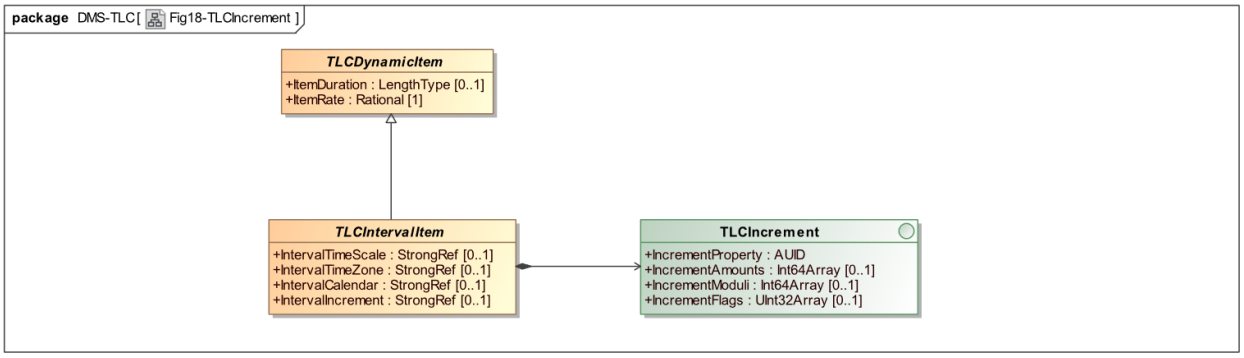

Figure 18 — TLC Increment

TLCIncrement shall be a subclass of InterchangeObject.

4.17.2 Attributes of the TLC Increment class

TLCIncrement adds the following Properties:

IncrementProperty – type AUID.

IncrementAmounts – type Int64Array (explicit).

IncrementModuli – type Int64Array (explicit).

IncrementFlags – type UInt32Array (explicit).

NOTE 1 When a TLCIntervalItem is used in the Sequence of a TLCTrack, decoders can expect that the intended value starts equal to value specified in the subclass, and at each ItemRate interval throughout the duration of the StructuralComponent::Duration Property, the intended value is increased by the IncrementAmounts one member at a time from the last to the first member, modulus the corresponding member of IncrementModuli. In this context, modulus means that when a changed member exceeds the IncrementModuli member, the corresponding member of the value is reduced by the IncrementModuli member and the value of the next (last to first) member is increased by 1, and this algorithm is applied iteratively.

EXAMPLE
For example, a clock time could be represented by a Record with fields Hours Minutes Seconds Microseconds, IncrementAmounts {0,0,0,1} and IncrementModuli {24,60,60,1000000}.

NOTE 2 The algorithm described above does not address cases where there are unpredictable discontinuities in the incrementation such as leap seconds or daily jam. In such cases it is recommended that when an Event is expected to cross a discontinuity, it is represented instead as two Events, the first addressing the period up to the discontinuity, the second addressing the period from the discontinuity onwards.

NOTE 3 The algorithm described above does not address cases where there are programmatic discontinuities in the incrementation, such as the SMPTE ST 12 Drop Frame provisions. In such cases, it is recommended that a decoder is advised of the expected discontinuity by defining a subclass with an appropriate Property such as:
TLCBasicTimecode::TLCBasicTimecodeDropFrame and adjusts the algorithm accordingly.

NOTE 4 This document does not define algorithms for specifying discontinuities, whether they be programmatic or unpredictable; these specifications must come from other standards that can be referenced from this one.

4.17.3 KLV Encoding of the TLC Increment class

The ULs defined for TLCIncrement are shown in Table 30.

The structure of the TLCIncrement set is shown in Table 31.

Table 30 — TLC Interval Item ULs

Item Name	Symbol	Kind	Item UL
TLC Increment	TLCIncrement	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00
Increment Property	IncrementProperty	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0c000000
Increment Amounts	IncrementAmounts	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0d000000
Increment Moduli	IncrementModuli	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0e000000
Increment Flags	IncrementFlags	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.0f000000

Table 31 — Elements of TLC Increment Set

Symbol	Type	Len	Req?	Meaning	Default
TLCIncrement	UL	16	Req	TLC Increment	
Length	*BER Length*		*Req*	*Set Length*	
All items from InterchangeObject as specified in SMPTE ST 377-1:2019 MXF Clause A.1					
IncrementProperty	AUID	16	Req	Increment Property	
IncrementAmounts	Int64Array	8 + 8 * N	Opt	Increment Amount	
IncrementModuli	Int64Array	8 + 8 * N	Opt	Increment Moduli	
IncrementFlags	UInt32Array	8 + 4 * N	Opt	Increment Flags	

4.18 TLC Time Scale

4.18.1 Description of the Time Scale class

The purpose of TLCTimeScale is to specify the absolute time origin in which a TLCItem was created.

TLCTimeScale shall be a subclass of InterchangeObject.

The class diagram of TLCTimeScale is shown in Figure 19. Classes inherited from MXF are shown unshaded.

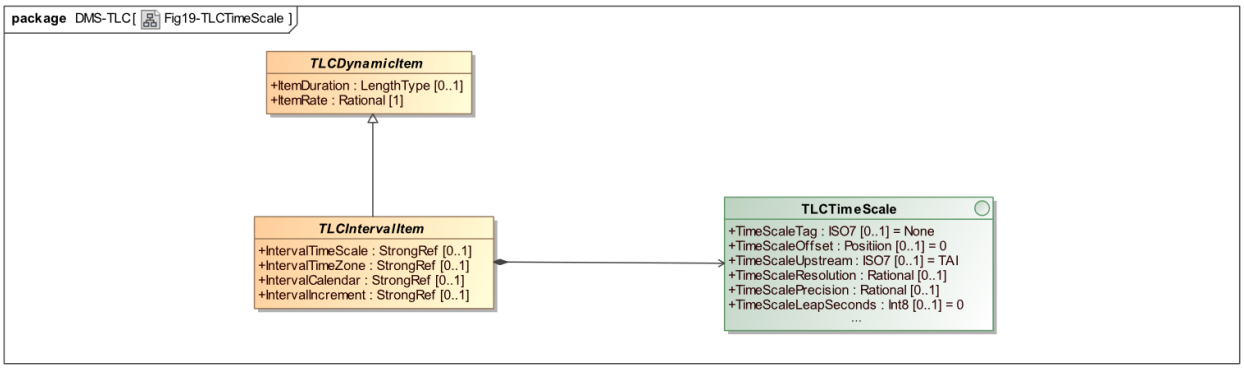

Figure 19 — TLC Time Scale

TLCTimeScale shall be a subclass of InterchangeObject.

4.18.2 Attributes of the TLC Time Scale class

TLCTimeScale adds the following Properties:

TimeScaleTag – optional, type ISO7 (enumerated).

TimeScaleOffset– optional, type PositionType.

TimeScaleUpstream– optional, type ISO7 (enumerated).

TimeScaleResolution – optional, type Rational.

TimeScalePrecision – optional, type Rational.

TimeScaleLeapSeconds – type Int8.

TimeScaleTag and TimeScaleUpstream are enumerated ISO7 strings. Known values should be registered in the SMPTE Types Register. Defined values are listed in Table 32.

If TimeScaleTag equals Unknown or None, TimeScaleOffset shall not be present.

The value of TimeScaleOffset is the number of edit units that are added to the offset of the TimeScaleUpstream to determine the time origin in the time scale in which a TLCItem was created.

The value of TimeScaleResolution is the smallest number of edit units that was possible for the encoder to resolve when creating a TLCItem.

The value of TimeScalePrecision is the standard deviation of the number of edit units offset from the StartPosition that decoders can expect when evaluating multiple TLCItems.

The value of TimeScaleLeapSeconds is the number of seconds that are added to the offset of the TimeScaleUpstream to determine the time origin in the time scale in which a TLCItem was created.

Table 32 — Enumerated Known Values of Time Scale Tag Type

Value	Symbol	Detail	Reference Doc
Unknown	Unknown	The time scale origin in which a TLCItem was created is not known	
None	None	Times are not specified relative to any origin	
TAI	TAI	The time scale origin is ISO TAI	ISO TAI

4.18.3 KLV Encoding of the TLC Time Scale class

The ULs defined for TLCTimeScale are shown in Table 33.

The structure of the TLCTimeScale set is shown in Table 34.

Table 33 — TLC Time Scale ULs

Item Name	Symbol	Kind	Item UL
TLCTimeScale	TLCTimeScale	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00
Time Scale Tag	TimeScaleTag	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.10000000
Time Scale Offset	TimeScaleOffset	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.11000000
Time Scale Upstream	TimeScaleUpstream	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.12000000
Time Scale Resolution	TimeScaleResolution	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.13000000
Time Scale Precision	TimeScalePrecision	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.14000000
Time Scale Leap Seconds	TimeScaleLeapSeconds	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.15000000

Table 34 — Elements of TLC Time Scale Set

Symbol	Type	Len	Req?	Meaning	Default
TLCTimeScale	UL	16	Req	TLC Time Scale	
Length	*BER Length*		*Req*	*Set Length*	
All items from InterchangeObject as specified in SMPTE ST 377-1:2019 MXF Clause A.1					
TimeScaleTag	TimeScaleTagType	N	Opt	Time Scale Tag	Unknown
TimeScaleOffset	PositionType	8	Opt	Time Scale Offset	0
TimeScaleUpstream	TimeScaleTagType	N	Opt	Time Scale Upstream Tag	TAI
TimeScaleResolution	Rational	8	Opt	Time Scale Resolution	
TimeScalePrecision	Rational	8	Opt	Time Scale Precision	
TimeScaleLeapSeconds	Int8	1	Opt	TimeScaleLeapSeconds	0

4.19 TLC Time Zone

4.19.1 Description of the Time Zone class

The purpose of TLCTimeZone is to specify the TimeZone in which a TLCItem was created.

TLCTimeZone shall be a subclass of InterchangeObject.

The class diagram of TLCTimeZone is shown in Figure 20.

Classes inherited from MXF are shown unshaded.

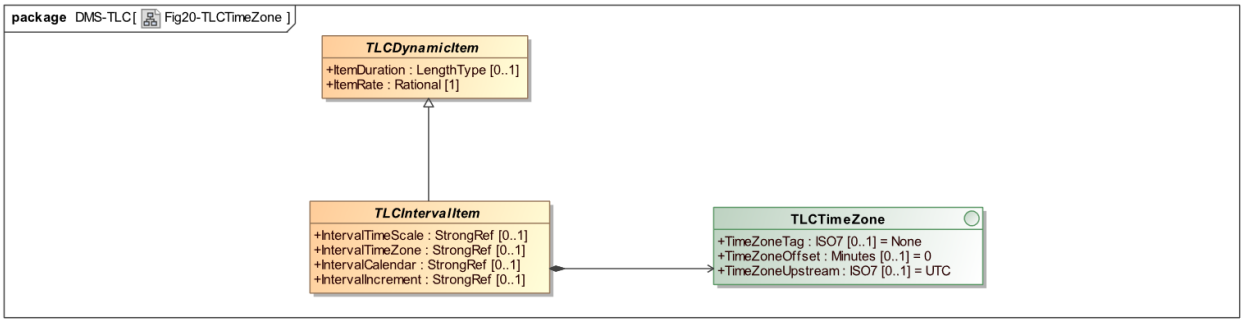

Figure 20 — TLC Time Zone

TLCTimeZone shall be a subclass of InterchangeObject.

4.19.2 Attributes of the TLC Time Zone class

TLCTimeZone adds the following Properties:

TimeZoneTag– type ISO7 (enumerated).

TimeZoneOffset – type Int32.

TimeZoneUpstream– type ISO7 (enumerated).

TimeZoneTag and TimeZoneUpstream are enumerated ISO7 strings. Known values should be registered in the SMPTE Types Register. Defined values are listed in the IANA time zone database, and in Table 35.

If TimeZoneTag equals Unknown or None, TimeZoneOffset shall not be present.

The value of TimeZoneOffset is the number of minutes that are added to the offset of the TimeZoneUpstream to determine the time zone offset in the calendar in which a TLCItem was created.

Table 35 — Enumerated Known Values of Time Zone Tag Type

Value	Symbol	Detail	Reference Doc
Unknown	Unknown	The time zone in which a TLCItem was created is not known	
None	None	Times are not specified relative to any time zone	
UTC	UTC	Times are specified according to UTC	ISO 8601

4.19.3 KLV Encoding of the TLC Time Zone class

The ULs defined for TLCTimeZone are shown in Table 36.

The structure of the TLCTimeZone set is shown in Table 37.

Table 36 — TLC Time Zone ULs

Item Name	Symbol	Kind	Item UL
TLC Time Zone	TLCTimeZone	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030f00
Time Zone Tag	TimeZoneTag	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.16000000
Time Zone Offset	TimeZoneOffset	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.17000000
Time Zone Upstream	TimeZoneUpstream	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.18000000

Table 37 — Elements of TLC Time Zone Set

Symbol	Type	Len	Req?	Meaning	Default
TLCTimeZone	UL	16	Req	TLC Time Zone	
Length	*BER Length*		*Req*	*Set Length*	
All items from InterchangeObject as specified in SMPTE ST 377-1:2019 MXF Clause A.1					
TimeZoneTag	TimeZoneTagType	N	Opt	Time Zone Tag	Unknown
TimeZoneOffset	Int32	4	Opt	Time Zone Offset measured in Minutes	0
TimeZoneUpstream	TimeZoneTagType	N	Opt	TimeZoneUpstream	UTC

4.20 TLC Calendar

4.20.1 Description of the Calendar class

The purpose of TLCCalendar is to specify the calendar in use when a TLCItem was created.

TLCCalendar shall be a subclass of InterchangeObject.

The class diagram of TLCCalendar is shown in Figure 21.

Classes inherited from MXF are shown unshaded.

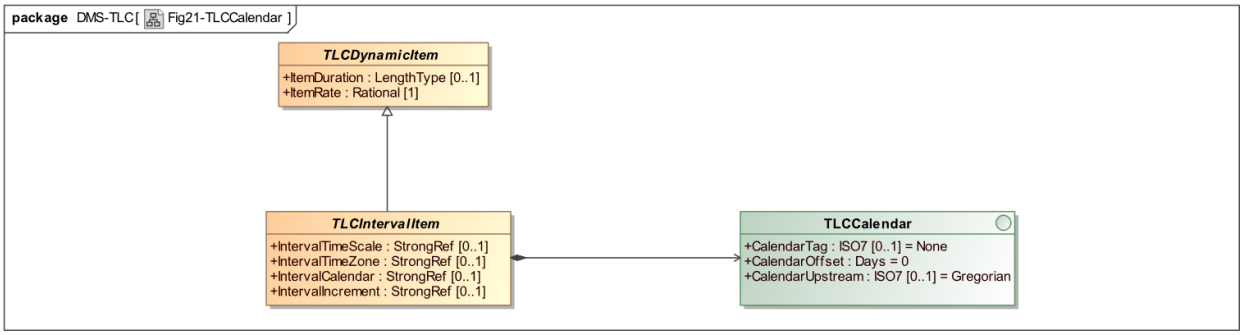

Figure 21 — TLC Calendar

TLCCalendar shall be a subclass of InterchangeObject.

4.20.2 Attributes of the TLC Calendar class

TLCCalendar adds the following Properties:

CalendarTag– type ISO7 (enumerated).

CalendarOffset – type Int32.

CalendarUpstream– type ISO7 (enumerated).

CalendarTag and CalendarUpstream are enumerated ISO7 strings. Known values should be registered in the SMPTE Types Register. Defined values are listed in Table 38.

If CalendarTag equals Unknown or None, CalendarOffset shall not be present.

The value of CalendarOffset is the number of days that are added to the day number of the CalendarUpstream to determine the day number in the calendar in which a TLCItem was created.

Table 38 — Enumerated Known Values of Calendar Tag Type

Value	Symbol	Detail	Reference Doc
Unknown	Unknown	The calendar in which a TLCItem was created is not known	
None	None	Dates are not specified in any calendar	
Gregorian	Gregorian	Dates are specified relative to the Gregorian calendar	ISO 8601

4.20.3 KLV Encoding of the TLC Calendar class

The ULs defined for TLCCalendar are shown in Table 39.

The structure of the TLCCalendar set is shown in Table 40.

Table 39 — TLC Calendar ULs

Item Name	Symbol	Kind	Item UL
TLC Calendar	TLCCalendar	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06031000
Calendar Tag	CalendarTag	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.19000000
Calendar Offset	CalendarOffset	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1a000000
Calendar Upstream	CalendarUpstream	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1b000000

Table 40 — Elements of TLC Calendar Set

Symbol	Type	Len	Req?	Meaning	Default
TLCCalendar	UL	16	Req	TLC Calendar	
Length	*BER Length*		*Req*	*Set Length*	
All items from InterchangeObject as specified in SMPTE ST 377-1:2019 MXF Clause A.1					
CalendarTag	CalendarTagType	N	Opt	Calendar Tag	Unknown
CalendarOffset	Int32	4	Opt	Calendar Offset measured in Days	0
CalendarUpstream	CalendarTagType	N	Opt	Calendar Upstream Tag	Gregorian

4.21 TLC Basic Timecode

4.21.1 Description of the TLC BasicTimecode class

The purpose of TLCBasicTimecode is to represent the fundamental attributes of SMPTE ST 12 time bits as used in TimecodeComponent (SMPTE ST 377-1:2019 MXF Clause B.17).

TLCBasicTimecode shall be a subclass of TLCIntervalItem.

TLCBasicTimecode inherits all Properties of its superclasses; in particular it inherits ItemRate.

The class diagram of TLCBasicTimecode is shown in Figure 22.

Classes inherited from MXF are shown unshaded.

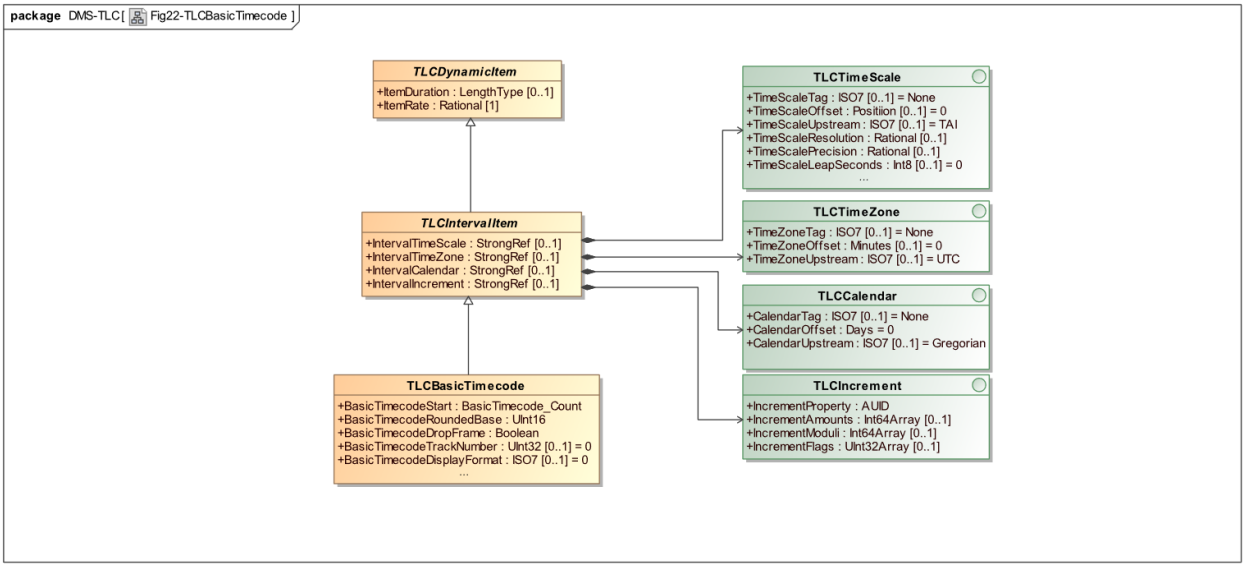

Figure 22 — TLC Basic Timecode

TLCBasicTimecode shall be a subclass of TLCIntervalItem.

TLCBasicTimecode provides functionality as defined in TimecodeComponent (MXF B.17).

TLCBasicTimecode may be subclassed.

4.21.2 Attributes of the TLC BasicTimecode class

TLCBasicTimecode inherits all Properties of its superclasses.

TLCBasicTimecode adds the following Properties:

BasicTimecodeStart – type BasicTimecode_Count – the number of frames.

BasicTimecodeRoundedBase – UInt16.

BasicTimecodeDropFrame – Boolean.

BasicTimecodeTrackNumber – optional, type UInt32.

BasicTimecodeDisplayFormat – optional, type ISO7 string (enumerated) – the preferred display format, for example SMPTE ST 258.

In a TLCBasicTimecode, the type of BasicTimecodeStart is BasicTimecode_Count , which is a Record with one member Frames, which is of type PositionType (which is Int64). A value of 0 shall be interpreted to mean midnight in an unspecified time zone with an unspecified epoch.

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = BasicTimecodeStart

IncrementAmounts = { 1 }

IncrementModuli = { 0 }

IncrementFlags = { 0 } unless overridden by BasicTimecodeDropFrame = true, in which case IncrementFlags = { 1 }

When TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass are not present, applications shall assume the following values:

TimeScaleUpstream = None

TimeZoneUpstream = None

CalendarUpstream = None

NOTE 1 The definition of TLCBasicTimecode is chosen to match the usage of MXF TimecodeComponent.

NOTE 2 The use of the PositionType type is chosen to match the type of TimecodeComponent::StartPosition.

NOTE 3 ItemRate is independent of the TLCTrack::EventEditRate. Therefore, incrementing values of TLCBasicTimecode can be used in TLCTracks of a higher, lower, or equal EditRate.

The optional BasicTimecodeTrackNumber may be used to discriminate between multiple timecode items in a single TLCLabel. BasicTimecodeTrackNumber is an unsigned integer. When a TLCBasicTimecode is constructed from an MXF Timecode Track (MXF B.15), BasicTimecodeTrackNumber should be set equal to the GenericTrack TrackNumber Property.

It is the responsibility of an application to represent BasicTimecodeStart in a formatted text representation. Applications may interpret the optional BasicTimecodeDisplayFormat to select a display format.

BasicTimecodeDisplayFormat is an enumerated ISO7 string. Known values should be registered in the SMPTE Types Register. The known values are listed in Table 41.

Table 41 — Enumerated Known Values of Basic Timecode Display Format

Value	Symbol	Detail	Reference Doc
Unknown	Unknown	No recommended text format is known	
ST258	ST258	Text HH:MM:SSpFF as in SMPTE ST 258:2004 Clause 8	SMPTE ST 258

4.21.3 KLV Encoding of the TLC BasicTimecode class

The ULs defined for TLCBasicTimecode are shown in Table 42.

The structure of the TLCBasicTimecode set is shown in Table 43.

Table 42 — TLC Basic Timecode ULs

Item Name	Symbol	Kind	Item UL
TLC Basic Timecode	TLCBasicTimecode	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800
Basic Timecode Start	BasicTimecodeStart	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1c000000
Basic Timecode Rounded Base	BasicTimecodeRoundedBase	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1d000000
Basic Timecode Drop Frame	BasicTimecodeDropFrame	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1e000000
Basic Timecode Track Number	BasicTimecodeTrackNumber	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.1f000000
Basic Timecode Display Format	BasicTimecodeDisplayFormat	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.20000000
Basic Timecode Count	BasicTimecode_Count	LEAF	urn:smpte:ul:060e2b34.01040101.03011100.00000000

Table 43 — Elements of TLC Basic Timecode Set

Symbol	Type	Len	Req?	Meaning	Default
TLCBasicTimecode	UL	16	Req	TLCBasicTimecode	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCIntervalItem as specified in Clause 4.16					
BasicTimecodeStart	BasicTimecode_Count	8	Req	Timecode Start	
BasicTimecodeRoundedBase	UInt16	2	Req	Rounded Base	
BasicTimecodeDropFrame	Boolean	1	Req	Drop Frame Flag	
BasicTimecodeTrackNumber	UInt32	4	Opt	Basic Timecode Track Number	0
BasicTimecodeDisplayFormat	UInt8	1	Opt	Basic Timecode Display Format	SMPTE ST 258

5 Additional Concrete Classes and Extensions

5.1 General Principles of TLC Extension

Per SMPTE ST 377-1:2019 MXF Clause 9.3 and Annex A.1, DMS-TLC may be extended by the addition of optional Properties, or by the definition of additional subclasses, that can define additional optional or required Properties.

Extension classes of TLCDynamicItem and TLCIntervalItem are shown in Figure 23 and defined in Clauses 5.4 through 5.10. Further extension classes can be defined in other documents or in revisions of this document.

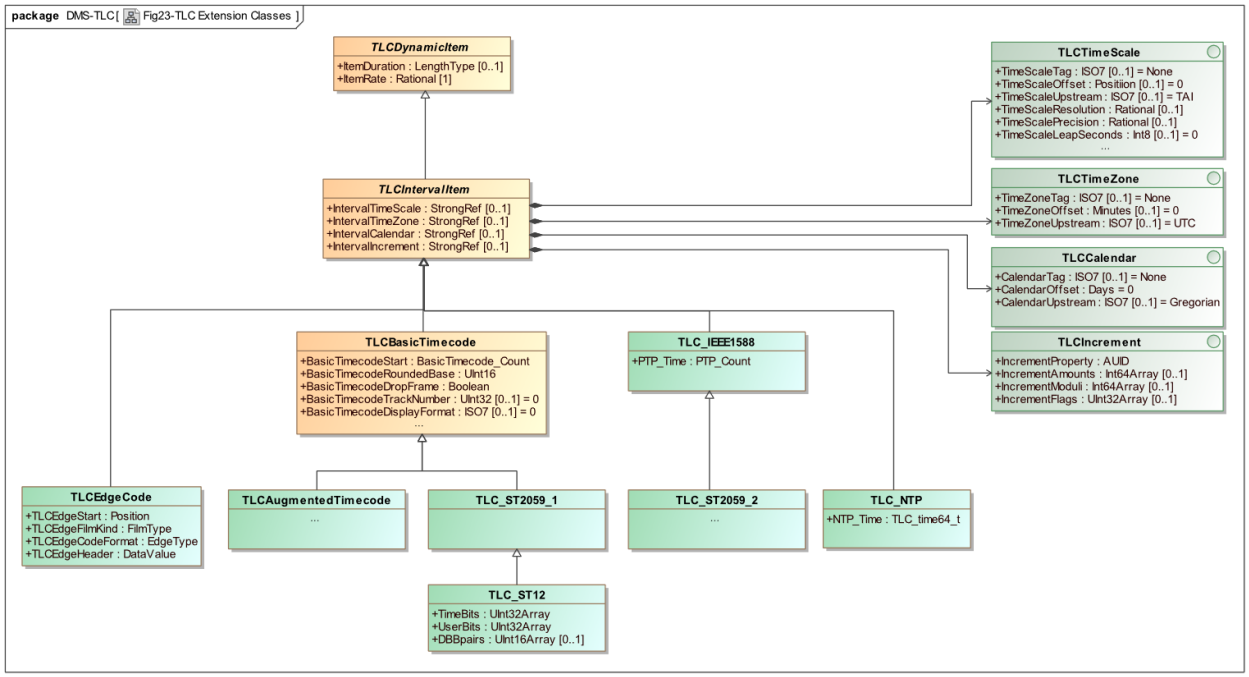

Figure 23 — TLC Extension Classes

Extension optional Properties need not be registered in the SMPTE Elements Register, and need not be represented in SMPTE ST 377-2 KXS. In this case, the specification of unregistered extensions will not be known to other implementations.

Extension classes and their Properties and types should be registered. When the assigned ULs are in SMPTE ST 377-2 KXS Classes 1 to 13, extension classes and their Properties and types shall be registered.

It is recommended that KXS definitions are defined for all extension Properties, extension classes, and extension types. Per SMPTE ST 377-2 KXS, the definitions may be carried in the Extensions Header of MXF files, or they may be published elsewhere.

5.2 Extensions of TLC Fixed Item

Extension classes of TLCFixedItem can be defined to represent time label components that are fixed for the entire duration of the TLCSegment in which they are contained.

For example, an application might desire a time label that includes a text name, or a numeric shelf number, or other item.

The name of the extension class should be chosen to reflect the role of the time label component.

The time label component can be a previously registered Element.

The actual Type can be any registered type, including a previously registered Type.

If a TLCSchemeDefinition is present, the class, multiplicity and type of the time label component should be specified in an instance of ObjectConstraint.

5.3 Extensions of TLC Dynamic Item and TLC Interval Item

Several extension classes are defined in brief in Clauses 5.4 through 5.10.

Other extension classes may be added, for example, subclasses of TLCIntervalItem to model SMPTE ST 262 Binary Groups of Time and Control Codes — Storage and Transmission of Data.

5.4 TLC Edge Code

5.4.1 Description of the TLC Edge Code class

The purpose of TLCEdgeCode is to represent labels that correspond to SMPTE ST 254, SMPTE ST 270, and SMPTE ST 271 Manufacturer-Printed Latent Image Identification Information.

The class diagram of TLCEdgeCode is shown in Figure 23.

Classes inherited from MXF are shown unshaded.

TLCEdgeCode shall be a subclass of TLCIntervalItem.

5.4.2 Attributes of the TLC Edge Code class

TLCEdgeCode inherits all Properties of its superclasses.

TLCEdgeCode adds the following Properties:

TLCEdgeStart – type PositionType – the starting number of the edge code.

TLCEdgeFilmKind – type FilmType – an enumerated value specifying the film type.

TLCEdgeCodeFormat – type EdgeType – an enumerated value specifying the type of edge code.

TLCEdgeHeader – type DataValue – the character value that precedes the incrementing edge code.

Values of these Properties can be obtained from the human-readable key number as specified in Clauses 6.6.1 and 6.6.3 of ST254:2008, ST270:2008 and ST 271:2008 (these three standards are identical in this respect) .

5.4.3 KLV Encoding of the TLC Edge Code class

The ULs defined for TLCEdgeCode are shown in Table 44.

The structure of the TLCEdgeCode set is shown in Table 45.

Table 44 — TLC Edge Code ULs

Item Name	Symbol	Kind	Item UL
TLC Edge Code	TLCEdgeCode	LEAF	urn:smpte:ul:060e2b34.027f0101.0d01040 1.06030900
TLC Edge Start	TLCEdgeStart	LEAF	urn:smpte:ul:060e2b34.0101010e.0406060 3.21000000
TLC Edge Film Kind	TLCEdgeFilmKind	LEAF	urn:smpte:ul:060e2b34.0101010e.0406060 3.22000000
TLC Edge Code Format	TLCEdgeCodeFormat	LEAF	urn:smpte:ul:060e2b34.0101010e.0406060 3.23000000
TLC Edge Header	TLCEdgeHeader	LEAF	urn:smpte:ul:060e2b34.0101010e.0406060 3.24000000

Table 45 — Elements of TLC Edge Code Set

Symbol	Type	Len	Req?	Meaning	Default
TLCEdgeCode	UL	16	Req	TLC Edge Code	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCIntervalItem as specified in Clause 4.16					
TLCEdgeStart	PositionType	8	Req	TLC Edge Start	
TLCEdgeFilmKind	FilmType	1	Req	TLC Edge Film Kind	
TLCEdgeCodeFormat	EdgeType	1	Req	TLC Edge Code Format	
TLCEdgeHeader	DataValue	Var	Req	TLC Edge Header	

NOTE The length of Type DataValue is given by the L of the KLV. The value itself does not include an 8-byte header.

5.5 TLC Augmented Timecode

5.5.1 Description of the TLC Augmented Timecode class

The purpose of TLCAugmentedTimecode is to represent attributes of variants of the SMPTE ST 12 time bits, as used in SMPTE ST 12-1, SMPTE ST 12-2 and SMPTE ST 12-3, and in SMPTE ST 309.

The class diagram of TLCAugmentedTimecode is shown in Figure 23. Classes inherited from MXF are shown unshaded.

TLCAugmentedTimecode shall be a subclass of TLCBasicTimecode.

5.5.2 Attributes of the TLC Augmented Timecode class

TLCAugmentedTimecode inherits all Properties of its superclasses.

TLCAugmentedTimecode adds no Properties.

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = BasicTimecodeStart

IncrementAmounts = { 1 }

IncrementModuli = { 0 }

IncrementFlags = { 0 } unless overridden by BasicTimecodeDropFrame = true, in which case IncrementFlags = { 1 }

When TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass are not present, applications shall assume the following values:

TimeScaleUpstream = TAI

TimeZoneUpstream = UTC

CalendarUpstream = Gregorian

5.5.3 KLV Encoding of the TLC Augmented Timecode class

The ULs defined for TLCAugmentedTimecode are shown in Table 46.

The structure of the TLCAugmentedTimecode set is shown in Table 47.

Table 46 — TLC Augmented Timecode ULs

Item Name	Symbol	Kind	Item UL
TLC Augmented Timecode	TLCAugmentedTimecode	LEAF	urn:smpte:ul:060e2b34.027f0101.0d 010401.06030a00

Table 47 — Elements of TLC Augmented Timecode Set

Symbol	Type	Len	Req?	Meaning	Default
TLCAugmentedTimecode	UL	16	Req	TLC Augmented Timecode	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCBasicTimecode as specified in Clause 4.21					

5.6 TLC ST2059-1

5.6.1 Description of the TLC ST2059-1 class

The purpose of TLC_ST2059_1 is to specify a timecode that complies with SMPTE ST 2059-1.

The class diagram of TLC_ST2059_1 is shown in Figure 23. Classes inherited from MXF are shown unshaded.

TLC_ST2059_1 shall be a subclass of TLCBasicTimecode.

5.6.2 Attributes of the TLC ST2059-1 class

TLC_ST2059_1 adds no Properties:

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = BasicTimecodeStart

IncrementAmounts = { 1 }

IncrementModuli = { 0 }

IncrementFlags = { 0 } unless overridden by BasicTimecodeDropFrame = true, in which case IncrementFlags = { 1 }

When TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass are not present, applications shall assume the following values:

TimeScaleUpstream = ST309

TimeZoneUpstream = ST309

CalendarUpstream = ST309

5.6.3 KLV Encoding of the TLC ST2059-1 class

The ULs defined for TLC_ST2059_1 are shown in Table 48.

The structure of the TLC_ST2059_1 set is shown in Table 49.

Table 48 — TLC ST2059-1 ULs

Item Name	Symbol	Kind	Item UL
TLC ST2059-1	TLC_ST2059_1	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030b00

Table 49 — Elements of TLC ST2059-1 Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_ST2059_1	UL	16	Req	TLC ST2059-1	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCBasicTimecode as specified in Clause 4.21					

5.7 TLC IEEE1588

5.7.1 Description of the TLC IEEE 1588 class

The purpose of TLC_IEEE1588 is to specify an IntervalItem that complies with SMPTE ST 2059-2.

The class diagram of TLC_IEEE1588 is shown in Figure 23. Classes inherited from MXF are shown unshaded.

TLC_IEEE1588 shall be a subclass of TLCIntervalItem.

5.7.2 Attributes of the TLC IEEE 1588 class

TLC_IEEE1588 adds the following Property:

PTP_Time – type PTP_Count

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = BasicTimecodeStart

IncrementAmounts = { 0, 1 }

IncrementModuli = { 0, 10 ^ 9 }

IncrementFlags = { 0 }

In the case of TLC_IEEE1588, the type of PTP_Time is PTP_Count , which is a Record with two members, of type Int48 and UInt32.

TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass shall not be present, and applications shall assume the following values:

TimeScaleUpstream = TAI

TimeZoneUpstream = None

CalendarUpstream = None

5.7.3 KLV Encoding of the TLC IEEE 1588 class

The ULs defined for TLC_IEEE1588 are shown in Table 50.

The structure of the TLC_IEEE1588 set is shown in Table 51.

Table 50 — TLC IEEE1588 ULs

Item Name	Symbol	Kind	Item UL
TLC IEEE1588	TLC_IEEE1588	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06030c00
PTP Time	PTP_Time	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.25000000
PTP Record	PTP_Count	LEAF	urn:smpte:ul:060e2b34.01040101.03011200.00000000
UInt48	UInt48	LEAF	urn:smpte:ul:060e2b34.01040101.01010900.00000000
Int48	Int48	LEAF	urn:smpte:ul:060e2b34.01040101.01010a00.00000000

Table 51 — Elements of TLC IEEE1588 Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_IEEE1588	UL	16	Req	TLC IEEE1588	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCIntervalItem as specified in Clause 4.16					
PTP_Time	PTP_Count	10	Req	PTP Time	

5.8 TLC_ST12

5.8.1 Description of the TLC ST12 class

The purpose of TLC_ST12 is to represent attributes of variants of the SMPTE ST 12 time bits, as used in SMPTE ST 12-1, SMPTE ST 12-2, SMPTE ST 12-3, and in SMPTE ST 309.

In particular, TLC_ST12 adds Properties to specify Date and Time Zone Information, and to state the time epoch (the time instant that corresponds to TLCValue == 0).

NOTE 1 The application of the Binary Groups to carry a second incrementing timecode can be addressed by including a second TLC_ST12 in the TLCSegment.

NOTE 2 This document does not define specific epochs; these specifications must come from other standards that can be referenced from this one.

The class diagram of TLC_ST12 is shown in Figure 23.

Classes inherited from MXF are shown unshaded.

TLC_ST12 shall be a subclass of TLC_ST2059_1.

5.8.2 Attributes of the TLC ST12 class

TLC_ST12 inherits all Properties of its superclasses.

TLC_ST12 adds the following Properties:

TimeBits – an array of UInt32 – each value shall be the 8 binary groups of each frame of the time address bits.

UserBits – an array of UInt32 – each value shall be the 8 binary groups of each frame of the timecode binary groups.

DBBPairs – type array of UInt16 – each value shall specify the Distributed Binary Bits DBB1 and DBB2 for a frame.

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = BasicTimecodeStart

IncrementAmounts = { 1 }

IncrementModuli = { 0 }

IncrementFlags = { 0 } unless overridden by BasicTimecodeDropFrame = true, in which case IncrementFlags = { 1 }

When TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass are not present, applications shall assume the following values:

TimeScaleUpstream = None

TimeZoneUpstream = None

CalendarUpstream = None

5.8.3 KLV Encoding of the TLC ST12 class

The ULs defined for TLC_ST12 are shown in Table 52.

The structure of the TLC_ST12 set is shown in Table 53.

Table 52 — TLC ST12 ULs

Item Name	Symbol	Kind	Item UL
TLC ST12	TLC_ST12	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06031100
Time Bits – Time Address	TimeBits	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.26000000
User Bits – Binary Groups	UserBits	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.27000000
DBB Pairs	DBBPairs	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.28000000

Table 53 — Elements of TLC ST12 Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_ST12	UL	16	Req	TLC Augmented Timecode	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLC_ST2059_1 as specified in Clause 5.6					
TimeBits	UInt32Array	8 + 4 * N	Req	Time Bits – Time Address	
UserBits	UInt32Array	8 + 4 * N	Req	User Bits – Binary Groups	
DBBPairs	UInt16Array	8 + 2 * N	Req	DBB Pairs	

5.9 TLC ST 2059-2

5.9.1 Description of the TLC ST2059-2 class

The purpose of TLC_ST2059_2 is to represent an ST2059-2:2021 Time as an IEEE1588 PTP time.

The class diagram of TLC_ST2059_2 is shown in Figure 23. Classes inherited from MXF are shown unshaded.

TLC_ST2059_2 shall be a subclass of TLC_IEEE1588.

5.9.2 Attributes of the TLC ST2059-2 class

TLC_ST2059_2 inherits all Properties of its superclasses.

TLC_ST2059_2 adds no Properties.

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = PTP_Time

IncrementAmounts = { 0, 1 }

IncrementModuli = { 0, 10 ^ 9 }

IncrementFlags = { 0 }

TimeZone, and Calendar of the TLCIntervalItem superclass shall not be present, and applications shall assume the following values:

TimeZoneUpstream = None

CalendarUpstream = None

5.9.3 KLV Encoding of the TLC ST2059-2 class

The ULs defined for TLC_ST2059_2 are shown in Table 54.

The structure of the TLC_ST2059_2 set is shown in Table 55.

Table 54 — TLC ST2059-2 ULs

Item Name	Symbol	Kind	Item UL
TLC ST2059-2	TLC_ST2059_2	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06031200

Table 55 — Elements of TLC ST2059-2 Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_ST2059_2	UL	16	Req	TLC ST2059-2	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLC_IEEE1588 as specified in Clause 5.7					

5.10 TLC NTP

5.10.1 Description of the TLC NTP class

The purpose of TLC_NTP is to specify a time conforming to the IETF RFC 5905 Network Time Protocol Version 4.

The class diagram of TLC_NTP is shown in Figure 23. Classes inherited from MXF are shown unshaded.

TLC_NTP shall be a subclass of TLCIntervalItem.

5.10.2 Attributes of the TLC NTP class

TLC_NTP adds the following Property:

NTP_Time – type TLC_time64_t.

In a TLC_NTP, the type of NTP_Time is TLC_time64_t, which is a Record with a single member of type Int64

When Increment of the TLCIntervalItem superclass is not present, applications shall assume the following values:

IncrementProperty = NTP_Time

IncrementAmounts = { 1 }

IncrementModuli = { 0 }

IncrementFlags = { 0 }

When TimeScale, TimeZone, or Calendar of the TLCIntervalItem superclass are not present, applications shall assume the following values:

TimeScaleUpstream = NTP

TimeZoneUpstream = None

CalendarUpstream = None

5.10.3 KLV Encoding of the TLC NTP class

The ULs defined for TLC_NTP are shown in Table 56.

The structure of the TLC_NTP set is shown in Table 57.

Table 56 — TLC NTP ULs

Item Name	Symbol	Kind	Item UL
TLC NTP	TLC_NTP	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06031300
NTP Time	NTP_Time	LEAF	urn:smpte:ul:060e2b34.0101010e.04060603.29000000
TLC time64_t	TLC_time64_t	LEAF	urn:smpte:ul:060e2b34.01040101.03011300.00000000

Table 57 — Elements of TLC NTP Set

Symbol	Type	Len	Req?	Meaning	Default
TLC_NTP	UL	16	Req	TLC NTP	
Length	*BER Length*		*Req*	*Set Length*	
All items from TLCIntervalItem as specified in Clause 4.16					
NTP_Time	TLC_time64_t	8	Req	NTP time value	

6 Descriptive Scheme Definition Classes

6.1 Overview

The purpose of the Descriptive Scheme Definition classes is to represent an allowable configuration of a Descriptive Metadata Scheme (DMS).

Descriptive Metadata Schemes are defined by SMPTE EG 42 as a collection of Descriptive Frameworks, each of which is associated with a Track, and contains a number of Descriptive Objects.

The overall class diagram of Descriptive Scheme Definitions is shown in Figure 24 and are enlarged in Figure 25.

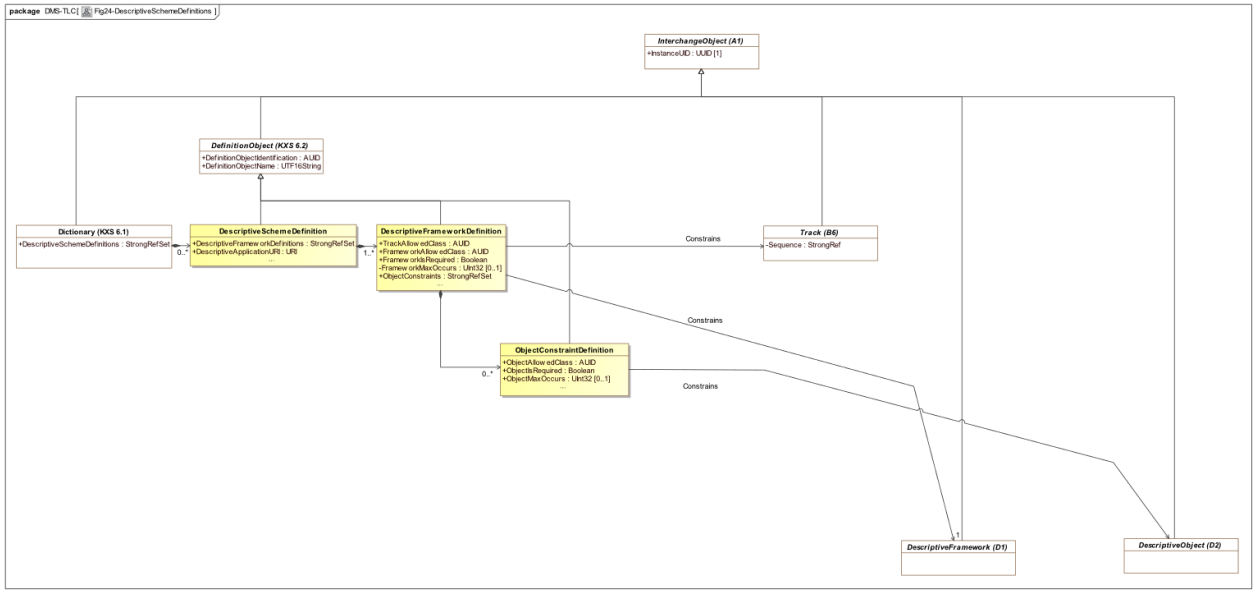

Figure 24 — Overall Descriptive Scheme Definition Classes

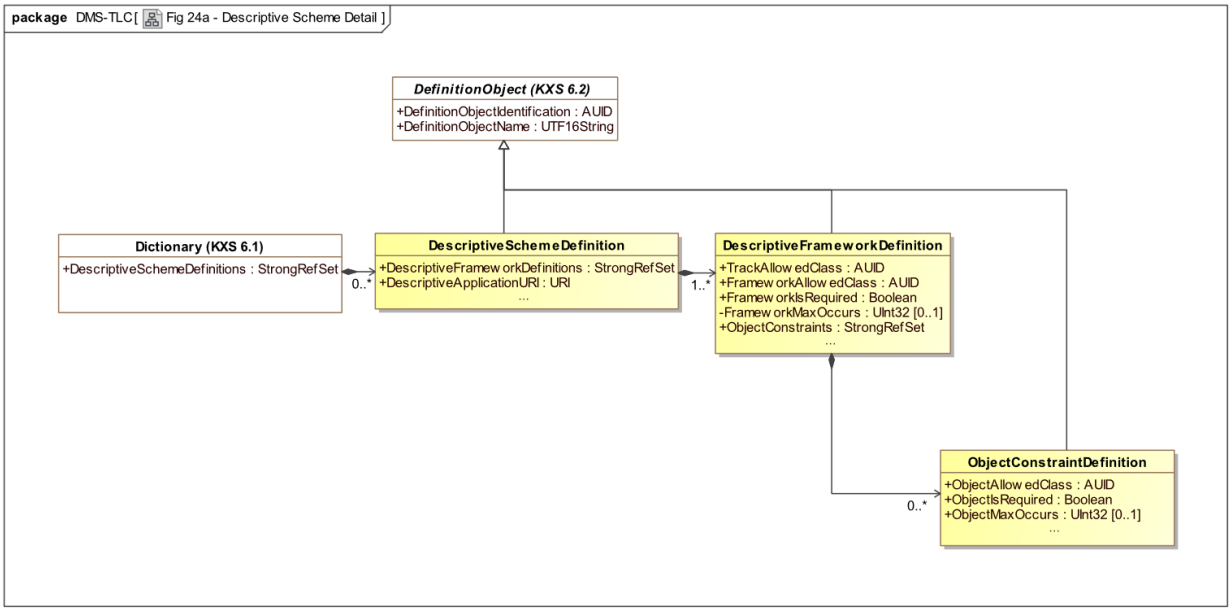

Figure 25 — Overall Descriptive Scheme Definition Classes (Enlarged View)

One or more Descriptive Scheme Definitions may be contained in the Header Metadata of MXF Files, in the optional DescriptiveSchemeDefinitions Property of the optional Dictionary object of the Preface.

The ULs defined for DescriptiveSchemeDefinitions are shown in Table 58.

The additional structure of the Dictionary set is shown in Table 59. This is an added Optional Property per SMPTE ST 377-1:2019 MXF Clause 9.3 and Annex A.1.

Table 58 — Descriptive Scheme Definitions ULs

Item Name	Symbol	Kind	Item UL
Descriptive Scheme Definitions	DescriptiveSchemeDefinitions	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.0b000000

Table 59 — Additional Optional Property of Dictionary Set

Symbol	Type	Len	Req?	Meaning	Default
Dictionary	UL	16	Req	Dictionary	
Length	*BER Length*		*Req*	*Set Length*	
All items from InterchangeObject as specified in SMPTE ST 377-1 MXF					
All items from Dictionary as specified in SMPTE ST 377-2:2019 KXS Clause 6.1					
DescriptiveScheme Definitions	Strong Ref Set DescriptiveSchemeDefinition	8 + N * 16	Opt	Descriptive Scheme Definitions	

NOTE 1 Further details of the optional Dictionary object of an MXF Preface are described in SMPTE ST 377-2:2019 KXS Clause 6.1

NOTE 2 A Descriptive Scheme Definition forms a profile of a DMS that can be used to automatically verify conformance of an instance of a DMS.

NOTE 3 DescriptiveSchemeDefinition and its contents are defined separately from TLCSchemeDefinition to allow their use for other DMSes, not limited to DMS-TLC.

6.2 Descriptive Scheme Definition

6.2.1 Description of the Descriptive Scheme Definition class

The purpose of DescriptiveSchemeDefinition is to represent an allowable configuration of a single Descriptive Metadata Scheme (DMS).

The class diagram of DescriptiveSchemeDefinition is also shown in Figure 24.

6.2.2 Attributes of the Descriptive Scheme Definition class

DescriptiveSchemeDefinition shall be a subclass of DefinitionObject (SMPTE ST 377-2:2019 KXS Clause 6.2)

DescriptiveSchemeDefinition inherits the Properties of DefinitionObject, including Identification, Name and Description.

The value of DefinitionObject Identification shall be present, should conform to SMPTE ST 377-1:2019 MXF Clause 9.8.2, Table 21, should be a leaf beneath the MXFDMSStructureVersion1 node, and should be registered in the SMPTE Labels Registry.

NOTE 1 Per SMPTE ST 377-1:2019 MXF Clause 9.8.2, Descriptive Metadata Schemes can have different labels to those specified in MXF Table 21.

DescriptiveSchemeDefinition adds the following Properties:

DescriptiveFrameworkDefinitions - type Strong Ref Set DescriptiveFrameworkDefinition

DescriptiveApplicationURI – type URI (which is a UTF16String)

NOTE 2 Composition of profiles can be accomplished by specifying several TLCFrameworks in the surrounding DescriptiveFrameworkDefinitions Property.

NOTE 3 DescriptiveApplicationURI has a similar role to the role of DescriptiveMetadataApplicationEnvironmentID described in SMPTE ST 377-1:2019 MXF Clauses 9.8.5 and DMSegment (SMPTE ST 377-1:2019 MXF Clause B.32).

6.2.3 KLV Encoding of the Descriptive Scheme Definition class

The ULs defined for DescriptiveSchemeDefinition are shown in Table 60.

The structure of the DescriptiveSchemeDefinition set is shown in Table 61.

Table 60 — Descriptive Scheme Definition ULs

Item Name	Symbol	Kind	Item UL
Descriptive Scheme Definition	DescriptiveSchemeDefinition	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100
Descriptive Framework Definitions	DescriptiveFrameworkDefinitions	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.01000000
Descriptive Application URI	DescriptiveApplicationURI	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.02000000

Table 61 — Elements of Descriptive Scheme Definition Set

Symbol	Type	Len	Req?	Meaning	Default
DescriptiveSchemeDefinition	UL	16	Req	Descriptive Scheme Definition	
Length	*BER Length*		*Req*	*Set Length*	
All items from DefinitionObject as specified in SMPTE ST 377-2:2019 KXS Clause 6.2					
DescriptiveFrameworkDefinitions	Strong Ref Set DescriptiveFrameworkDefinition	8 + N * 16	Req	Descriptive Framework Definitions	
DescriptiveApplicationURI	URI (UTF16String)	Var	Opt	Descriptive Application URI	

6.3 Descriptive Framework Definition

6.3.1 Description of the Descriptive Framework Definition class

The purpose of DescriptiveFrameworkDefinition is to represent an allowable configuration of a single Descriptive Metadata Framework within a DMS, including the allowed Track type in which the DescriptiveFramework shall be contained.

The class diagram of DescriptiveFrameworkDefinition is also shown in Figure 24. Classes inherited from MXF are shown unshaded.

DescriptiveFrameworkDefinition shall be a subclass of DefinitionObject.

6.3.2 Attributes of the Descriptive Framework Definition class

DescriptiveFrameworkDefinition inherits all Properties of its superclasses.

The value of DefinitionObject Identification shall be present, should conform to SMPTE ST 377-1:2019 MXF Clause 9.8.3 Table 22, should be a leaf beneath the DescriptiveFramework leaf, and should be registered in the SMPTE Labels Registry.

NOTE Per SMPTE ST 377-1:2019 MXF Clause 9.8.3, Descriptive Metadata Frameworks can have different labels than those specified in MXF Table 22.

DescriptiveFrameworkDefinition adds the following Properties:

TrackAllowedClass – type AUID UL that identifies the permitted subclass of Track.

FrameworkAllowedClass – type AUID, UL that identifies the permitted subclass of DescriptiveFramework.

FrameworkIsRequired – type Boolean.

FrameworkMaxOccurs – type UInt32, an unsigned integer, optional.

ObjectConstraints - type Strong Ref Set Object Constraint.

These Properties constrain Track, Descriptive Framework and Descriptive Object.

6.3.3 KLV Encoding of the Descriptive Framework Definition class

The ULs defined for DescriptiveFrameworkDefinition are shown in Table 62.

The structure of the DescriptiveFrameworkDefinition set is shown in Table 63.

Table 62 — Descriptive Framework Definition ULs

Item Name	Symbol	Kind	Item UL
Descriptive Framework Definition	DescriptiveFramework Definition	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010 401.06010200
Track Allowed Class	TrackAllowedClass	LEAF	urn:smpte:ul:060e2b34.0101010e.0406 0601.03000000
Framework Allowed Class	FrameworkAllowedClass	LEAF	urn:smpte:ul:060e2b34.0101010e.0406 0601.04000000
Framework Is Required	FrameworkIsRequired	LEAF	urn:smpte:ul:060e2b34.0101010e.0406 0601.05000000
Framework Max Occurs	FrameworkMaxOccurs	LEAF	urn:smpte:ul:060e2b34.0101010e.0406 0601.06000000
Object Constraints	ObjectConstraints	LEAF	urn:smpte:ul:060e2b34.0101010e.0406 0601.07000000

Table 63 — Elements of Descriptive Framework Definition Set

Symbol	Type	Len	Req?	Meaning	Default
DescriptiveFrameworkDefinition	UL	16	Req	Descriptive Framework Definition	
Length	*BER Length*		*Req*	*Set Length*	
All items from DefinitionObject as specified in SMPTE ST 377-2:2019 KXS Clause 6.2					
TrackAllowedClass	AUID	16	Req	Track Allowed Class	
FrameworkAllowedClass	AUID	16	Req	Framework Allowed Class	
FrameworkIsRequired	Boolean	1	Req	Framework Is Required	
FrameworkMaxOccurs	UInt32	4	Opt	Framework Max Occurs	
ObjectConstraints	ObjectConstraint StrongReference Set	8 + N * 16	Opt	Object Constraints	

6.4 Object Constraint Definition

6.4.1 Description of the Object Constraint Definition class

The purpose of an instance of the ObjectConstraintDefinition class is to specify one object that is allowable within a DescriptiveFramework, including its allowed class and, allowed multiplicity.

NOTE Composition of profiles can be accomplished by specifying several TLCFrameworks in the surrounding DMSchemeDefinition.

The class diagram of ObjectConstraintDefinition is also shown in Figure 24.

ObjectConstraintDefinition shall be a subclass of DefinitionObject.

6.4.2 Attributes of the ObjectConstraint Definition class

ObjectConstraintDefinition inherits all Properties of its superclasses.

ObjectConstraintDefinition adds the following Properties:

ObjectAllowedClass – type AUID. The UL that identifies a TLCItem or subclass per SMPTE ST 395.

ObjectIsRequired – type Boolean.

ObjectMaxOccurs – type UInt32, an unsigned integer, optional.

6.4.3 KLV Encoding of the Object Constraint Definition class

The ULs defined for ObjectConstraintDefinition are shown in Table 64.

The structure of the ObjectConstraint set is shown in Table 65.

Table 64 — Object Constraint Definition ULs

Item Name	Symbol	Kind	Item UL
Object Constraint Definition	ObjectConstraintDefinition	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300
Object Allowed Class	ObjectAllowedClass	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.08000000
Object Is Required	ObjectIsRequired	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.09000000
Object Max Occurs	ObjectMaxOccurs	LEAF	urn:smpte:ul:060e2b34.0101010e.04060601.0a000000

Table 65 — Elements of Object Constraint Definition Set

Symbol	Type	Len	Req?	Meaning	Default
ObjectConstraintDefinition	UL	16	Req	ObjectConstraintDefinition	
Length	*BER Length*		*Req*	*Set Length*	
All items from DefinitionObject as specified in SMPTE ST 377-2:2019 KXS Clause 6.2					
ObjectAllowedClass	AUID	16	Req	Object Allowed Class	
ObjectIsRequired	Boolean	1	Req	Object Is Required	
ObjectMaxOccurs	UInt32	4	Opt	Object Max Occurs	

6.5 TLC Scheme Definition

6.5.1 Description of the TLC Scheme Definition class

The purpose of a TLCSchemeDefinition is to represent an allowable configuration of a DMS-TLC.

The class diagram of TLCSchemeDefinition is also shown in Figure 24.

Instances of TLCSchemeDefinition may be contained in the Header Metadata of MXF Files, in the optional DescriptiveSchemeDefinitions Property of the optional Dictionary object of the Preface.

NOTE 1 Details of the optional Dictionary object of an MXF Preface are described in SMPTE ST 377-2 KXS.

NOTE 2 A TLCSchemeDefinition forms a profile of DMS-TLC that can be used to automatically verify conformance of an instance of DMS-TLC.

6.5.2 Attributes of the TLC Scheme Definition class

TLCSchemeDefinition shall be a subclass of DescriptiveSchemeDefinition.

TLCSchemeDefinition inherits all Properties of its superclass.

The value of DefinitionObject Identification shall be present, should conform to SMPTE ST 377-1:2019 MXF Clause 9.8.2 Table 21, should be a leaf beneath the TLCProfiles node, and should be registered in the SMPTE Labels Registry.

TLCSchemeDefinition does not add any Properties.

6.5.3 KLV Encoding of the TLC Scheme Definition class

The ULs defined for TLCSchemeDefinition are shown in Table 66.

The structure of the TLCSchemeDefinition set is shown in Table 67.

Table 66 — TLC Scheme Definition ULs

Item Name	Symbol	Kind	Item UL
TLC Scheme Definition	TLCSchemeDefinition	LEAF	urn:smpte:ul:060e2b34.027f0101.0d010401.06010400
TLC Basic Timecode Profile	TLCBasicTimecodeProfile	LEAF	urn:smpte:ul:060e2b34.0401010d.0d010401.06010000
TLC Basic Timecode Annotated Profile	TLCBasicTimecodeAnnotatedProfile	LEAF	urn:smpte:ul:060e2b34.0401010d.0d010401.06020000
TLC PTP Profile	TLC_PTPProfile	LEAF	urn:smpte:ul:060e2b34.0401010d.0d010401.06030000

Table 67 — Elements of TLC Scheme Definition Set

Symbol	Type	Len	Req?	Meaning	Default
TLCSchemeDefinition	UL	16	Req	TLC Scheme Definition	
Length	*BER Length*		*Req*	*Set Length*	
All items from the DescriptiveSchemeDefinition as specified in Clause 6.1					

7 KXS Representation of DMS-TLC

7.1 Extension Scheme Introduction

SMPTE ST 377-2 KXS defines specifications for DefinitionObjects and MetaDefinitions objects including ClassDefinitions, PropertyDefinitions, and TypeDefinitions that may be placed in an optional ExtensionsHeader within an MXF file or may be published in other ways such as a Registry. Clauses 7.2 and 7.3 list the SMPTE ST 377-2 KXS objects that describe DMS-TLC.

7.2 Extension Scheme for DMS-TLC

7.2.1 Extension Scheme Object for DMS-TLC

The ExtensionScheme object for DMS-TLC is shown in Table 68.

Table 68 — Class Definition of Extension Scheme for DMS-TLC

Item Name	Type	Value	Notes
ExtensionScheme	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
InstanceUID	UUID	Assigned upon instantiation	
ExtensionSchemeID	AUID	Assigned upon instantiation	See NOTE
SymbolSpaceURI	UTF16String	Assigned upon instantiation	
PreferredPrefix	UTF16String	"tlc"	
Extension Description	UTF16String	DMS-TLC	
MetaDefinitions	MetaDefinitionStrongReferenceSet	All MetaDefinitions as defined in Clauses 7.2.2, 7.2.3, 7.2.4	Class, Property and Type MetaDefinitions

NOTE The InstanceUID cannot be a UL until SMPTE has a Register for Definition Objects.

7.2.2 Class Definitions for DMS-TLC

ClassDefinition MetaDefinitions for DMS-TLC are shown in Table 69 through Table 98.

Table 69 — Class Definition of TLC Track

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020100	
MetaDefinition Name	UTF16String	TLCTrack	
MetaDefinition Description	UTF16String	TLC Track	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01013900	EventTrack
IsConcrete	Boolean	True	

Table 70 — Class Definition of TLC Sequence

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020200	
MetaDefinition Name	UTF16String	TLCSequence	
MetaDefinition Description	UTF16String	TLC Sequence	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01010f00	Sequence
IsConcrete	Boolean	True	

Table 71 — Class Definition of Descriptive Derived Component

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020300	
MetaDefinition Name	UTF16String	DescriptiveDerivedComponent	
MetaDefinition Description	UTF16String	Descriptive Derived Component	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01014500	DescriptiveClip
IsConcrete	Boolean	True	

Table 72 — Class Definition of TLC Derived Component

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020400	
MetaDefinition Name	UTF16String	TLCDerivedComponent	
MetaDefinition Description	UTF16String	TLC Derived Component	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06020300	DescriptiveDerivedComponent
IsConcrete	Boolean	True	

Table 73 — Class Definition of TLC Segment

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020500	
MetaDefinition Name	UTF16String	TLCSegment	
MetaDefinition Description	UTF16String	TLC Segment	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01014100	DMSegment (aka DescriptiveMarker)
IsConcrete	Boolean	True	

Table 74 — Class Definition of TLC Label

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020600	
MetaDefinition Name	UTF16String	TLCLabel	
MetaDefinition Description	UTF16String	TLC Label	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.00000000	DescriptiveFramework
IsConcrete	Boolean	True	

Table 75 — Class Definition of TLC Item

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020700	
MetaDefinition Name	UTF16String	TLCItem	
MetaDefinition Description	UTF16String	TLC Item	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010400.00000000	DescriptiveObject
IsConcrete	Boolean	True	

Table 76 — Class Definition of TLC Fixed Item

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030100	
MetaDefinition Name	UTF16String	TLCFixedItem	
MetaDefinition Description	UTF16String	TLC Fixed Item	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06020700	TLCItem
IsConcrete	Boolean	True	

Table 77 — Class Definition of TLC Source Name

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030200	
MetaDefinition Name	UTF16String	TLCSourceName	
MetaDefinition Description	UTF16String	TLC Source Name	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030100	TLCFixedItem
IsConcrete	Boolean	True	

Table 78 — Class Definition of TLC Source Identifier

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030300	
MetaDefinition Name	UTF16String	TLCSourceIdentifier	
MetaDefinition Description	UTF16String	TLC Source Identifier	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030100	TLCFixedItem
IsConcrete	Boolean	True	

Table 79 — Class Definition of TLC Basic UMID

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030400	
MetaDefinition Name	UTF16String	TLC_BasicUMID	
MetaDefinition Description	UTF16String	TLC Basic UMID	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030100	TLCFixedItem
IsConcrete	Boolean	True	

Table 80 — Class Definition of TLC Dynamic Item

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	
MetaDefinition Name	UTF16String	TLCDynamicItem	
MetaDefinition Description	UTF16String	TLC Dynamic Item	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06020700	TLCItem
IsConcrete	Boolean	False	

Table 81 — Class Definition of TLC Media Count

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030600	
MetaDefinition Name	UTF16String	TLCMediaCount	
MetaDefinition Description	UTF16String	TLC Media Count	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsConcrete	Boolean	True	

Table 82 — Class Definition of TLC Interval Item

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	
MetaDefinition Name	UTF16String	TLCIntervalItem	
MetaDefinition Description	UTF16String	TLC Interval Item	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsConcrete	Boolean	False	

Table 83 — Class Definition of TLC Basic Timecode

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	
MetaDefinition Name	UTF16String	TLCBasicTimecode	
MetaDefinition Description	UTF16String	TLC Basic Timecode	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsConcrete	Boolean	True	

Table 84 — Class Definition of TLC Edge Code

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030900	
MetaDefinition Name	UTF16String	TLCEdgeCode	
MetaDefinition Description	UTF16String	TLC Edge Code	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsConcrete	Boolean	True	

Table 85 — Class Definition of TLC Augmented Timecode

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030a00	
MetaDefinition Name	UTF16String	TLCAugmentedTimecode	
MetaDefinition Description	UTF16String	TLC Augmented Timecode	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsConcrete	Boolean	True	

Table 86 — Class Definition of TLC ST2059-1

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030b00	
MetaDefinition Name	UTF16String	TLC_ST2059_1	
MetaDefinition Description	UTF16String	TLC ST2059-1	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsConcrete	Boolean	True	

Table 87 — Class Definition of TLC IEEE1588

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030c00	
MetaDefinition Name	UTF16String	TLC_IEEE1588	
MetaDefinition Description	UTF16String	TLC IEEE1588	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsConcrete	Boolean	True	

Table 88 — Class Definition of TLC Increment

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00	
MetaDefinition Name	UTF16String	TLCIncrement	
MetaDefinition Description	UTF16String	TLC Increment	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01010100	InterchangeObject
IsConcrete	Boolean	True	

Table 89 — Class Definition of TLC Time Scale

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	
MetaDefinition Name	UTF16String	TLCTimeScale	
MetaDefinition Description	UTF16String	TLC Time Scale	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01010100	InterchangeObject
IsConcrete	Boolean	True	

Table 90 — Class Definition of TLC Time Zone

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030f00	
MetaDefinition Name	UTF16String	TLCTimeZone	
MetaDefinition Description	UTF16String	TLC Time Zone	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01010100	InterchangeObject
IsConcrete	Boolean	True	

Table 91 — Class Definition of TLC Calendar

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06031000	
MetaDefinition Name	UTF16String	TLCCalendar	
MetaDefinition Description	UTF16String	TLC Calendar	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01010100	InterchangeObject
IsConcrete	Boolean	True	

Table 92 — Class Definition of TLC ST12

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06031100	
MetaDefinition Name	UTF16String	TLC_ST12	
MetaDefinition Description	UTF16String	TLC ST12	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030b00	TLC_ST2059_1
IsConcrete	Boolean	True	

Table 93 — Class Definition of TLC ST2059-2

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06031200	
MetaDefinition Name	UTF16String	TLC_ST2059_2	
MetaDefinition Description	UTF16String	TLC ST2059-2	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030c00	TLC_IEEE1588
IsConcrete	Boolean	True	

Table 94 — Class Definition of TLC NTP

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06031300	
MetaDefinition Name	UTF16String	TLC_NTP	
MetaDefinition Description	UTF16String	TLC NTP	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsConcrete	Boolean	True	

Table 95 — Class Definition of Descriptive Scheme Definition

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100	
MetaDefinition Name	UTF16String	DescriptiveSchemeDefinition	
MetaDefinition Description	UTF16String	Descriptive Scheme Definition	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01011a00	DefinitionObject
IsConcrete	Boolean	True	

Table 96 — Class Definition of Descriptive Framework Definition

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	
MetaDefinition Name	UTF16String	DescriptiveFrameworkDefinition	
MetaDefinition Description	UTF16String	Descriptive Framework Definition	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01011a00	DefinitionObject
IsConcrete	Boolean	True	

Table 97 — Class Definition of Object Constraint Definition

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300	
MetaDefinition Name	UTF16String	ObjectConstraintDefinition	
MetaDefinition Description	UTF16String	Object Constraint Definition	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01011a00	DefinitionObject
IsConcrete	Boolean	True	

Table 98 — Class Definition of TLC Scheme Definition

Item Name	Type	Value	Notes
ClassDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06010400	
MetaDefinition Name	UTF16String	TLCSchemeDefinition	
MetaDefinition Description	UTF16String	TLC Scheme Definition	
ParentClass	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100	DescriptiveSchemeDefinition
IsConcrete	Boolean	True	

7.2.3 Property Definitions for DMS-TLC

PropertyDefinition MetaDefinitions for DMS-TLC are shown in Table 99 through Table 152.

Table 99 — Property Definition of Copied Component

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060602.02000000	
MetaDefinition Name	UTF16String	CopiedComponent	
MetaDefinition Description	UTF16String	Copied Component	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05020b00.00000000	ComponentStrongReference
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06020300	DescriptiveDerivedComponent
IsOptional	Boolean	True	

Table 100 — Property Definition of TLC Items

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060602.01000000	
MetaDefinition Name	UTF16String	TLCItems	
MetaDefinition Description	UTF16String	TLC Items	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05050f00.00000000	DescriptiveObjectStrongReferenceSet
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06020600	TLCLabel
IsOptional	Boolean	False	

Table 101 — Property Definition of TLC Name

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.01000000	
MetaDefinition Name	UTF16String	TLCName	
MetaDefinition Description	UTF16String	TLC Name	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100200.00000000	UTF16String
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030200	TLCSourceName
IsOptional	Boolean	False	

Table 102 — Property Definition of TLC Identifier

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.02000000	
MetaDefinition Name	UTF16String	TLCIdentifier	
MetaDefinition Description	UTF16String	TLC Identifier	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100200.00000000	UTF16String
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030300	TLCSourceIdentifier
IsOptional	Boolean	False	

Table 103 — Property Definition of TLC Identifier Kind

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.03000000	
MetaDefinition Name	UTF16String	TLCIdentifierKind	
MetaDefinition Description	UTF16String	TLC Identifier Kind	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100200.00000000	UTF16String
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030300	TLCSourceIdentifier
IsOptional	Boolean	False	

Table 104 — Property Definition of TLC UMID

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.04000000	
MetaDefinition Name	UTF16String	TLC_UMID	
MetaDefinition Description	UTF16String	TLC UMID	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01300100.00000000	UMID
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030400	TLC_BasicUMID
IsOptional	Boolean	False	

Table 105 — Property Definition of Item Rate

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.05000000	
MetaDefinition Name	UTF16String	ItemRate	
MetaDefinition Description	UTF16String	Item Rate	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03010100.00000000	Rational
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsOptional	Boolean	False	

Table 106 — Property Definition of Item Duration

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.06000000	
MetaDefinition Name	UTF16String	ItemDuration	
MetaDefinition Description	UTF16String	Item Duration	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01012002.00000000	LengthType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030500	TLCDynamicItem
IsOptional	Boolean	True	

Table 107 — Property Definition of TLC Count

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.07000000	
MetaDefinition Name	UTF16String	TLCCount	
MetaDefinition Description	UTF16String	TLC Count	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01012001.00000000	PositionType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030600	TLCMediaCount
IsOptional	Boolean	False	

Table 108 — Property Definition of Interval Increment

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.08000000	
MetaDefinition Name	UTF16String	IntervalIncrement	
MetaDefinition Description	UTF16String	Interval Increment	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023700.00000000	TLCIncrementStrongReference
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsOptional	Boolean	True	

Table 109 — Property Definition of Interval Time Scale

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.09000000	
MetaDefinition Name	UTF16String	IntervalTimeScale	
MetaDefinition Description	UTF16String	Interval Time Scale	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023800.00000000	TLCTimeScaleStrongReference
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsOptional	Boolean	True	

Table 110 — Property Definition of Interval Time Zone

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e0.04060603.0a000000	
MetaDefinition Name	UTF16String	IntervalTimeZone	
MetaDefinition Description	UTF16String	Interval Time Zone	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023900.00000000	TLCTimeZoneStrongReference
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsOptional	Boolean	True	

Table 111 — Property Definition of Interval Calendar

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e0.04060603.0b000000	
MetaDefinition Name	UTF16String	IntervalCalendar	
MetaDefinition Description	UTF16String	Interval Calendar	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023a00.00000000	TLCCalendarStrongReference
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030700	TLCIntervalItem
IsOptional	Boolean	True	

Table 112 — Property Definition of Increment Property

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.0c000000	
MetaDefinition Name	UTF16String	IncrementProperty	
MetaDefinition Description	UTF16String	Increment Property	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01030100.00000000	AUID
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00	TLCIncrement
IsOptional	Boolean	False	

Table 113 — Property Definition of Increment Amounts

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.0d000000	
MetaDefinition Name	UTF16String	IncrementAmounts	
MetaDefinition Description	UTF16String	Increment Amounts	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04010400.00000000	Int64Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00	TLCIncrement
IsOptional	Boolean	True	

Table 114 — Property Definition of Increment Moduli

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.0e000000	
MetaDefinition Name	UTF16String	IncrementModuli	
MetaDefinition Description	UTF16String	Increment Moduli	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04010400.00000000	Int64Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00	TLCIncrement
IsOptional	Boolean	True	

Table 115 — Property Definition of Increment Flags

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.0f000000	
MetaDefinition Name	UTF16String	IncrementFlags	
MetaDefinition Description	UTF16String	Increment Flags	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04010900.00000000	UInt32Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030d00	TLCIncrement
IsOptional	Boolean	True	

Table 116 — Property Definition of Time Scale Tag

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.10000000	
MetaDefinition Name	UTF16String	TimeScaleTag	
MetaDefinition Description	UTF16String	Time Scale Tag	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.02020208.00000000	TimeScaleTagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 117 — Property Definition of Time Scale Offset

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.11000000	
MetaDefinition Name	UTF16String	TimeScaleOffset	
MetaDefinition Description	UTF16String	Time Scale Offset	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01012001.00000000	PositionType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 118 — Property Definition of Time Scale Upstream

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.12000000	
MetaDefinition Name	UTF16String	TimeScaleUpstream	
MetaDefinition Description	UTF16String	Time Scale Upstream	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.02020208.00000000	TimeScaleTagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 119 — Property Definition of Time Scale Resolution

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.13000000	
MetaDefinition Name	UTF16String	TimeScaleResolution	
MetaDefinition Description	UTF16String	Time Scale Resolution	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03010100.00000000	Rational
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 120 — Property Definition of Time Scale Precision

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.14000000	
MetaDefinition Name	UTF16String	TimeScalePrecision	
MetaDefinition Description	UTF16String	Time Scale Precision	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03010100.00000000	Rational
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 121 — Property Definition of Time Scale Leap Seconds

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.15000000	
MetaDefinition Name	UTF16String	TimeScaleLeapSeconds	
MetaDefinition Description	UTF16String	Time Scale Leap Seconds	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010500.00000000	Int8
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030e00	TLCTimeScale
IsOptional	Boolean	True	

Table 122 — Property Definition of Time Zone Tag

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.16000000	
MetaDefinition Name	UTF16String	TimeZoneTag	
MetaDefinition Description	UTF16String	Time Zone Tag	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.02020209.00000000	TimeZoneTagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030f00	TLCTimeZone
IsOptional	Boolean	True	

Table 123 — Property Definition of Time Zone Offset

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.17000000	
MetaDefinition Name	UTF16String	TimeZoneOffset	
MetaDefinition Description	UTF16String	Time Zone Offset	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010700.00000000	Int32
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030f00	TLCTimeZone
IsOptional	Boolean	True	

Table 124 — Property Definition of Time Zone Upstream

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.18000000	
MetaDefinition Name	UTF16String	TimeZoneUpstream	
MetaDefinition Description	UTF16String	Time Zone Upstream	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.02020209.00000000	TimeZoneTagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030f00	TLCTimeZone
IsOptional	Boolean	True	

Table 125 — Property Definition of Calendar Tag

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.19000000	
MetaDefinition Name	UTF16String	CalendarTag	
MetaDefinition Description	UTF16String	Calendar Tag	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.0202020a.00000000	CalendarTagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031000	TLC Calendar
IsOptional	Boolean	True	

Table 126 — Property Definition of Calendar Offset

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1a000000	
MetaDefinition Name	UTF16String	CalendarOffset	
MetaDefinition Description	UTF16String	Calendar Offset	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010700.00000000	Int32
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031000	TLC Calendar
IsOptional	Boolean	True	

Table 127 — Property Definition of Calendar Upstream

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1b000000	
MetaDefinition Name	UTF16String	CalendarUpstream	
MetaDefinition Description	UTF16String	Calendar Upstream	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.0202020a.00000000	Calendar TagType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031-00	TLC Calendar
IsOptional	Boolean	True	

Table 128 — Property Definition of Basic Timecode Start

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1c000000	
MetaDefinition Name	UTF16String	BasicTimecodeStart	
MetaDefinition Description	UTF16String	Basic Timecode Start	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03011100.00000000	BasicTimecode_Count
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsOptional	Boolean	False	

Table 129 — Property Definition of Basic Timecode Rounded Base

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1d000000	
MetaDefinition Name	UTF16String	BasicTimecodeRoundedBase	
MetaDefinition Description	UTF16String	Basic Timecode Rounded Base	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010200.00000000	UInt16
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsOptional	Boolean	False	

Table 130 — Property Definition of Basic Timecode Drop Frame

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1e000000	
MetaDefinition Name	UTF16String	BasicTimecodeDropFrame	
MetaDefinition Description	UTF16String	Basic Timecode Drop Frame	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01040100.00000000	Boolean
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsOptional	Boolean	False	

Table 131 — Property Definition of Basic Timecode Track Number

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.1f000000	
MetaDefinition Name	UTF16String	BasicTimecodeTrackNumber	
MetaDefinition Description	UTF16String	Basic Timecode Track Number	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010300.00000000	UInt32
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsOptional	Boolean	True	

Table 132 — Property Definition of Basic Timecode Display Format

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.20000000	
MetaDefinition Name	UTF16String	BasicTimecodeDisplayFormat	
MetaDefinition Description	UTF16String	Basic Timecode Display Format	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.0202020b.00000000	TimecodeDisplayFormatType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
IsOptional	Boolean	True	

Table 133 — Property Definition of TLC Edge Start

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.21000000	
MetaDefinition Name	UTF16String	TLCEdgeStart	
MetaDefinition Description	UTF16String	TLC Edge Start	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01012001.00000000	PositionType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030900	TLCEdgeCode
IsOptional	Boolean	False	

Table 134 — Property Definition of TLC Edge Film Kind

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.22000000	
MetaDefinition Name	UTF16String	TLCEdgeFilmKind	
MetaDefinition Description	UTF16String	TLC Edge Film Kind	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.0201010d.00000000	FilmType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030900	TLCEdgeCode
IsOptional	Boolean	False	

Table 135 — Property Definition of TLC Edge Code Format

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.23000000	
MetaDefinition Name	UTF16String	TLCEdgeCodeFormat	
MetaDefinition Description	UTF16String	TLC Edge Code Format	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.0201010c.00000000	EdgeType
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030900	TLCEdgeCode
IsOptional	Boolean	False	

Table 136 — Property Definition of TLC Edge Header

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.24000000	
MetaDefinition Name	UTF16String	TLCEdgeHeader	
MetaDefinition Description	UTF16String	TLC Edge Header	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04100100.00000000	DataValue
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030900	TLCEdgeCode
IsOptional	Boolean	False	

Table 137 — Property Definition of PTP Time

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.25000000	
MetaDefinition Name	UTF16String	PTP_Time	
MetaDefinition Description	UTF16String	PTP Time	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03011200.00000000	PTP_Count
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06030c00	TLC_IEEE1588
IsOptional	Boolean	False	

Table 138 — Property Definition of Time Bits

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.26000000	
MetaDefinition Name	UTF16String	TimeBits	
MetaDefinition Description	UTF16String	Time Address Bits	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04010900.00000000	UInt32Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031100	TLC_ST12
IsOptional	Boolean	False	

Table 139 — Property Definition of User Bits

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.27000000	
MetaDefinition Name	UTF16String	UserBits	
MetaDefinition Description	UTF16String	Binary Groups	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04010900.00000000	UInt32Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031100	TLC_ST12
IsOptional	Boolean	False	

Table 140 — Property Definition of DBB Pairs

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.28000000	
MetaDefinition Name	DBBPairs	DBBPairs	
MetaDefinition Description	UTF16String	Distributed Binary Bits DBB1 and DBB2	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.04011200.00000000	UInt16Array
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031100	TLC_ST12
IsOptional	Boolean	True	

Table 141 — Property Definition of NTP Time

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060603.29000000	
MetaDefinition Name	UTF16String	NTP_Time	
MetaDefinition Description	UTF16String	NTP Time	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.03011300.00000000	TLC_time64_t
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06031300	TLC_NTP
IsOptional	Boolean	False	

Table 142 — Property Definition of Descriptive Framework Definitions

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.01000000	
MetaDefinition Name	UTF16String	DescriptiveFrameworkDefinitions	
MetaDefinition Description	UTF16String	Descriptive Framework Definitions	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05051400.00000000	DescriptiveFrameworkDefinitionStrongReferenceSet
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100	DescriptiveSchemeDefinition
IsOptional	Boolean	False	

Table 143 — Property Definition of Descriptive Application URI

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.02000000	
MetaDefinition Name	UTF16String	DescriptiveApplicationURI	
MetaDefinition Description	UTF16String	Descriptive Application URI	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100200.00000000	UTF16String
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100	DescriptiveSchemeDefinition
IsOptional	Boolean	True	

Table 144 — Property Definition of Track Allowed Class

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.03000000	
MetaDefinition Name	UTF16String	TrackAllowedClass	
MetaDefinition Description	UTF16String	Track Allowed Class	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01030100.00000000	AUID
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition
IsOptional	Boolean	False	

Table 145 — Property Definition of Framework Allowed Class

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.04000000	
MetaDefinition Name	UTF16String	FrameworkAllowedClass	
MetaDefinition Description	UTF16String	Framework Allowed Class	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01030100.00000000	AUID
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition
IsOptional	Boolean	False	

Table 146 — Property Definition of Framework Is Required

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.05000000	
MetaDefinition Name	UTF16String	FrameworkIsRequired	
MetaDefinition Description	UTF16String	Framework Is Required	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01040100.00000000	Boolean
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition
IsOptional	Boolean	False	

Table 147 — Property Definition of Framework Max Occurs

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.06000000	
MetaDefinition Name	UTF16String	FrameworkMaxOccurs	
MetaDefinition Description	UTF16String	Framework Max Occurs	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010300.00000000	UInt32
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition
IsOptional	Boolean	True	

Table 148 — Property Definition of Object Constraint Definitions

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.07000000	
MetaDefinition Name	UTF16String	ObjectConstraintDefinitions	
MetaDefinition Description	UTF16String	Object Constraint Definitions	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05051500.00000000	ObjectConstraintDefinitionStrongReferenceSet
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition
IsOptional	Boolean	True	

Table 149 — Property Definition of Object Allowed Class

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.08000000	
MetaDefinition Name	UTF16String	ObjectAllowedClass	
MetaDefinition Description	UTF16String	Object Allowed Class	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01030100.00000000	AUID
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300	ObjectConstraintDefinition
IsOptional	Boolean	False	

Table 150 — Property Definition of Object Is Required

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.09000000	
MetaDefinition Name	UTF16String	ObjectIsRequired	
MetaDefinition Description	UTF16String	Object Is Required	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01040100.00000000	Boolean
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300	ObjectConstraintDefinition
IsOptional	Boolean	False	

Table 151 — Property Definition of Object Max Occurs

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.0a000000	
MetaDefinition Name	UTF16String	ObjectMaxOccurs	
MetaDefinition Description	UTF16String	Object Max Occurs	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01010300.00000000	UInt32
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300	ObjectConstraintDefinition
IsOptional	Boolean	True	

Table 152 — Property Definition of Descriptive Scheme Definitions

Item Name	Type	Value	Notes
PropertyDefinition	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.0101010e.04060601.0b000000	
MetaDefinition Name	UTF16String	DescriptiveSchemeDefinitions	
MetaDefinition Description	UTF16String	Descriptive Scheme Definitions	
PropertyType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05051600.00000000	DescriptiveSchemeDefinitionStrongReferenceSet
MemberOf	ClassDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010101.01012200	Dictionary
IsOptional	Boolean	True	

7.2.4 Type Definitions for DMS-TLC

TypeDefinition MetaDefinitions for DMS-TLC are shown in Table 153 through Table 174.

Table 153 — Type Definition of Descriptive Framework Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05021f00.00000000	
MetaDefinition Name	UTF16String	DescriptiveFrameworkStrongReference	
MetaDefinition Description	UTF16String	Descriptive Framework Strong Reference	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.00000000	DescriptiveFramework

Table 154 — Type Definition of Descriptive Object Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05022200.00000000	
MetaDefinition Name	UTF16String	DescriptiveObjectStrongReference	
MetaDefinition Description	UTF16String	Descriptive Object Strong Reference	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010400.00000000	DescriptiveObject

Table 155 — Type Definition of Descriptive Object Strong Reference Set

Item Name	Type	Value	Notes
TypeDefinitionSet	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05050f00.00000000	
MetaDefinition Name	UTF16String	DescriptiveObjectStrongReferenceSet	
MetaDefinition Description	UTF16String	Descriptive Object Strong Reference Set	
SetElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05022200.00000000	DescriptiveObjectStrongReference

Table 156 — Type Definition of Descriptive Scheme Definition Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023600.00000000	
MetaDefinition Name	UTF16String	DescriptiveSchemeDefinitionStrongReference	
MetaDefinition Description	UTF16String	Descriptive Scheme Definition Strong Reference	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010100	DescriptiveSchemeDefinition

Table 157 — Type Definition of Descriptive Scheme Definition Strong Reference Set

Item Name	Type	Value	Notes
TypeDefinitionSet	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05051600.00000000	
MetaDefinition Name	UTF16String	DescriptiveSchemeDefinitionStrongReferenceSet	
MetaDefinition Description	UTF16String	Descriptive Scheme Definition Strong Reference Set	
SetElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023600.00000000	DescriptiveSchemeDefinitionStrongReference

Table 158 — Type Definition of Descriptive Framework Definition Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023400.00000000	
MetaDefinition Name	UTF16String	DescriptiveFrameworkDefinitionStrongReference	
MetaDefinition Description	UTF16String	Descriptive Framework Definition Strong Reference	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010200	DescriptiveFrameworkDefinition

Table 159 — Type Definition of Descriptive Framework Definition Strong Reference Set

Item Name	Type	Value	Notes
TypeDefinitionSet	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05051400.00000000	
MetaDefinition Name	UTF16String	DescriptiveFrameworkDefinitionStrongReferenceSet	
MetaDefinition Description	UTF16String	Descriptive Framework Definition Strong Reference Set	
SetElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023400.00000000	DescriptiveFrameworkDefinitionStrongReference

Table 160 — Type Definition of Object Constraint Definition Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023500.00000000	
MetaDefinition Name	UTF16String	ObjectConstraintDefinitionStrongReference	
MetaDefinition Description	UTF16String	Object Constraint Definition Strong Reference	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010300	ObjectConstraintDefinition

Table 161 — Type Definition of Object Constraint Definition Strong Reference Set

Item Name	Type	Value	Notes
TypeDefinitionSet	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05051500.00000000	
MetaDefinition Name	UTF16String	ObjectConstraintDefinitionStrongReferenceSet	
MetaDefinition Description	UTF16String	Object Constraint Definition Strong Reference Set	
SetElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.05023500.00000000	ObjectConstraintDefinitionStrongReference

Table 162 — Type Definition of TLC Increment Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023700.00000000	
MetaDefinition Name	UTF16String	TLCIncrementStrongReference	
MetaDefinition Description	UTF16String	StrongReference to TLCIncrement	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010d00	TLCIncrement

Table 163 — Type Definition of TLC Time Scale Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023800.00000000	
MetaDefinition Name	UTF16String	TLCTimeScaleStrongReference	
MetaDefinition Description	UTF16String	StrongReference to TLCTimeScale	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010e00	TLCTimeScale

Table 164 — Type Definition of TLC Time Zone Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023900.00000000	
MetaDefinition Name	UTF16String	TLCTimeZoneStrongReference	
MetaDefinition Description	UTF16String	StrongReference to TLCTimeZone	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06010f00	TLCTimeZone

Table 165 — Type Definition of TLC Calendar Strong Reference

Item Name	Type	Value	Notes
TypeDefinition StrongObjectReference	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.05023a00.00000000	
MetaDefinition Name	UTF16String	TLCCalendarStrongReference	
MetaDefinition Description	UTF16String	StrongReference to TLCCalendar	
ReferencedType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.027f0101.0d010401.06011000	TLCCalendar

Table 166 — Type Definition of Basic Timecode Count

Item Name	Type	Value	Notes
TypeDefinitionRecord	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.03011100.00000000	
MetaDefinition Name	UTF16String	BasicTimecode_Count	
MetaDefinition Description	UTF16String	Basic Timecode Count	
MemberTypes	TypeDefinitionWeakReferenceVector	urn:smpte:ul:060e2b34.01040101.01010300.00000000	UInt32
MemberNames	UTF16StringArray	Frames	

Table 167 — Type Definition of PTP Count

Item Name	Type	Value	Notes
TypeDefinitionRecord	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.03011200.00000000	
MetaDefinition Name	UTF16String	PTP_Count	
MetaDefinition Description	UTF16String	PTP Count	
MemberTypes	TypeDefinitionWeakReferenceVector	urn:smpte:ul:060e2b34.01040101.01010a00.00000000 urn:smpte:ul:060e2b34.01040101.01010300.00000000	Int48 UInt32
MemberNames	UTF16StringArray	Seconds Nanoseconds	

Table 168 — Type Definition of TLC_time64_t

Item Name	Type	Value	Notes
TypeDefinitionRecord	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.03011300.00000000	
MetaDefinition Name	UTF16String	TLC_time64_t	
MetaDefinition Description	UTF16String	NTP Record	
MemberTypes	TypeDefinitionWeakReferenceVector	urn:smpte:ul:060e2b34.01040101.01010800.00000000	Int64
MemberNames	UTF16StringArray	Seconds	

Table 169 — Type Definition of UInt48

Item Name	Type	Value	Notes
TypeDefinitionInteger	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.01010900.00000000	
MetaDefinition Name	UTF16String	UInt48	
MetaDefinition Description	UTF16String	UInt48	
Size	UInt8	6	
IsSigned	Boolean	false	

Table 170 — Type Definition of Int48

Item Name	Type	Value	Notes
TypeDefinitionInteger	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.01010a00.00000000	
MetaDefinition Name	UTF16String	Int48	
MetaDefinition Description	UTF16String	Int48	
Size	UInt8	6	
IsSigned	Boolean	True	

Table 171 — Type Definition of Time Scale Tag Type

Item Name	Type	Value	Notes
TypeDefinition Enumeration	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.02020208.00000000	
MetaDefinition Name	UTF16String	TimeScaleTagType	
MetaDefinition Description	UTF16String	Controlled vocabulary string value identifying a time scale	
ElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100400.00000000	ISO7
ElementNames	UTF16StringArray	Unknown None TAI	

Table 172 — Type Definition of Time Zone Tag Type

Item Name	Type	Value	Notes
TypeDefinition Enumeration	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.02020209.00000000	
MetaDefinition Name	UTF16String	TimeZoneTagType	
MetaDefinition Description	UTF16String	IANA TZ database controlled vocabulary string value identifying a time zone	Max Length = 14 + 1 + 14
ElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100400.00000000	ISO7
ElementNames	UTF16StringArray	Unknown None UTC	

Table 173 — Type Definition of Calendar Tag Type

Item Name	Type	Value	Notes
TypeDefinition Enumeration	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.0202020a.00000000	
MetaDefinition Name	UTF16String	CalendarTagType	
MetaDefinition Description	UTF16String	Controlled vocabulary string value identifying a time scale	
ElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100400.00000000	ISO7
ElementNames	UTF16StringArray	Unknown None Gregorian	

Table 174 — Type Definition of Timecode Display Format Type

Item Name	Type	Value	Notes
TypeDefinition Enumeration	**Set Key**	**See SMPTE ST 377-2:2019 Table 10**	
MetaDefinition Identification	AUID	urn:smpte:ul:060e2b34.01040101.0202020b.00000000	
MetaDefinition Name	UTF16String	TimecodeDisplayFormatType	
MetaDefinition Description	UTF16String	Controlled vocabulary string value identifying the preferred text format of Timecode	
ElementType	TypeDefinitionWeakReference	urn:smpte:ul:060e2b34.01040101.01100400.00000000	ISO7
ElementNames	UTF16StringArray	Unknown ST258	

7.3 Scheme Definitions for DMS-TLC

7.3.1 Scheme Definition Introduction

This clause (Clause 7.3) lists Scheme Definitions and their associated Framework Definitions and Object Constraint Definitions for the BasicTimecode example shown in Clause 8.

7.3.2 TLC BasicTimecode Scheme Definition

DefinitionObjects for the TLC Basic Timecode Profile are shown in Table 175 through Table 177.

Table 175 — TLC Scheme Definition of TLC Basic Timecode Profile

Item Name	Type	Value	Notes
TLCSchemeDefinition	**Set Key**	**urn:smpte:ul:060e2b34.027f0101.0d010401.06010400**	
Definition Identification	AUID	urn:smpte:ul:060e2b34.0401010d.0d010401.06010000	TLCBasicTimecodeProfile
Definition Name	UTF16String	TLCBasicTimecodeProfile	
Definition Description	UTF16String	TLC Basic Timecode Profile	
DMApplicationURI	URI (UTF16String)	Assigned upon instantiation	See NOTE 1
DescriptiveFrameworkDefinitions	Strong Ref Set DescriptiveFrameworkDefinition	See Table 176	TLCConstrainedLabel

NOTE 1 The DMApplicationURI cannot be a UL until SMPTE has a Register for DMApplications.

Table 176 — Descriptive Framework Definition of TLC Constrained Label

Item Name	Type	Value	Notes
DescriptiveFrameworkDefinition	**Set Key**	**urn:smpte:ul:060e2b34.027f0101.0d010401.06010200**	
DefinitionIdentification	AUID	Assigned upon instantiation	See NOTE 2
DefinitionName	UTF16String	TLCConstrainedLabel	
DefinitionDescription	UTF16String	TLC Constrained Label for Basic Timecode Profile	
TrackAllowedClass	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020100	TLCTrack
FrameworkAllowedClass	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06020600	TLCLabel
FrameworkIsRequired	Boolean	True	
FrameworkMaxOccurs	UInt32	1	
ObjectConstraints	ObjectConstraintStrongReferenceSet	See Table 177	Object Constraint Definitions of TLC Basic Timecode

NOTE 2 The DefinitionIdentification cannot be a UL until SMPTE has a Register for Definition Objects.

Table 177 — Object Constraint Definitions of TLC Basic Timecode

Item Name	Type	Value	Notes
ObjectConstraintDefinition	**Set Key**	**urn:smpte:ul:060e2b34.027f0101.0d010401.06010300**	
DefinitionIdentification	AUID	Assigned upon instantiation	See NOTE 3
DefinitionName	UTF16String	ObjectConstraintDefinition	
DefinitionDescription	UTF16String	Object Constraint Definition for Basic Timecode Profile	
ObjectAllowedClass	AUID	urn:smpte:ul:060e2b34.027f0101.0d010401.06030800	TLCBasicTimecode
ObjectIsRequired	Boolean	True	
ObjectMaxOccurs	UInt32	1	

NOTE 3 The DefinitionIdentification cannot be a UL until SMPTE has a Register for Definition Objects.

8 Examples (Informative)

8.1 Examples Overview

Clause 8 includes several examples of DMS-TLC instances.

8.2 DMS-TLC in an MXF File

Figure 26 shows an example of DMS-TLC in an MXF file.

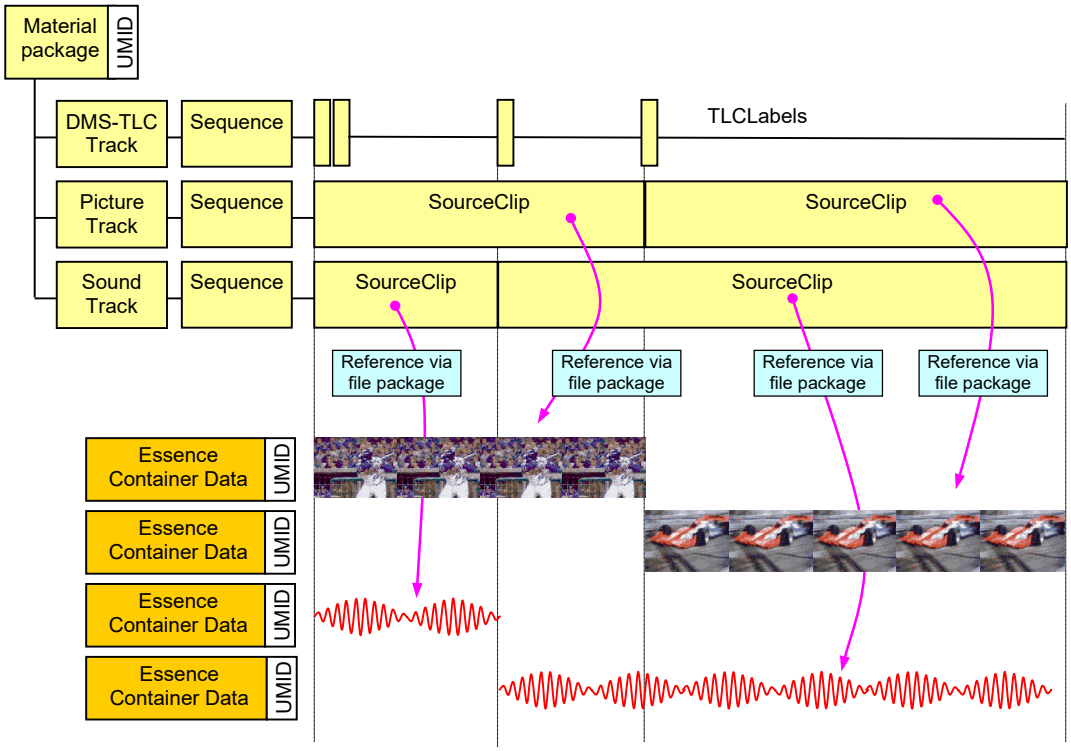

Figure 26 — Example of DMS-TLC in an MXF File

8.3 DMS-TLC in Systems

Figure 27 shows an example of DMS-TLC in a system.

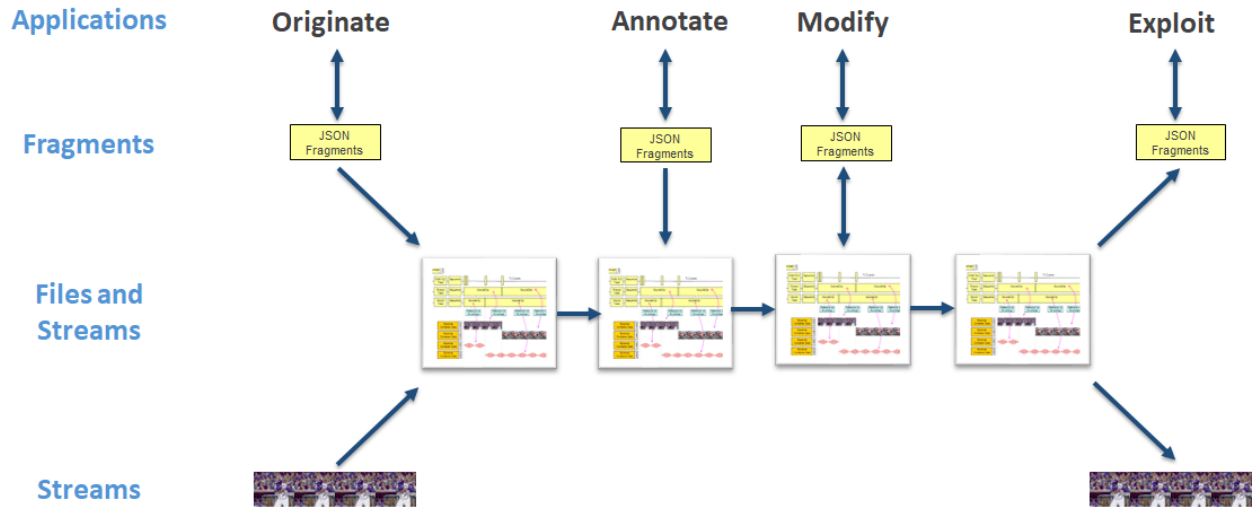

Figure 27 — Example of DMS-TLC in a System

8.4 Basic Timecode

This example shows an xml instance of DMS-TLC that contains a single timecode.

An equivalent MXF file “DMS_TLC.basic.mxf” is available as test material.

NOTE 1 This is fully populated assuming all Properties are Req. Sensible defaults will allow Properties to change to Best Efforts and will reduce the size of instances.

NOTE 2 This example is not fully compliant with SMPTE ST 2001-1 RegXML

```
<?xml version="1.0" encoding="UTF-8"?>
<DMS xmlns="http://www.freemxf.org/mxfx/proto/040926" xmlns:xlink="http://www.w3.org/1999/xlink">
   <DMScheme dict="DMS_TLC.dict.xml" version="0.1">TLCBasicTimecodeProfile</DMScheme>
   <TLCTrack>
      <EventEditRate>30000/1001</EventEditRate>
      <TrackSegment>
         <TLCSequence>
            <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
            <ComponentLength>600</ComponentLength>
            <StructuralComponents>
               <TLCSegment>
                  <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
                  <ComponentLength>600</ComponentLength>
                  <EventStartPosition>0</EventStartPosition>
                  <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
                  <DMFramework>
                     <TLCLabel>
                        <TLCItems>
                           <TLCBasicTimecode>
                              <ItemRate>30000/1001</ItemRate>
                              <ItemDuration>600</ItemDuration>
                              <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                              <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                              <BasicTimecodeStart>
                                 <Frames>107892</Frames>
                              </BasicTimecodeStart>
                              <BasicTimecodeTrackNumber>1000</BasicTimecodeTrackNumber>
                              <BasicTimecodeDisplayFormat>ST258</BasicTimecodeDisplayFormat>
                           </TLCBasicTimecode>
                        </TLCItems>
                     </TLCLabel>
                  </DMFramework>
               </TLCSegment>
            </StructuralComponents>
         </TLCSequence>
      </TrackSegment>
   </TLCTrack>
</DMS>
```

This example shows a json instance of DMS-TLC that contains a single timecode

NOTE 3 Since there is no RegJSON, this example is syntactically valid but obeys no standard schema.


```
{
  "DescriptiveSchemes": [ "TLCBasicTimecodeProfile" ],
  "TLCTrack": {
    "TrackName": "TLC",
    "TrackID": 1000,
    "TrackNumber": 1,
    "EventEditRate": { "Numerator": "30000", "Denominator": "1001" },
    "TrackSegment": {
      "TLCSequence": {
        "ComponentDataDefinition": "DescriptiveMetadataTrack",
        "ComponentLength": 600,
        "StructuralComponents": [
          { "TLCSegment": {
              "ComponentDataDefinition": "DescriptiveMetadataTrack",
              "ComponentLength": 600,
              "EventStartPosition": 0,
              "DescriptiveMetadataScheme": "TLCBasicTimecodeProfile",
              { "DMFramework": {
                  "TLCLabel": {
                    "TLCItems": [
                      { "TLCBasicTimecode":
                       { "ItemRate": { "Numerator": "30000", "Denominator": "1001" },
                         "ItemDuration": 600,
                         "BasicTimecodeRoundedBase" : 30,
                         "BasicTimecodeDropFrame" : 1,
                         "BasicTimecodeStart": { "Frames": 107892 } }
                      }
                    ]
                  }
                }
              }
            }
          }
        ]
      }
    }
  }
}
```


8.5 Basic Timecode with Additional Metadata

This example adds two TLCItems to the previous example.

An equivalent MXF file “DMS_TLC.annotated.mxf” is available as test material.

```
<?xml version="1.0" encoding="UTF-8"?>
<DMS xmlns="http://www.freemxf.org/mxfx/proto/040926" xmlns:xlink="http://www.w3.org/1999/xlink">
   <DMScheme dict="DMS_TLC.dict.xml" version="0.1">TLCBasicTimecodeAnnotatedProfile</DMScheme>
   <TLCTrack>
      <EventEditRate>30000/1001</EventEditRate>
      <TrackSegment>
         <TLCSequence>
            <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
            <ComponentLength>600</ComponentLength>
            <StructuralComponents>
               <TLCSegment>
                  <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
                  <ComponentLength>600</ComponentLength>
                  <EventStartPosition>0</EventStartPosition>
                  <DescriptiveMetadataScheme>TLCBasicTimecodeAnnotatedProfile</DescriptiveMetadataScheme>
                  <DMFramework>
                     <TLCLabel>
                        <TLCItems>
                           <TLCSourceIdentifier>
                              <TLCIdentifier>urn:uuid:47ea11e1-8476-45fa-8e73-bda485c2ee1</TLCIdentifier>
                              <TLCIdentifierKind>UUID</TLCIdentifierKind>
                           </TLCSourceIdentifier>
                           <TLCSourceName>
                              <TLCName>P1060225</TLCName>
                           </TLCSourceName>
                           <TLCBasicTimecode>
                              <ItemRate>30000/1001</ItemRate>
                              <ItemDuration>600</ItemDuration>
                              <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                              <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                              <BasicTimecodeStart>
                                 <Frames>107892</Frames>
                              </BasicTimecodeStart>
                           </TLCBasicTimecode>
                        </TLCItems>
                     </TLCLabel>
                  </DMFramework>
               </TLCSegment>
            </StructuralComponents>
         </TLCSequence>
      </TrackSegment>
   </TLCTrack>
</DMS>
```

8.6 PTP

This example shows an xml instance of DMS-TLC that contains a single PTP time.

An equivalent MXF file “DMS_TLC.ptp.mxf” is available as test material.

```
<?xml version="1.0" encoding="UTF-8"?>
<DMS xmlns="http://www.freemxf.org/mxfx/proto/040926" xmlns:xlink="http://www.w3.org/1999/xlink">
   <DMScheme dict="DMS_TLC.dict.xml" version="0.1">TLC_PTPProfile</DMScheme>
   <TLCTrack>
      <TrackName>TLC</TrackName>
      <TrackID>1000</TrackID>
      <TrackNumber>1</TrackNumber>
      <EventEditRate>1000000000:1</EventEditRate>
      <TrackSegment>
         <TLCSequence>
            <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
            <ComponentLength>17982017982018</ComponentLength>
            <StructuralComponents>
               <TLCSegment>
                  <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
                  <ComponentLength>17982017982018</ComponentLength>
                  <EventStartPosition>0</EventStartPosition>
                  <DescriptiveMetadataScheme>TLC_PTPProfile</DescriptiveMetadataScheme>
                  <DMFramework>
                     <TLCLabel>
                        <TLCItems>
                           <TLC_IEEE1588_2>
                              <ItemRate>1000000000:1</ItemRate>
                              <ItemDuration>20020000</ItemDuration>
                              <PTP_Time>
                                 <Seconds>1665761370</Seconds>
                                 <Nanoseconds>356801000</Nanoseconds>
                              </PTP_Time>
                           </ TLC_IEEE1588_2>
                        </TLCItems>
                     </TLCLabel>
                  </DMFramework>
               </TLCSegment>
            </StructuralComponents>
         </TLCSequence>
      </TrackSegment>
   </TLCTrack>
</DMS>
```

8.7 Discontinuous Timecode

This example shows an xml instance of DMS-TLC that contains six segments of discontinuous timecode.

An equivalent MXF file “DMS_TLC.discontinuous.mxf” is available as test material. This file includes the same discontinuous timecode in three forms: DMS-TLC, an MXF TimecodeTrack, and LTC in an audio track.

NOTE 1 This is fully populated assuming all Properties are Req. Sensible defaults will allow Properties to change to Best Efforts and will reduce the size of instances.

NOTE 2 This is not yet fully compliant with SMPTE ST 2001-1 RegXML

```
<?xml version="1.0" encoding="UTF-8"?>
<DMS xmlns="http://www.freemxf.org/mxfx/proto/040926" xmlns:xlink="http://www.w3.org/1999/xlink">
   <DMScheme dict="DMS_TLC.dict.xml" version="0.1">TLCBasicTimecodeProfile</DMScheme>
   <TLCTrack>
      <EventEditRate>30000/1001</EventEditRate>
      <TrackSegment>
         <TLCSequence>
            <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
            <ComponentLength>600</ComponentLength>
            <StructuralComponents>
               <TLCSegment>
                  <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
                  <ComponentLength>119</ComponentLength>
                  <EventStartPosition>0</EventStartPosition>
                  <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
                  <DMFramework>
                     <TLCLabel>
                        <TLCItems>
                           <TLCBasicTimecode>
                              <ItemRate>30000/1001</ItemRate>
                              <ItemDuration>119</ItemDuration>
                              <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                              <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                              <BasicTimecodeStart>
                                 <Frames>971028</Frames>
                              </BasicTimecodeStart>
                           </TLCBasicTimecode>
                        </TLCItems>
                     </TLCLabel>
                  </DMFramework>
               </TLCSegment>
               <TLCSegment>
                  <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
                  <ComponentLength>117</ComponentLength>
                  <EventStartPosition>121</EventStartPosition>
                  <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
                  <DMFramework>
```

```
            <TLCLabel>
               <TLCItems>
                  <TLCBasicTimecode>
                     <ItemRate>30000/1001</ItemRate>
                     <ItemDuration>117</ItemDuration>
                     <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                     <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                     <BasicTimecodeStart>
                        <Frames>971149</Frames>
                     </BasicTimecodeStart>
                  </TLCBasicTimecode>
               </TLCItems>
            </TLCLabel>
         </DMFramework>
      </TLCSegment>
      <TLCSegment>
         <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
         <ComponentLength>118</ComponentLength>
         <EventStartPosition>242</EventStartPosition>
         <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
         <DMFramework>
            <TLCLabel>
               <TLCItems>
                  <TLCBasicTimecode>
                     <ItemRate>30000/1001</ItemRate>
                     <ItemDuration>118</ItemDuration>
                     <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                     <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                     <BasicTimecodeStart>
                        <Frames>1684853</Frames>
                     </BasicTimecodeStart>
                  </TLCBasicTimecode>
               </TLCItems>
            </TLCLabel>
         </DMFramework>
      </TLCSegment>
      <TLCSegment>
         <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
         <ComponentLength>118</ComponentLength>
         <EventStartPosition>360</EventStartPosition>
         <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
         <DMFramework>
            <TLCLabel>
               <TLCItems>
                  <TLCBasicTimecode>
                     <ItemRate>30000/1001</ItemRate>
                     <ItemDuration>118</ItemDuration>
                     <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
```



```
                <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                <BasicTimecodeStart>
                   <Frames>2535400</Frames>
                </BasicTimecodeStart>
             </TLCBasicTimecode>
          </TLCItems>
       </TLCLabel>
    </DMFramework>
</TLCSegment>
<TLCSegment>
    <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
    <ComponentLength>8</ComponentLength>
    <EventStartPosition>478</EventStartPosition>
    <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
    <DMFramework>
       <TLCLabel>
          <TLCItems>
             <TLCBasicTimecode>
                <ItemRate>30000/1001</ItemRate>
                <ItemDuration>8</ItemDuration>
                <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                <BasicTimecodeDropFrame>No</BasicTimecodeDropFrame>
                <BasicTimecodeStart>
                   <Frames>973797</Frames>
                </BasicTimecodeStart>
             </TLCBasicTimecode>
          </TLCItems>
       </TLCLabel>
    </DMFramework>
</TLCSegment>
<TLCSegment>
    <ComponentDataDefinition>DescriptiveMetadataTrack</ComponentDataDefinition>
    <ComponentLength>114</ComponentLength>
    <EventStartPosition>486</EventStartPosition>
    <DescriptiveMetadataScheme>TLCBasicTimecodeProfile</DescriptiveMetadataScheme>
    <DMFramework>
       <TLCLabel>
          <TLCItems>
             <TLCBasicTimecode>
                <ItemRate>30000/1001</ItemRate>
                <ItemDuration>114</ItemDuration>
                <BasicTimecodeRoundedBase>30</BasicTimecodeRoundedBase>
                <BasicTimecodeDropFrame>Yes</BasicTimecodeDropFrame>
                <BasicTimecodeStart>
                   <Frames>64</Frames>
                </BasicTimecodeStart>
             </TLCBasicTimecode>
          </TLCItems>
```

```
                    </TLCLabel>
                </DMFramework>
            </TLCSegment>
        </StructuralComponents>
    </TLCSequence>
</TrackSegment>
</TLCTrack>
</DMS>
```

Bibliography (Informative)

SMPTE AG-25 *Use of JSON in Engineering Documents*. https://doc.smpte-doc.org/ag-25/9a5bc95d09e2a5d69280ff67c0054ec96ae321e8/

SMPTE ST 254:2008, *Motion-Picture Film (35-mm) — Manufacturer-Printed Latent Image Identification Information*. https://doi.org/10.5594/SMPTE.ST254.2008

SMPTE ST 270:2008, *Motion-Picture Film (65-mm) — Manufacturer-Printed Latent Image Identification Information - 80 Perforation repeat*. https://doi.org/10.5594/SMPTE.ST270.2008

SMPTE ST 271:2008, *Motion-Picture Film (16-mm) — Manufacturer-Printed Latent Image Identification Information*. https://doi.org/10.5594/SMPTE.ST271.2008