

SMPTE STANDARD

for Television — Material Exchange Format (MXF) — Operational Patterns 1c, 2c and 3c



Page 1 of 16 pages

Table of contents

Foreword

1 Scope

2 Normative references

3 Glossary of acronyms, terms and data types

4 Introduction

Annex A Specification of operational pattern 1c

Annex B Specification of operational pattern 2c

Annex C Specification of operational pattern 3c

Annex D Bibliography

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 Part XIII of its Administrative Practices.

This SMPTE document was prepared by the Technology Committee W25 on Metadata and Wrappers.

1 Scope

This standard defines operational patterns 1c, 2c and 3c, as defined in SMPTE 377M section 7, for the exchange of MXF files that represent the following levels of file complexity:

OP1c: A choice of 2 or more alternate material packages that play out selected tracks of either a single file package or two or more synchronized file packages,

OP2c: A choice of 2 or more alternate material packages that play out selected tracks of either a sequence of single file packages, or a sequence of two or more synchronized file packages,

OP3c: A choice of 2 or more alternate material packages that play out selected portions of tracks (edit list) from one or more file packages each of which may be referenced and synchronized at any given position along the timeline.

In each case, a top-level file package is linked to an essence container where each essence container may comprise either a single essence element or an interleave of multiple essence elements. Furthermore, in each case, one or more of the essence containers may be internal or external to the file.

This standard defines the operating restrictions, structural metadata objects and individual attributes that shall be applied to the MXF file format specification to achieve interoperability when exchanging an MXF file with these operational patterns.

These operational patterns require the use of body partitions for internal essence containers. Subdivision of each essence container by using body partitions is optional.

2 Normative references

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

SMPTE 377M-2004, Television — Material Exchange Format (MXF) — File Format Specification

SMPTE 378M-2004, Television — Material Exchange Format (MXF) — Operational Pattern 1a (Single Item, Single Package)

SMPTE 391M-2004, Television — Material Exchange Format (MXF) — Operational Pattern 1b (Single Item, Ganged Packages)

SMPTE 392M-2004, Television — Material Exchange Format (MXF) — Operational Pattern 2a (Play-List Items, Single Package)

SMPTE 393M-2004, Television — Material Exchange Format (MXF) — Operational Pattern 2b (Play-List Items, Ganged Packages)

SMPTE 407M-2009, Television — Material Exchange Format (MXF) — Operational Patterns 3a and 3b

3 Glossary of acronyms, terms and data types

The full glossary of acronyms, terms and data types used in the MXF specification is given in the MXF file format specification. It is not repeated here to avoid any divergence of meaning.

Essence element: An essence container may contain many essence elements interleaved together. An essence element in this standard corresponds to a separable part of the interleave which is described by an MXF track, such as a picture track, a sound track, or a data track.

4 Introduction

This standard defines MXF operational patterns 1c, 2c and 3c. SMPTE 377M defines the properties of the generalized operational patterns, and SMPTE EG 41 describes the concepts of operational patterns and the general conditions for audio-visual material exchange and interoperability. The introductory sections of these documents are not repeated here.

4.1 Operational pattern overview

Generalized MXF operational patterns are defined as a combination of the two dimensions as defined in the MXF file format specification.

These two dimensions are broadly illustrated in informative figure 1.

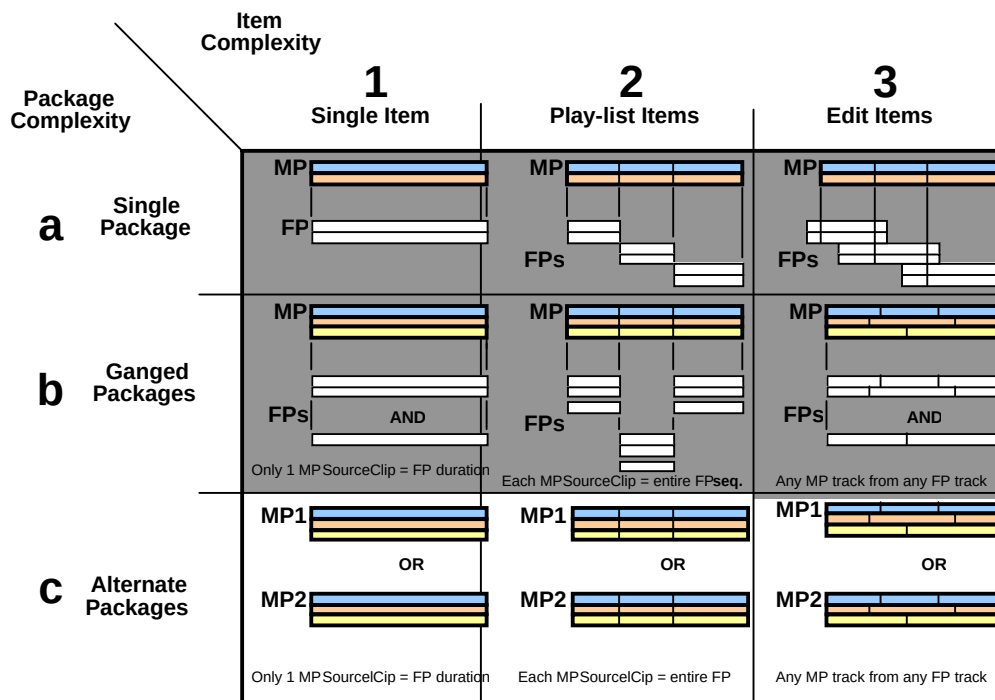


Figure 1 (informative) – Item and package complexity

This standard defines three generalized operational patterns as follows:

OP1c: A choice of 2 or more alternate material packages that play out selected tracks of either a single file package or two or more synchronized file packages.

This is illustrated in the leftmost column and bottom row.

The detailed specifications of operational pattern 1c are given in normative annex A.

OP2c: A choice of 2 or more alternate material packages that play out selected tracks of either a sequence of single file packages, or a sequence of two or more synchronized file packages.

This is illustrated in the center column and bottom row.

The detailed specifications of operational pattern 2c are given in normative annex B.

OP3c: A choice of 2 or more alternate material packages that play out selected portions of tracks (edit list) from one or more file packages each of which may be referenced and synchronized at any given position along the timeline.

This is illustrated in the rightmost column and bottom row.

The detailed specifications of operational pattern 3c are given in normative annex C.

None of these operational patterns apply constraints on the placement or use of descriptive metadata. general guidance on the use of descriptive metadata is given in SMPTE EG 42, SMPTE EG 41, and in SMPTE 380M. Implementers are encouraged to ensure descriptive metadata SourceClip references and descriptive metadata segments are kept consistent when essence references to file packages are modified.

Annex A (normative)
Specification of operational pattern 1c

A.1 MXF application

A.1.1 Material and top-level file package relationships

Other operational pattern specifications (e.g., SMPTE 378M, SMPTE 391M, SMPTE 392M, and SMPTE 393M) illustrate the relationship between the top-level file packages and lower-level source packages (as file or physical packages). This relationship is not repeated in figure A.1

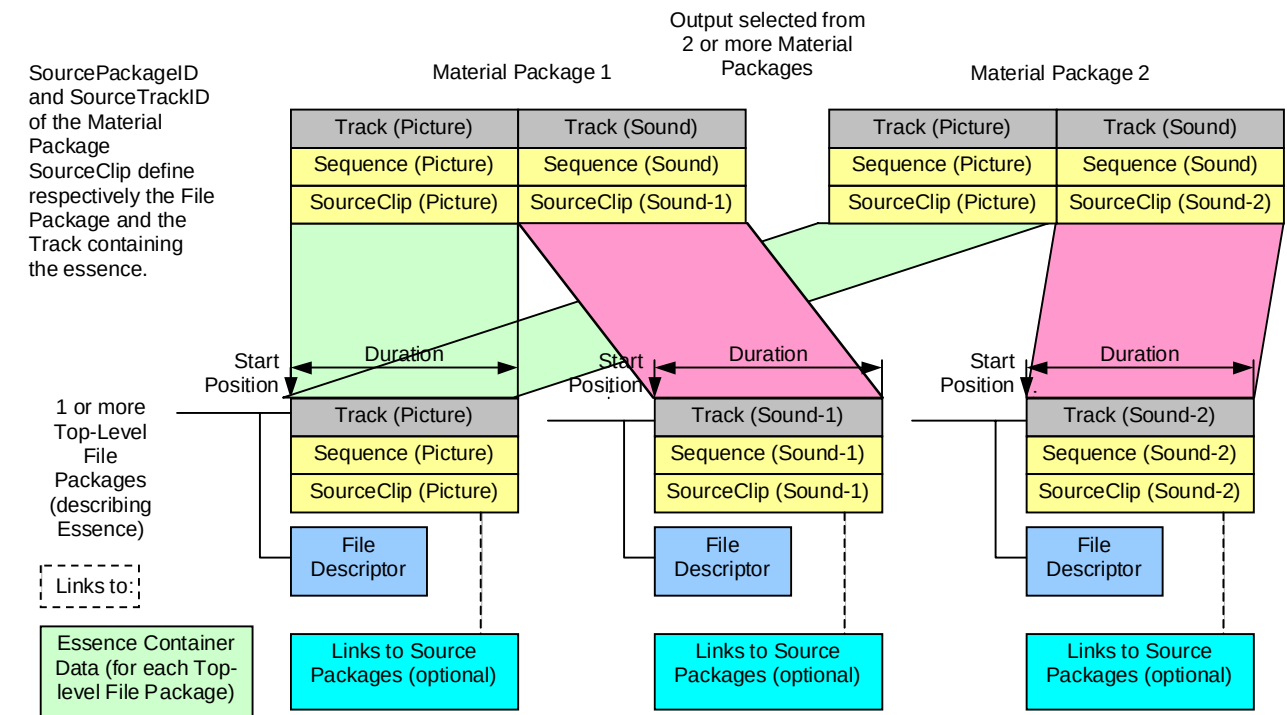


Figure A.1 (informative) – Outline of operational pattern 1c

A.1.2 General description

Operational pattern 1c is an extension of operational patterns 1a and 1b where the output comprises a choice of two or more synchronized playable essence containers containing the audio-visual items.

Operational pattern 1c is intended to meet the requirements of multi-lingual or multi-resolution applications where the alternate audio-visual sources are contained in two or more essence containers.

In order to support this operational pattern, devices may require random access to the contents of the essence containers.

One or more essence containers may be external to the MXF file. Guidance on the use of external essence containers is given in SMPTE EG 41. For MXF files used for program exchange, the essence containers should be internal to the file. The nature of this operational pattern allows the playout of the file to be changed by selecting the desired material package from a choice of multiple material packages.

A.1.2.1 Essence container requirements

1. The essence containers shall contain either a single essence element or an interleave of essence elements with a duration that equals the duration of the material package tracks.
2. Any track of a material package shall only create references to file package tracks of the same type.
3. All essence containers shall provide for the continuous decoding of contiguous essence elements.

A.1.2.2 Example uses (informative)

This operational pattern allows the file payout to be versioned, typically providing for a choice of language track payout.

Other uses might include a choice of picture options where the file might contain pictures of different resolutions or different aspect ratios.

A.2 Operational pattern constraints

A list of general constraints for this operational pattern is given in table A.1.

Table A.1 – General constraints for operational pattern 1c

File Kind	MXF
“Operational Pattern”	1c: (Choice of output selected from one or more Essence Containers).
Role	Versioning of the file payout.
Essence	One or more Essence Containers, Operational Pattern Qualifiers apply (see Table A.2).
Material Packages	>1
Number of Material Package SourceClips for each Essence Track	1
Top-level File Packages	1 or more. Zero or more Top-level File Packages may be external to the file.
Number of Essence Container Types	1 or more
Lower-level Source Packages	0 or more. Essence described by Lower-level File Packages must be external to the file.
Partition limits	None
Body Partitions	Required when >1 Top-level File Packages. Note: when there are >1 Top-level File Packages, it is recommended that each Top-level File Package is contained in at least one Body Partition.
Index Tables	Optional, but recommended.
Editing Support	None.
Streaming Support	Conditional according to section A.3.4.2.

A.3 Header metadata specification

A.3.1 General

The structural metadata sets and the normative universal label used to identify this operational pattern are defined in SMPTE 377M with specific constraints and additions detailed below.