Recommendation ITU-R BT.1775-1
(11/2023)

BT Series: Broadcasting service (television)

File format with editing capability, for the exchange of metadata, audio, video, data essence and ancillary data for use in broadcasting

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

Policy on Intellectual Property Right (IPR)

ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Resolution ITU-R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from http://www.itu.int/ITU-R/go/patents/en where the Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC and the ITU-R patent information database can also be found.

Series of ITU-R Recommendations

(Also available online at https://www.itu.int/publ/R-REC/en)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	**Broadcasting service (television)**
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: *This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.*

RECOMMENDATION ITU-R BT.1775-1

File format with editing capability, for the exchange of metadata, audio, video, data essence and ancillary data for use in broadcasting

(Question ITU-R 34-3/6)

(2006-2023)

Scope

This Recommendation defines the file format for use in the broadcasting environment. The file format may be edited, streamed in real time or non-real time, and is agnostic to image formats and video compression.

The ITU Radiocommunication Assembly,

considering

a) that storage systems based on information technology, including data disks and data tapes have permeated all areas of the professional television environment; production, non-linear editing, play-out, post-production, distributed production, archiving, contribution and distribution;

b) that TV production environments now incorporate more and more systems from the IT world such as networks and server systems;

c) that contribution and distribution delivery applications for television broadcasting are being introduced based upon software platforms which handle content (metadata, audio, video, data essence and ancillary data) in file form;

d) that file exchange does not introduce additional picture and sound quality degradation if, for example, the compressed audio and video accommodated in the file body is transferred in its native, compressed form;

e) that file exchange can be adapted easily to the available channel bandwidth so that user can trade-off transfer-bandwidth versus transfer-time;

f) that television broadcasters are seeking interoperable and harmonised schema for the carriage of metadata, audio, video, data essence and ancillary data in a common file;

g) that metadata, audio, video, data essence and ancillary data can be stored and transferred as independent files with provision for later synchronization;

h) that systems can be built using generic computer equipment which adds economic benefits to the overall system;

i) that the technology of file formats and file exchange offers significant advantages in terms of operating flexibility, production flow, and station automation;

j) that television broadcasters in many administrations are seeking a migration path from videotape-based recording systems for production, post-production and archiving to a file-based system with real time and non-real time capability;

k) that interchange between broadcasters, and between broadcasters and their suppliers or agencies, relies on file formats;

l) that the terminology and specifications for exchange of metadata, audio, video, data essence and ancillary data has been defined in a suite of related standards by SMPTE and has gained wide acceptance in broadcasting and associated industries;

m)   that television broadcasting equipment manufacturers and software developers have established a series of implementations for the flexible and extensible exchange of files containing metadata, audio, video, data essence and ancillary data;

n)   that these standards for file formats are under continuing development,

      recommends

1   that the editable file format specification for use in broadcasting should comply with the file format described in Annex 1;

2   that the generic container specification should comply with the generic container described in Annex 2;

3   that any embedded dark metadata should not degrade or enhance the interoperability or performance of any MXF decoder.[1]

Annex 1

SMPTE ST 377-1:2019 [2]

MATERIAL EXCHANGE FORMAT (MXF)
FILE FORMAT SPECIFICATION

Summary

This standard defines the data structure of the Material Exchange Format (MXF) for the interchange of audio-visual material. It defines the data structure for network transport and may be used on storage media. This document does not define internal storage formats for MXF compliant devices.

The standard defines all the components of the MXF file specification including all those in the file header, file body and file footer. It defines the application of partitions in the file that provide valuable features such as the ability for an MXF file to serve many application requirements and recovery of partially received files. The standard also defines key features of the file structure including the Partition Packs, the Structural Metadata, the Primer Pack, the Random Index Pack and Index Tables.

The standard does not define either the Essence Container or the Descriptive Metadata. Instead, it defines the requirements for these components to be added as a plug-in to an MXF file.

SMPTE ST 377-1:2019 may be downloaded at: https://ieeexplore.ieee.org/document/8984681

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[1] MXF files may include specialized data encapsulated in KLV packets to which the keys of the KLV syntax are not specified in an MXF specification (known as dark metadata).

[2] While references to the current versions of these standards are provided, it should be noted that further revisions are in progress and that a public Advisory Note is available.

Annex 2

SMPTE ST 379-2:2010

MATERIAL EXCHANGE FORMAT (MXF)
MXF GENERIC CONTAINER

Summary

This standard specifies numerous refinements based on SMPTE 379-1. This standard specifies the format of the MXF Generic Container (GC). The MXF GC is the native essence container of the material exchange format (MXF) file body. The MXF GC is defined for the interchange of streamable audio-visual material.

This standard defines the data structure at the signal interfaces of networks or storage media. This standard does not define internal storage formats for MXF compliant devices.

Appropriate essence and metadata payloads that can be mapped into the MXF GC are defined in associated documents.

The MXF specification includes operation pattern specifications that may define restrictions on the way in which this essence container type should be implemented. The reader is advised to carefully study the appropriate operational pattern document for compliance to a defined implementation.

SMPTE ST 379-2:2010 may be downloaded at: https://ieeexplore.ieee.org/document/7291800

SMPTE ST 379-1:2009 may be downloaded at: https://ieeexplore.ieee.org/document/7292040

General MXF Generic Container overview (informative)

The MXF generic container is a streamable data container that can be placed on any suitable transport and potentially stored.

The MXF generic container format is intended for inclusion into a MXF (Material eXchange Format) file as an essence container.

The premise for the MXF generic container format is that of a general-purpose essence data and metadata container for the containment of many different kinds of essence and metadata elements into a single entity by interleaving the data streams in a defined and time-synchronous manner (typically over a 1-frame duration). Associated SMPTE mapping documents define the essence data and metadata elements that can be placed in the generic container. Some mapping documents define complete mappings for an entire content package while others simply define mapping of metadata or essence data into an element.

Why SMPTE ST 379-1 and 379-2?

SMPTE ST 379-2 is intended to be a proper subset of SMPTE ST 379-1. In some cases, SMPTE ST 379-1 allows greater latitude by leaving constraints unspecified, and SMPTE ST 379-2 includes additional constraints with the objective of permitting simpler implementation of compliant decoders.

The use of SMPTE ST 379-1 has been deprecated; however, there are many applications still in use that use this standard. New applications are encouraged to use SMPTE ST 379-2.

As a generalization, data conforming to SMPTE ST 379-2 are compatible with processors that conform to SMPTE ST 379-1. The reverse may not be true. Data conforming to SMPTE ST 379-1 may not be compatible with processors that conform to SMPTE ST 379-2.