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SMPTE STANDARD

for Television — Material Exchange Format (MXF) — Mapping Type D-11 Essence Data to the MXF Generic Container



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1 Scope

This standard defines the mapping of compressed picture data according to the type D-11 data stream and up to 8 channels of AES3 data into the material exchange format generic container (MXF-GC). This mapping is given the acronym: MXF-GC(D-11).

The MXF specification is written in several parts. This is one of a set of documents that define the contents of the MXF file body.

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

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 editions of the standards indicated below.

SMPTE 331M-2004, Television — Element and Metadata Definitions for SDTI-CP

SMPTE 367M-2002, Television — Type D-11 Picture Compression and Data Stream Format

SMPTE 369M-2002, Television — Type D-11 Data Stream and AES3 Data Mapping over SDTI

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

SMPTE 379M-2004, Television — Material Exchange Format (MXF) — MXF Generic Container.

SMPTE 385M-2004, Television — Material Exchange Format (MXF) — Mapping SDTI-CP Essence and Metadata into the MXF Generic Container

3 Glossary of acronyms, terms and data types

The general glossary of acronyms, terms and data types used in the MXF specification is given in SMPTE 377M. Supplementary glossaries of acronyms and terms are defined in SMPTE 379M and SMPTE 385M. They are not repeated here to avoid any divergence of meaning.

3.1 Acronyms and terms used in this standard

ECC: Error Correction Code
H-ANC: Horizontal ANCillary data (per SMPTE 291M)
VITC: Vertical Interval Time Code
PsF: Progressive segmented Frame

4 Introduction (informative)

This standard specifies the mapping of type D-11 data from an SDTI data port specified by SMPTE 369M to the MXF generic container (SMPTE 379M). The type D-11 data comprises packets of type D-11 basic blocks containing compressed picture data and auxiliary picture data as specified in SMPTE 367M (type D-11 picture compression and data stream format).

Four channels of 24-bit AES3 data are optionally mapped into the H-ANC space of the SDTI according to SMPTE 272M. In addition, VITC may also be mapped into the H-ANC space according to SMPTE 369M. This specification also covers the mapping of the audio and VITC data from the SDTI into the MXF generic container.

Figure 1 also includes the optional four channels of 24-bit AES3 data mapped into the H-ANC space. VITC data (shown as auxiliary data in figure 1) may also be mapped into the H-ANC space.

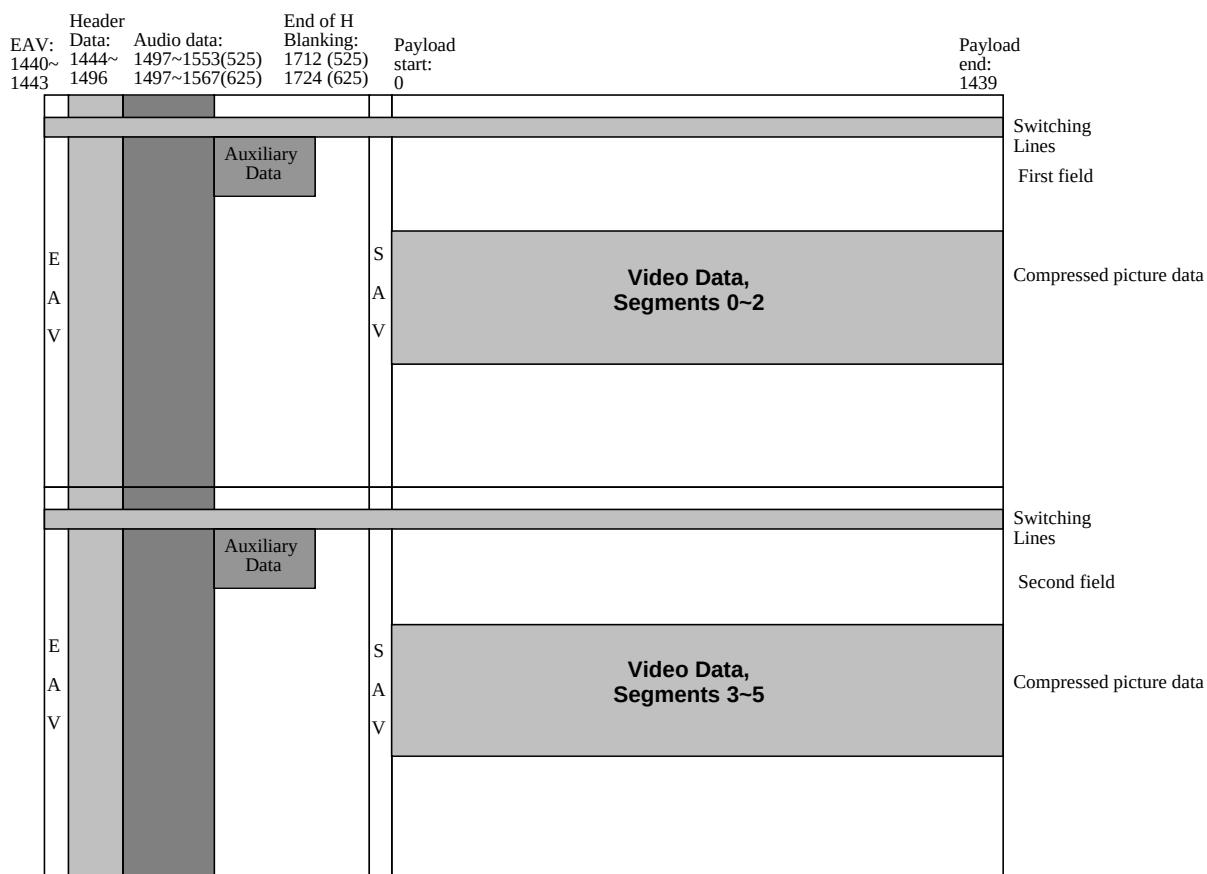


Figure 1 – SDTI mapping

The type D-11 data stream packets are grouped into six equal data segments of which the first three data segments are mapped onto the first field of the SDTI and the last three data segments are mapped onto the second field of the SDTI, as shown in figure 1.

Note that because the type D-11 format operates at 24-Hz and 24÷1.001-Hz frame rates as well as the conventional television rates of 25-Hz and 30÷1.001-Hz, the SDTI must operate at all frame rates to support synchronous stream transfers based on one frame of compressed HD picture data together with the associated audio data and VITC data packed into one frame of the SDTI.

Table 1 shows the core parameters of the SDTI at all the frame rates used by SMPTE 367M.

Table 1 – Total number of lines and samples per line for each frame rate of the interface

Frame rate of the Interface	24÷1.001Hz	24Hz	25Hz	30÷1.001Hz
Total number of Lines	525	625	625	525
Total number of samples per Line	2145	1800	1728	1716

This standard defines the mapping of type D-11 data into the generic container as an MXF-compliant body. In effect, this standard defines the generic container with a system item, a type D-11 compressed picture data element, a 4-channel AES3 data element and optional auxiliary data elements in the auxiliary item.

The MXF-GC (D-11) mapping conforming to this standard complies with the requirements for MXF body files defined in the MXF format document.

5 Type D-11 data structure and mapping to the generic container

For each frame of the type D-11 SDTI payload, the data shall be divided into four components as follows:

1. A metadata pack element followed by optional metadata elements whose values are extracted from ancillary data packets. These ancillary data packets are extracted from the H-ANC space as specified in SMPTE 369M.
2. A mandatory picture element whose value comprises all six concatenated segments of the type D-11 compressed picture information (see SMPTE 367M). This component is mapped into a type D-11 element in the generic container picture item.
3. An optional AES3 sound element whose value comprises all the AES3 data packets extracted from the H-ANC space of the SDTI as defined in SMPTE 369M. This AES3 data is mapped into an 8-channel AES3 Element as defined in SMPTE 331M. Only 4 channels of the 8-channel element are used.
4. Optional H-ANC data packet elements for the carriage of ANC data packets not carried by the system item.

This specification shall use frame-based mapping as defined by SMPTE 379M. The order of items in this mapping shall be system, picture, sound and data (if present).

5.1 KLV coding

The resulting KLV coded packets for each frame are represented in sequence as shown in figure 2.

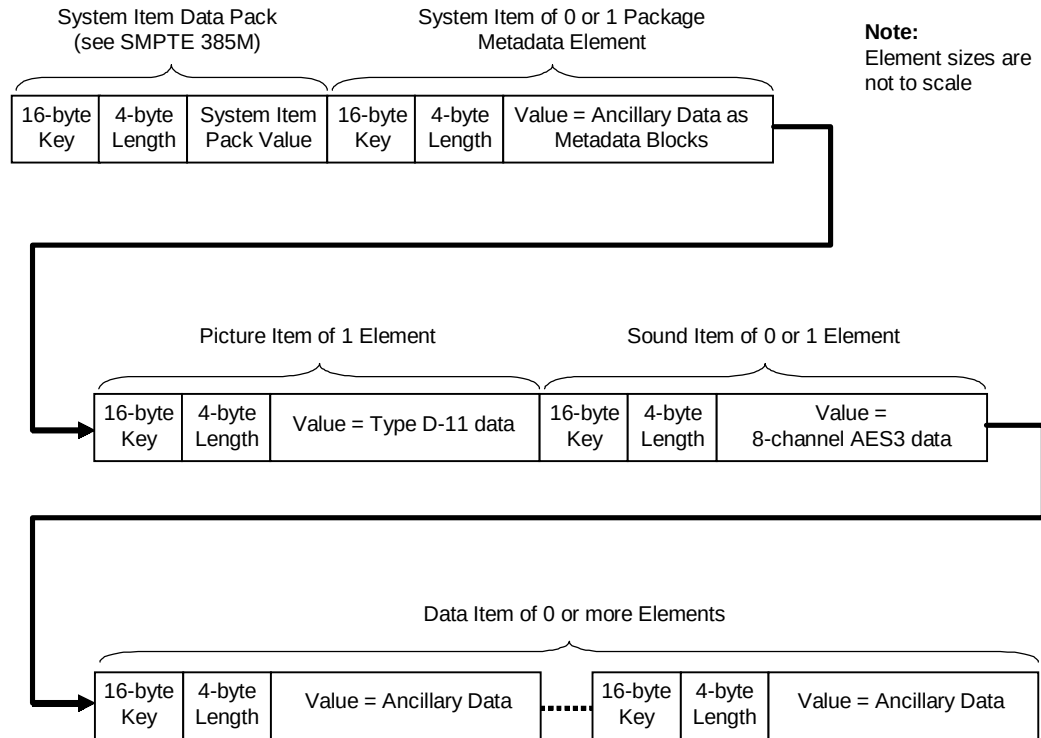


Figure 2 – Sequence of KLV coded GC elements in the type D-11 mapping

5.1.1 Ancillary data packet mapping

The SDTI payload as defined by SMPTE 369M may include “auxiliary data” coded as H-ANC packets according to SMPTE 291M.

These H-ANC packets contain data that can be mapped into either the GC system item or the GC data item depending on the value of the H-ANC data ID word and the secondary data ID word (where applicable). Only those auxiliary data H-ANC packets carrying 8-bit data are supported in this mapping. Any auxiliary data H-ANC packets which contain data ID and secondary data ID values identifying user data words of 9-bits per word are not supported.

Figure 3 illustrates the “auxiliary data” H-ANC packet structure.