SMPTE RECOMMENDED PRACTICE

Packing UMID and Program Identification Label Data into SMPTE 291M Ancillary Data Packets

1 Scope

This practice describes a means of packing unique material identification (UMID) label data or other program identification label data into SMPTE 291M ancillary data packets for transport. Other program identification labels that are not in a KLV format are formatted per SMPTE 336M before packing into ANC packets according to this practice.

This practice is applicable to standard definition serial digital interfaces as defined by ANSI/SMPTE 259M, and with high-definition serial digital interfaces as defined by SMPTE 292M. Packing of UMIDs and other program identification labels in this practice is defined only for 10-bit serial digital interfaces.

2 Normative references

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

ANSI/SMPTE 259M-1997, Television — 10-Bit 4:2:2 Component and 4f_{SC} NTSC Composite Digital Signals — Serial Digital Interface

SMPTE 291M-1998, Television — Ancillary Data Packet and Space Formatting

SMPTE 292M-1998, Television — Bit-Serial Digital Interface for High-Definition Television Systems

SMPTE 330M-2000, Television — Unique Material Identifier (UMID)

SMPTE 336M-2001, Television — Data Encoding Protocol using Key-Length-Value

SMPTE RP 168-2002, Definition of Vertical Interval Switching Point for Synchronous Video Switching

SMPTE RP 210.4-2002, Metadata Dictionary Registry of Metadata Element Descriptions

3 Introduction

Although a UMID or other program identification labels may be formatted similar to generic metadata, they are labels (not metadata).

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A requirement exists to carry this label data within the serial digital stream and that these labels be accorded a high priority and to preserve it transparently.

It is desirable that the UMID data be packed in an ANC packet with its own unique DID and SDID rather than being bundled with other KLV formatted data and packed into ANC packets according to SMPTE RP 214. This is to facilitate the simple identification of ANC packets containing a UMID or other program identification label by interface equipment with minimal resources.

Other program identification labels such as ISAN and V-ISAN data may not have a format directly compatible with KLV coded metadata. These labels must be assigned key values in the metadata dictionary and encoded in KLV format in accordance with SMPTE 336M.

This practice describes a means for packing this data into SMPTE 291M ancillary (ANC) data packets.

4 Location of vertical ancillary data

In order to reduce the latency and buffering required for an ANC data reader, and to promote interoperability, ANC packets containing UMIDs or other program identification labels should be limited to a specific range of the total ANC space; i.e., the vertical ancillary space. In addition, this data may be bound to a specific frame in order to be used. For these reasons, ANC data packets carrying this data should be placed within the vertical ancillary (VANC) space

The data packets shall be located in the active line portion of one line in the VANC space. Data may be located in any line in the area from the line after the line specified for switching as defined by SMPTE RP 168 to the last line before active video, inclusively. On segmented frame progressive formats, these ANC data packets shall occur in the VANC area at the start of the frame.

Receiving equipment should identify the UMID or other program identification label data on the basis of its ANC DID and SDID fields.

The chrominance (Cb/Cr) and luminance (Y) data are carried in two separate streams within the SMPTE 292M signal, complete with their own ANC data flags and CRCs. When the ANC packets defined in this practice are carried in a SMPTE 292M signal, they shall be carried in the Y stream.

5 Format of VANC data packets

Each data packet follows the format defined in SMPTE 291M for a type 2 ANC packet. It consists of the ancillary data flag (ADF), the data ID (DID), the secondary data ID (SDID), the data count (DC), the user data words (UDW), and the checksum (CS). The UDW consists of the data payload.

5.1 ANC packet header format

The ADF has the value 000_h $3FF_h$ $3FF_h$ as defined in SMPTE 291M.

The value of the DID used for the UMID and other program identification label packets defined in this practice is 44_h. The value of the DID (44_h) identifies type 2 ANC packets. The value of SDID shall be 44_h.

DID = 44_h
SDID = 44_h

The DC is a count of the number of words in the UDW. The values of DC for UMID and other program identification label types are determined by the length of these labels as specified in their respective defining documents.

The DID, the SDID, and the DC are transmitted in bits b7-b0 of the 10-bit data word. Bit b8 is even parity for b7 through b0, and b9 equals not b8 as defined in SMPTE 291M.

The format of the data in the UDW is defined in 5.2 of this practice. The format and method of calculating the checksum (CS) are defined in SMPTE 291M.

5.2 UDW format

The ANC packet UDW is a sequence of 10-bit words. The UMID or other program identification label data are transmitted in bits b7 through b0 of the 10-bit data word. When the size of the label characters is less than 8 bits, these characters shall be most significant bit (msb) justified with the msb of the label character in UDW word bit b7 and any unused bits set to zero. Bit b8 is even parity for b7 through b0, and b9 equals not b8. In addition to providing a simple error detection capability, this avoids transmitting data that matches one of the code words 0-3 and 1020-1023 that are prohibited by ANSI/SMPTE 259M and SMPTE 292M.

The UDW shall consist of a key, a length, and the label in the value coded in accordance with SMPTE 336M. Note that in the case of UMID, this is built into the UMID itself.

NOTE – Designers of equipment should be aware that the 10-bit ANC packets defined in this practice may be processed and stored by 8-bit based equipment. ANSI/SMPTE 259M interface supports 8-bit or 10-bit component video interface; however, for this particular application, only a 10-bit interface is defined.

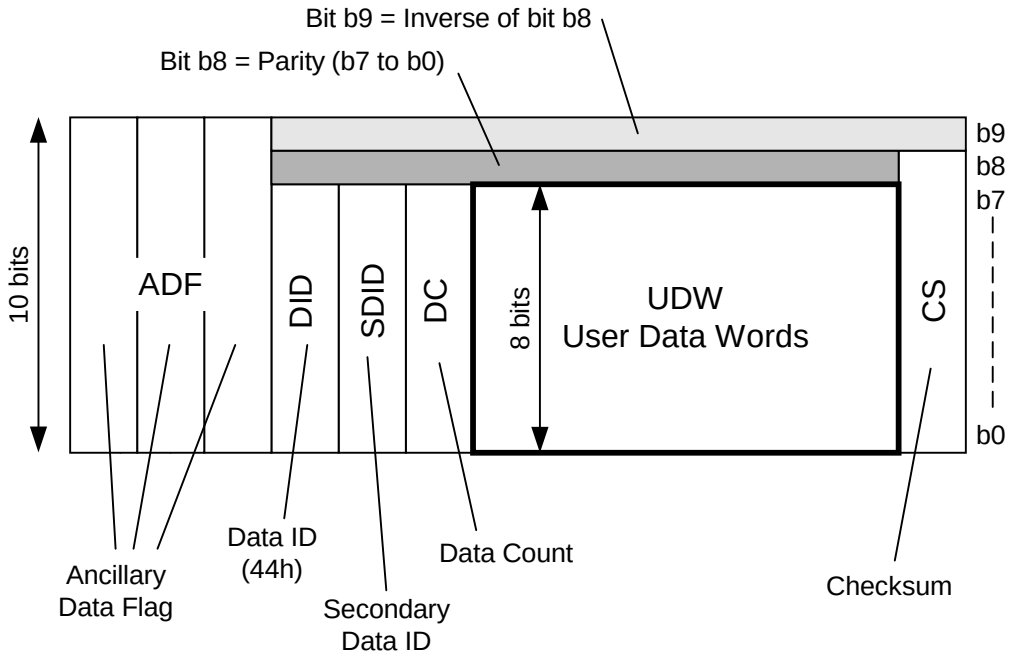

Figure 1 – Data structure of a SMPTE 291M ANC packet (type 2)

Annex A (informative)
UDW format

A.1 UDW format for UMID

The UMID label data is defined in SMPTE 330M and consists of 32 8-bit bytes for a basic UMID or 64 bytes for an extended UMID. The number of words in the UDW is indicated in the DC field of the ANC packet header. For the basic UMID and for the extended UMID, the data count shall be as shown in table A.1. Each byte of the UMID is mapped into one UDW word.

Table A.1 – UMID data count (DC) and key values

Label	Defining standard	Metadata dictionary key		K+L+V length (bytes)	DC (hexadecimal)
Basic UMID	SMPTE 330M	06.0A.2B.34.01.01.01.01	01.01.xx.xx	32	20_h
Extended UMID	SMPTE 330M	06.0A.2B.34.01.01.01.01	01.01.xx.xx	64	40_h

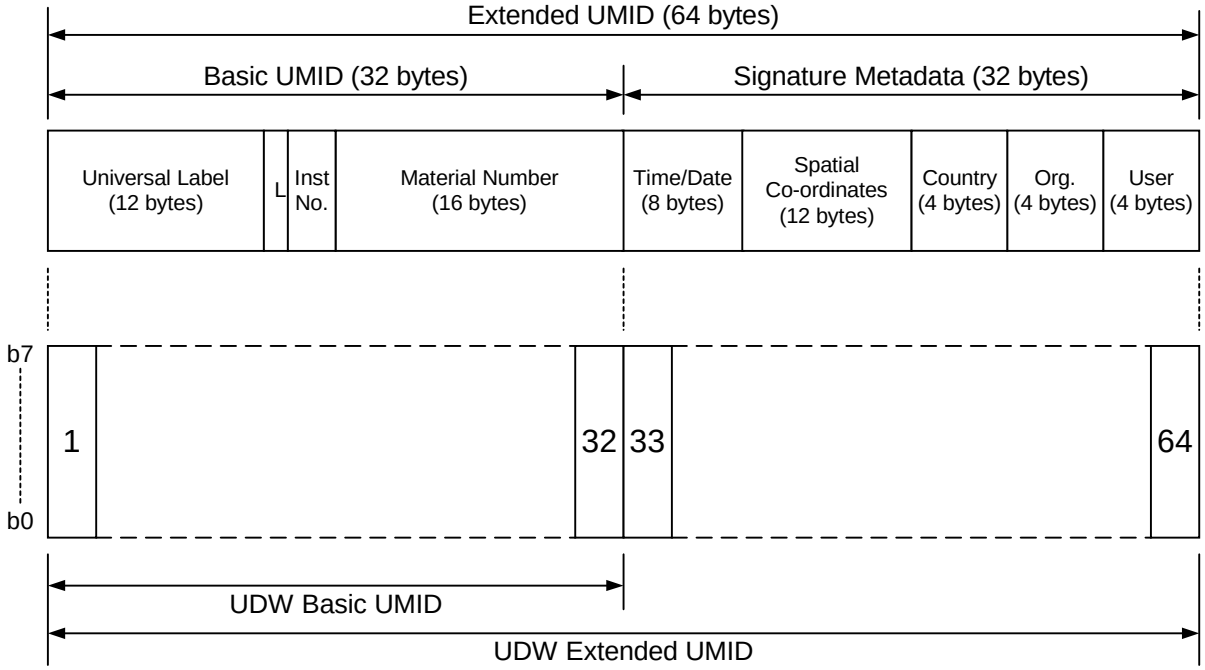

Figure A.1 – Data structure of UDWs for UMIDs

A.2 UDW format for ISAN

The ISAN label data is defined in ISO 15706 and consists of 64 binary bits or 16 hexadecimal digits. The ISAN number value is pre-pended with the KLV key and length per SMPTE 336M. The ISAN digits are transmitted MSB first with the most significant bit of the first digit in bit b7. Two hexadecimal digits of the ISAN are mapped into each UDW word. The number of words in the UDW is indicated in the DC field of the ANC packet header.

Table A.2 – ISAN data count (DC) and key values

Label	Defining standard	Metadata dictionary key		Label length (bytes)	DC (hexadecimal)
ISAN	ISO 15706	06.0E.2B.34.01.01.01.01	01.01.11.01.00.00.00.00	8	19_h

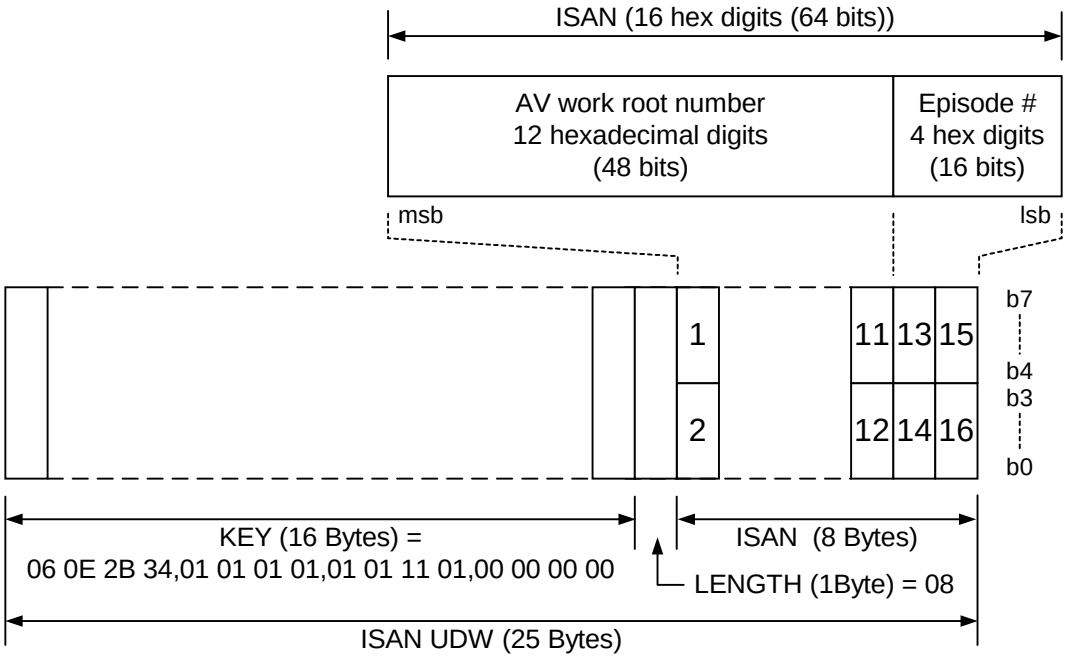

Figure A.2 – Data structure of UDWs for ISANs

Annex B (informative)
Bibliography

SMPTE RP 205-2000, Application of Unique Material Identifiers in Production and Broadcast Environments

SMPTE RP 214-2002, Packing KLV Encoded Metadata and Data Essence into SMPTE 291M Ancillary Data Packets

ISO 15706:2002, International Standard Audiovisual Number (ISAN)