SMPTE STANDARD

for Television —
Format for Non-PCM Audio and Data in AES3 — KLV Data Type

1 Scope

This standard specifies data type specific format requirements for SMPTE 336M (KLV) data bursts carried within an AES3 interface according to SMPTE 337M.

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

SMPTE 337M-2000, Television — Format for Non-PCM Audio and Data in AES3 Serial Digital Audio Interface

SMPTE 338M-2000, Television — Format for Non-PCM Audio and Data in AES3 — Data Types

SMPTE RP 210.1-2001, Metadata Dictionary

3 Introduction

This standard describes a means for packing SMPTE metadata and/or essence encoded in the SMPTE 336M KLV protocol into AES3 serial digital streams. A strong interest exists to carry audio/visual data, metadata, and/or essence within the same digital stream. The use of one data stream facilitates delivery and synchronization of the overall multimedia presentation to the consumer. Metadata is classified as information about the content or essence. An example of metadata is information such as camera angle, scene identifier, or property rights. Other essence is supplemental content to the audio and video such as closed captioning, sports statistics, or hyperlinked advertisements.

4 SMPTE 336M (KLV) burst_preamble

The SMPTE 337M protocol describes an interface format for the transport of non-PCM audio or data, using the AES3 serial digital audio interface. The SMPTE 336M (KLV) data type is provided for the transmission of non-PCM data formatted according to the SMPTE 336M (KLV) protocol.

4.1 data_type

The data_type shall have a value of 27.

4.2 data_type_dependent

The burst_preamble for a SMPTE 336M (KLV) type data burst shall include a data_type_dependent field encoded as shown in table 1.

Table 1 – Values of data_type_dependent field for SMPTE 336M (KLV) data type

data_type_dependent bit number	Meaning
0–3	Reserved, shall be set to 0000
4	key_flag

Approved
April 19, 2001

4.3 key_flag

When this flag is set to 1, a universal label key as defined in SMPTE 336M (KLV) shall be present at the beginning of the burst_payload indicating that the data burst contains the start of a KLV packet. When this flag is set to 0, no key shall be present in the burst_payload indicating that the data burst is a continuation of a KLV packet.

5 SMPTE 336M (KLV) burst_payload

KLV data packets shall be placed into the burst_payload such that the beginning of the KLV packet (starting with a universal label data key) shall be present at the beginning of a burst_payload immediately following preamble word Pd (length_code). The key_flag in the data_type_dependent field of this data burst shall be set to 1 indicating the data burst contains the start of a KLV packet. The KLV packet shall be segmented into 16-, 20-, or 24-bit data words for mapping into the AES3 subframes of the burst_payload depending on the data_mode specified in the burst_preamble. The first bit of the UL data key shall be placed in time slot 27 of the first AES3 subframe of the burst_payload. Any unused AES3 time slots in the last AES3 subframe of the burst_payload shall be filled with 0 as specified in SMPTE 337M. If the size of the KLV packet exceeds the size of the burst_payload in this data burst, the KLV packet shall be continued in subsequent data bursts of the same data_stream_number with the key_flag set to 0 in the additional data bursts. In this way, a single KLV packet may span multiple data bursts. Individual data bursts shall contain no more than one KLV packet.

Other standards or recommended practices may specify additional formatting requirements for data bursts for specific data types carried within the KLV packet.

Annex A (informative)
Organization of references

The organization of SMPTE standards and recommended practices addressing the coding of individual data items such as essence and metadata are illustrated in figure A.1. No single standard can contain all of the information needed to describe and encode all data. The encoding protocol standard (SMPTE 336M) and the metadata dictionary document (SMPTE RP 210) form the SMPTE normative standards for defining metadata and its coding. Informative SMPTE documents supplement the standards for encoding with examples and administrative instructions on managing the data standardization and registration process.

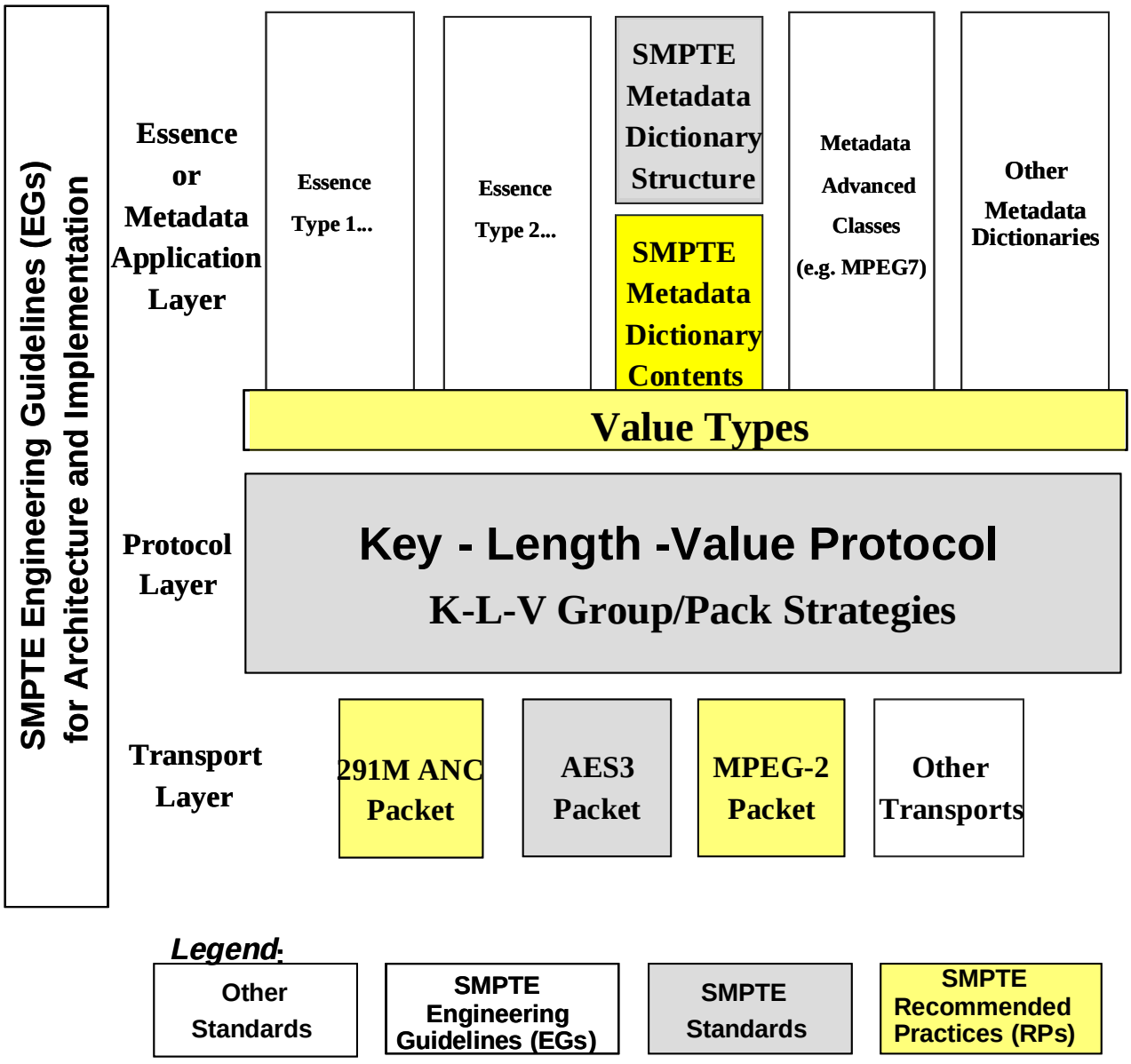


Figure A.1 – Organization of references

Annex B (informative)
KLV data packets

KLV data packets consist of a 16-octet (byte) universal label data key segment (key), a length segment, and a value segment. The key segment consists of a number of subsegments as shown in figure B.1.

When conveying KLV data on the AES3 interface, the KLV packet is first mapped into the burst_payload section of one or more data bursts as defined in SMPTE 337M and this standard (see figure B.2). Should the length of the KLV packet exceed the size of the burst_payload section of a data burst, then the KLV packet is continued in subsequent data bursts (see key_flag designator above).

The data bursts containing the KLV packets must then be subsegmented and mapped into AES3 subframes. AES3 subframes consist of 32 bits (time slots) of which 16, 20, or 24 bits may be used to carry data, depending on the data mode that is selected. This mapping is illustrated in figure B.3. As shown, the most significant bit (MSB) of each 16-, 20-, or 24-bit subsegment will map to time slot 27 of the AES subframe. The least significant bit (LSB) will map to time slot 12, 8, or 4 depending on the data mode.

Figures B.4–B.6 illustrate a detailed mapping of the burst_preamble and burst_payload segments to AES3 time slots. Since the burst_preamble is defined to always occupy four AES3 subframes independent of the data_mode, the start of the burst_payload and, therefore, the start of the KLV data will always begin in time slot 27 of an AES3 subframe. Note that in the 20-bit mode, some bytes will be split between AES3 subframes with 4 bits in one AES3 subframe and 4 bits in the following AES3 subframe (as shown in figure B.5).

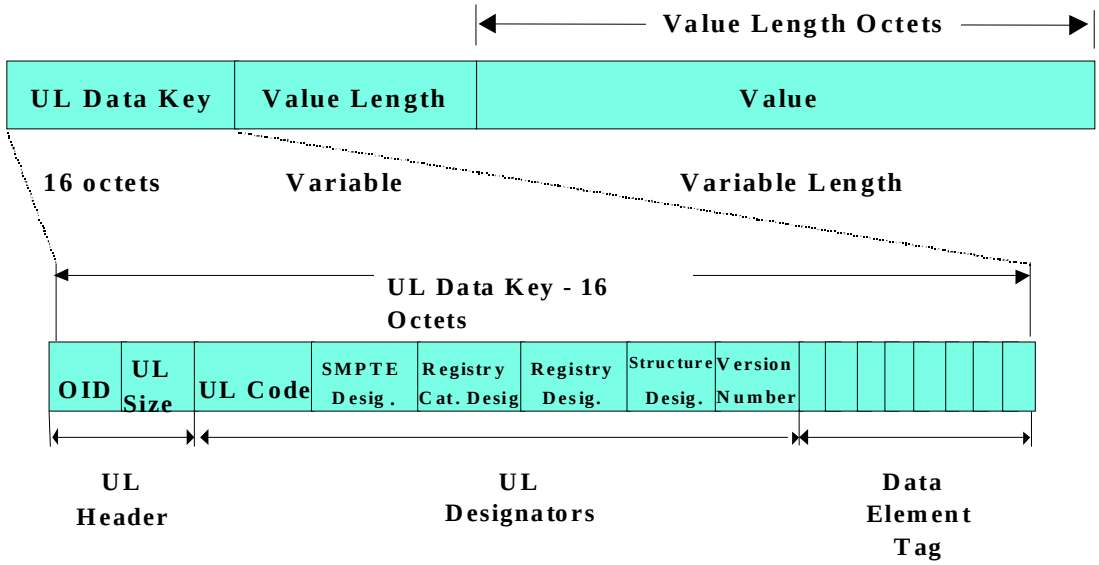


Figure B.1 – SMPTE KLV data packet

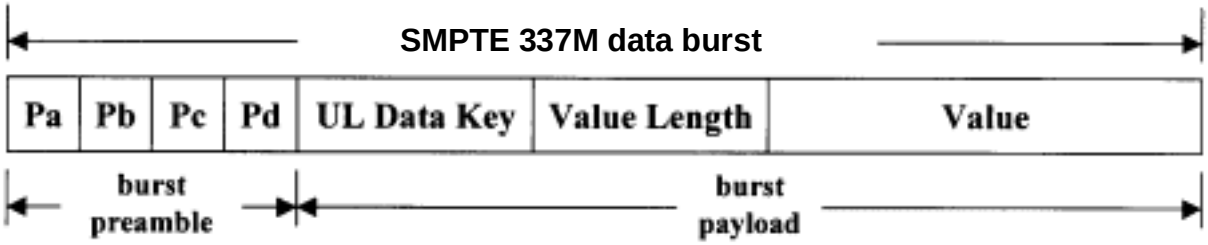


Figure B.2 – KLV mapping to AES3 data bursts

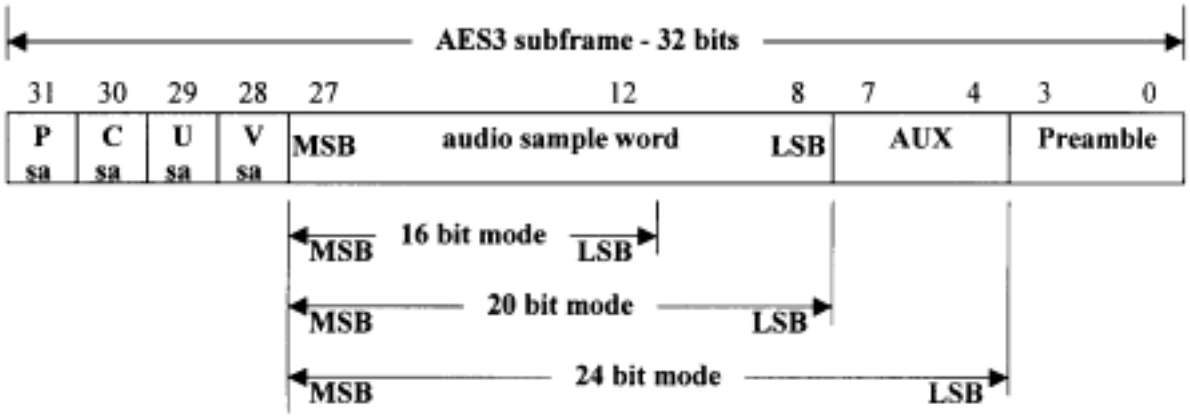


Figure B.3 – Mapping data burst segments to AES3 subframes

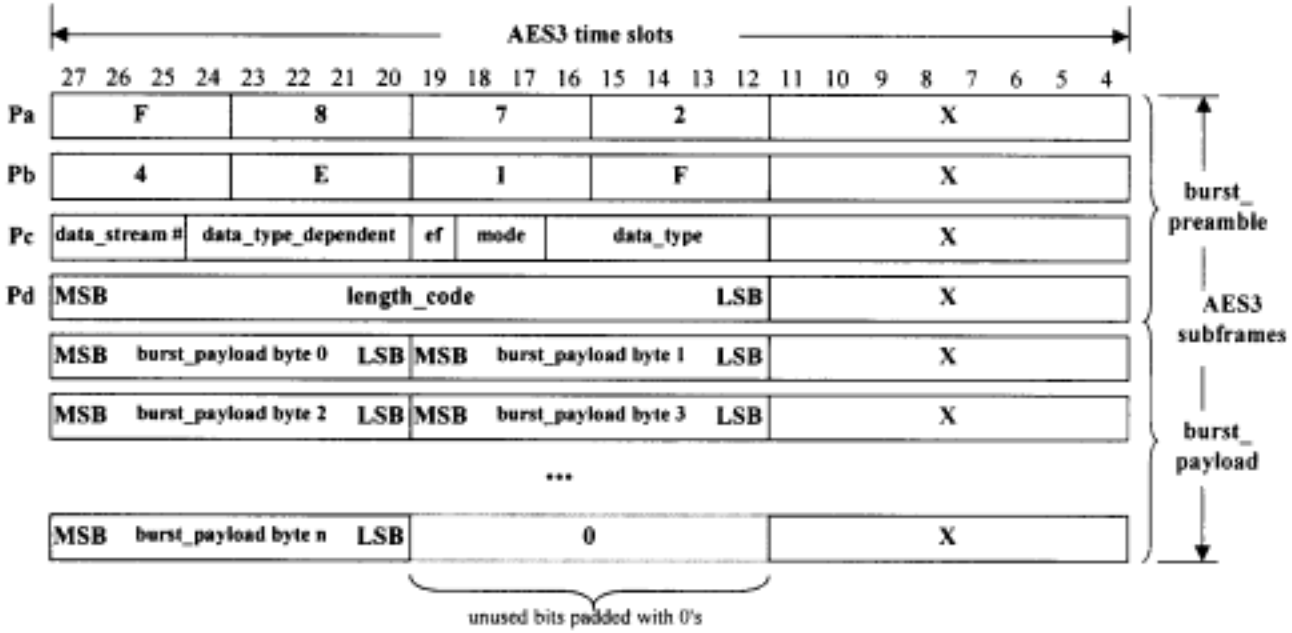


Figure B.4 – Mapping data burst segments to AES3 time slots (16-bit mode)

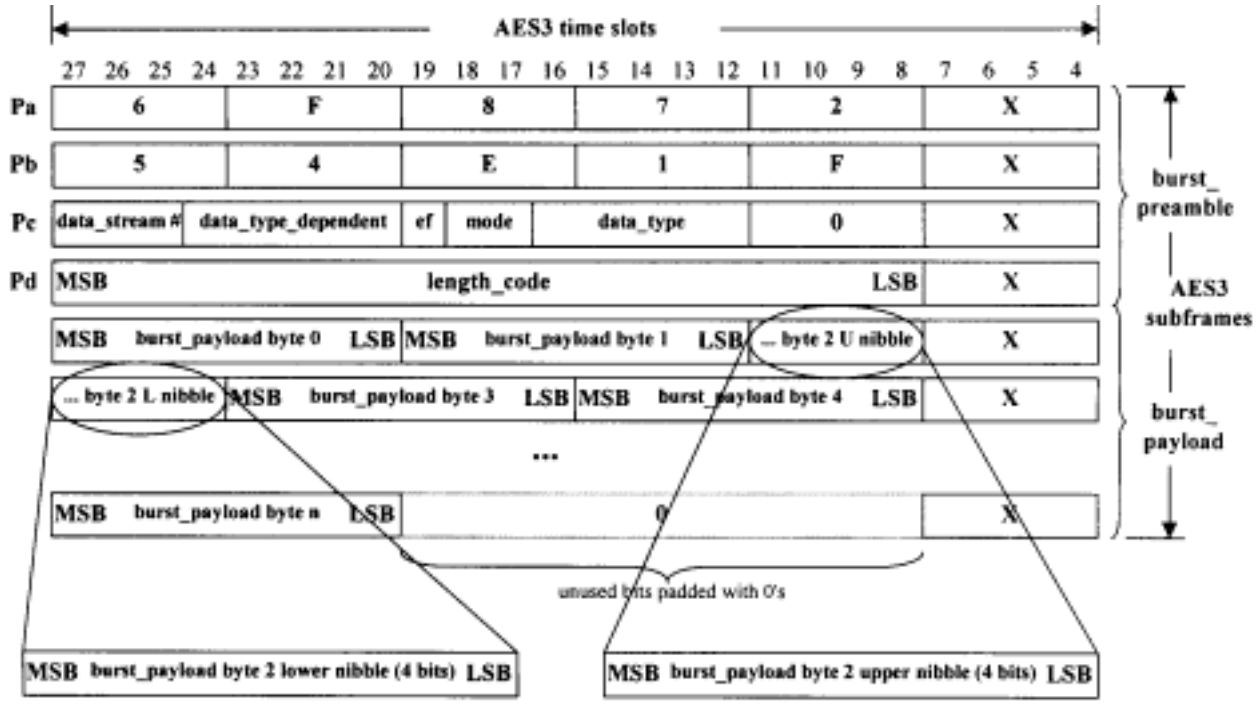


Figure B.5 – Mapping data burst segments to AES3 time slots (20-bit mode)

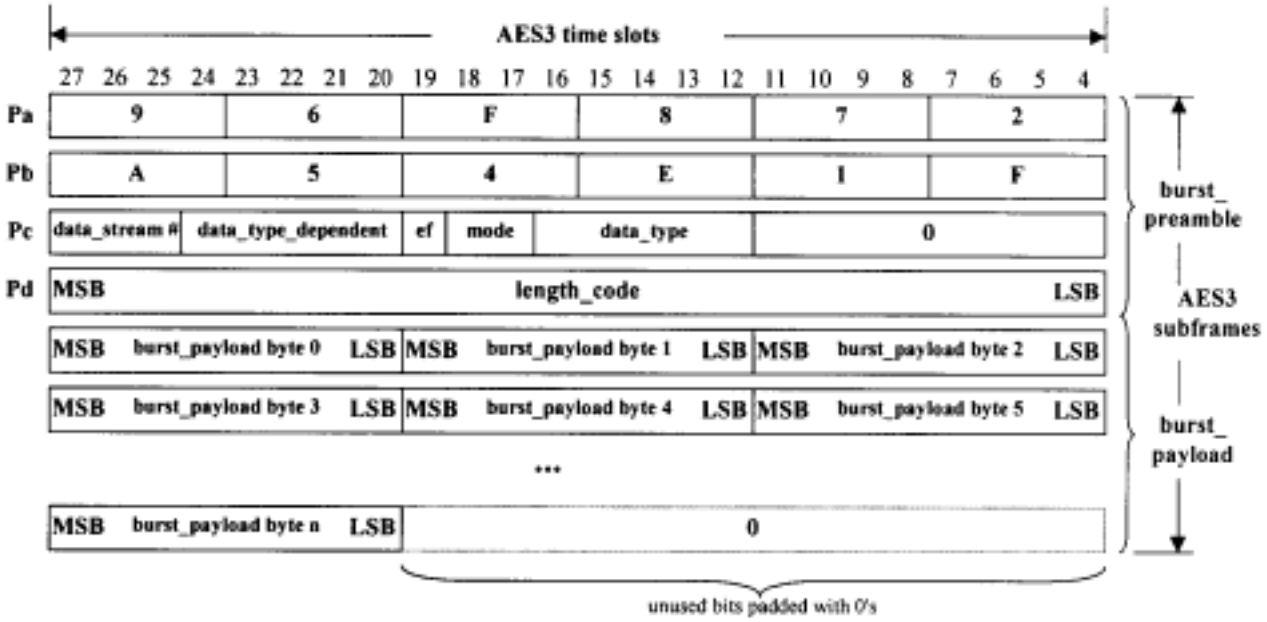


Figure B.6 – Mapping data burst segments to AES3 time slots (24-bit mode)

Annex C (informative)
Example

As an example of mapping KLV packets into the AES3 interface, consider a KLV packet with a key as shown in figure C.1.

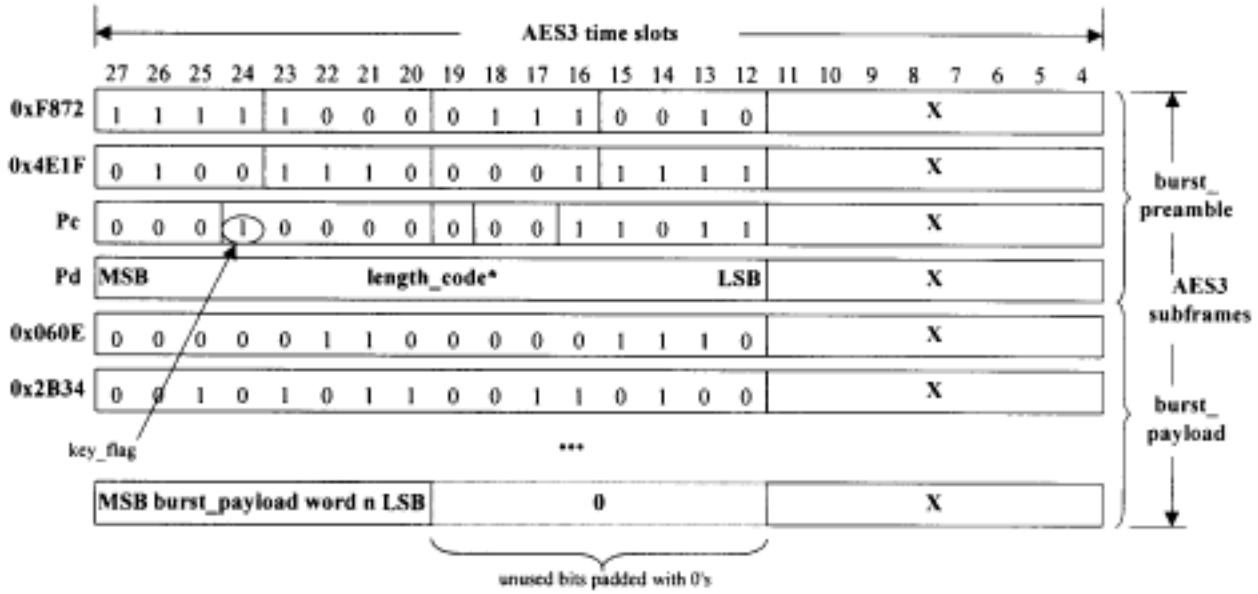
In this example, the KLV packet is to be carried in the AES3 interface in the 16-bit mode in a single AES3 data burst identified as stream #0. Therefore, the values of the fields in the burst_info header of the AES3 burst_preamble are:

data_stream_number = 0
data_type_dependent = 0 × 10 (key_flag is set indicating key is present)
error_flag = 0
data_mode = 0
data_type = 0 x 1B

Therefore, the mapping of the KLV packet to the AES3 data burst is as shown in figure C.2.

06.0E.2B.34.01.01.01.01.07.09.02.02.02.00.00

Figure C.1 – Example universal label data key



*Length_code indicates the length of burst_payload (in bits) which in this example will equal the size of the entire KLV packet.

Figure C.2 – Example mapping of KLV data burst to AES3 time slots

Annex D (informative)
Bibliography

AES3-1992, Digital Audio Engineering — Serial Transmission Format for Two-Channel Linearly Represented Digital Audio Data

ANSI/SMPTE 298M-1997, Television — Universal Labels for Unique Identification of Digital Data