SMPTE STANDARD

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SMPTE ST 291:2010

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SMPTE ST 291:2011; Content Unchanged

Ancillary Data Packet and Space Formatting

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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 Section XIII of its Engineering Operations Manual.

SMPTE ST 291-1 was prepared by Technology Committee 32NF.

Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. Attention is drawn, however, to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

Ancillary data packets and space formatting described by this Standard reside in the Ancillary data space defined by an interconnecting interface document. Ancillary data space in a serial interface is a space not used by the main data stream and can be used as a transport for data associated with the main data stream. The type of payload data carried in the ancillary data space is defined in separate application documents.

SAV (Start of Active Video) and EAV (End of Active Video) markers that mark active digital video/data spaces exist on all serial digital interfaces (SDI, HD-SDI and SDTI), regardless of the number of TV lines used by the television system.

During the horizontal interval of every television line, the ancillary data space that is located between EAV and SAV markers is called horizontal ancillary data space (HANC).

During the vertical interval of each field or frame, the ancillary data space located between SAV and EAV markers is called vertical ancillary data space (VANC).

Ancillary data packets are divided into Type 1 and 2, where Type 1 uses a single ID word and Type 2 uses two ID words. Using such a method allows for a wider range of identification values within the limited ID word space. In addition, a total of 189 data identification values are reserved for 8-bit applications, whereas up to approximately 29,000 values are provided for 10-bit applications.

The basic formats of ancillary data packets are similar for both Type 1 and Type 2, but they differ in the use of a data block number. The definitions of the individual parts that make up the ancillary data packet, such as ancillary data flags (ADF), data identification (DID), secondary data identification (SDID), data block number (DBN), data count (DC), data validity checksum (CS), together with restrictions on user data words (UDW), are specified in this standard.

All of the assigned Ancillary ID codes are documented in the SMPTE online register (maintained by SMPTE-RA, LLC) titled "Assigned Ancillary Identification Codes," which serves as a register for the ancillary ID space

and is an element of this document.. The reason for such a register is to assure timely updated information on assigned ancillary codes for implementers. Documents utilizing ancillary data, as defined by this standard, normatively include their assigned ID values, so the SMPTE online register need not be a normative reference.

Legacy Equipment (Informative)

The serial digital interfaces (SMPTE ST 259, SMPTE ST 305, and SMPTE ST 292) and component parallel digital interfaces (SMPTE ST 125, SMPTE ST 274 and SMPTE ST 296) are capable of passing 10-bit words (Data 9 – Data 0). Some legacy equipment, however, is capable only of processing 8-bit data words (carried on interfaces as Data 9 – Data 2). Passage of 10-bit words through such equipment therefore will result in truncation of the two least significant bits (Data 1 and Data 0) of ancillary data words.

1 Scope

This standard specifies the basic formatting structure of the ancillary data space in digital video data streams in the form of 10 bit words. Application of this standard includes, but is not limited to, 525-line and 625-line standard definition digital television interfaces (component and composite), high definition digital television interfaces (750 and 1125 lines), and D-Cinema interfaces that provide 8-bit or 10-bit ancillary data spaces.

Space available for ancillary data packets is defined in documents specifying connecting interfaces.

Ancillary data packet payload definitions for a specific application are specified by a SMPTE Standard, Recommended Practice, or Registered Disclosure Document, or by a document generated by another organization, a company, or an individual (an Entity). When a payload format is registered with SMPTE, an application document describing the payload format is required, and the registered ancillary data packet is identified by a registered data identification word.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or that contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and that can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative," or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next, followed by formal languages, then figures, and then any other language forms.

Note that, throughout this standard, a lower case “h” following a numerical value indicates hexadecimal notation.

3 Normative References

No Normative references are specified for implementation of this standard.

4 DID and DID/SDID Registration Process

Type 1 and Type 2 Data Identifier values (see Section 5.1) shall be registered with SMPTE by following the process defined in this section. The current list of registered values shall be contained in an online register at:

http://www.smpte-ra.org/S291/S291_reg.html.

The online register is a record of the uses of the ID values and constitutes an integral part of this document. The normative definitions of all DID/SDID values shall be contained in their associated technical application documents. The register shall designate provisional registration values by a suitable notation.

Regardless of the availability of an original application document, registered DID/SDID values shall not be changed or deleted administratively.

Type 1 and Type 2 value registrations by SMPTE Technology Committees shall follow the process described in Section 4.1. Type 2 value registrations by other Entities shall follow the process described in Section 4.2.

4.1 SMPTE Technology Committees

SMPTE Technology Committees, during the document standardization process, shall request registration of Type 1 DID and Type 2 DID/SDID values based upon normative value definitions in SMPTE Standards, Recommended Practices, or Registered Disclosure Documents.

Requests for proposed registrations shall be made to the SMPTE Director of Engineering, who will enter the Type 1 or Type 2 values in the online register, provided there is no known conflict.

Provisional DID/SDID values shall be added to the register and indicated by a suitable notation when the defining Engineering Document reaches the Final Committee Draft (FCD) level of approval. The provisional status notation shall be removed when the document is elevated to Draft Publication (DP).

Note that these levels of approval (FCD, DP) are defined in the SMPTE Engineering Operations Manual.

4.2 Other Organizations, Companies and Individuals (External Entities)

Other organizations, companies, and individuals (i.e., Entities) may request registration of Type 2 DID/SDID values within the Registered to External Entities assigned space and shall be required to submit a complete technical application document (e.g., an external standard) specifying the proposed use of the Type 2 value. Requests and all supporting documents shall be in English and accompanied by complete contact details for the Entity requesting the Type 2 value registration.

The submitted technical application document shall contain sufficient information about the ancillary data packet payload that interoperability is enabled and that other users can develop equipment using the Entity's defined ancillary data packet. The document either shall be publicly available, or the right to copy without charge shall be granted to SMPTE.

An application by an Entity for assignment of an ID value shall include information indicating whether the submitted technical application document is believed to contain intellectual property rights, so that attention is drawn to the possibility that some of the elements of the technical application document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any such patent rights.

Requests for Type 2 identifiers shall be made to the point of contact listed on the SMPTE-RA website identified above. Upon determining that these requirements have been met adequately, the SMPTE Director of Engineering shall process the request from an Entity by assigning the desired Type 2 value and entering the assigned code in the online register.

If the submitted document is in draft form, the Entity may request a provisional DID/SDID value. In such a case, a suitable notation signifying a provisional registration shall be made in the online register. Provisional status shall be removed once a final technical application document has been received from the Entity by the SMPTE Director of Engineering. Provisional values shall be valid only for 12 months from the date of posting in the online register. If the final version of the Entity's technical application document is not received by the SMPTE Director of Engineering within that time, the provisional DID/SDID values may be removed from the register and made available for another use.

4.3 Registration Request Conflicts

In the event that a request for a value or values is in conflict with an existing registration or with another SMPTE document under development and the Director of Engineering is unable to resolve the conflict with the requesting parties, values shall be issued in the order of their having been requested.

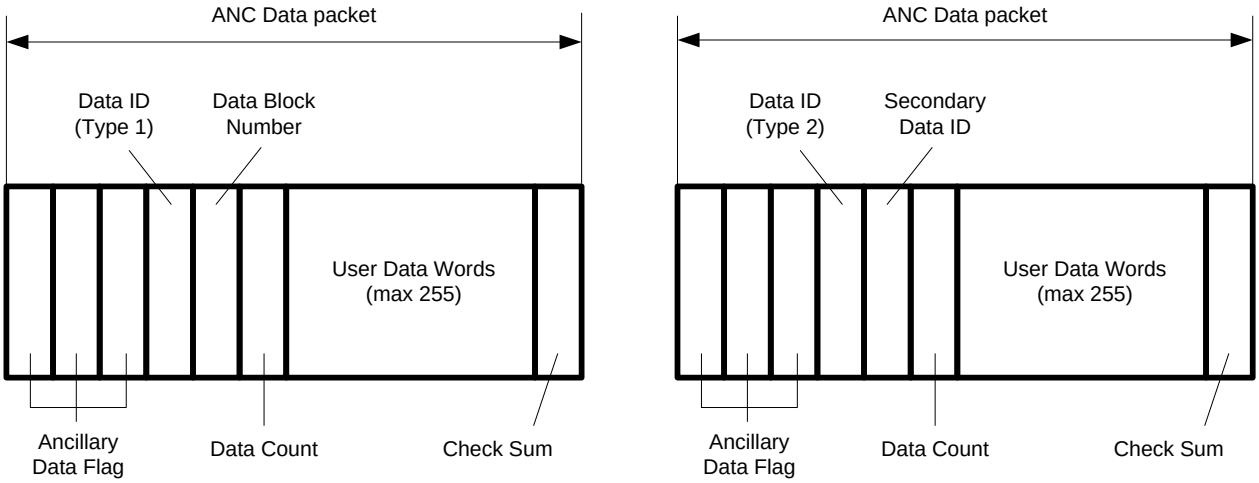
5 Ancillary Data Packet Format

5.1 Ancillary Data Packet Types

Ancillary data packets shall be formatted into one of two types: Type 1 or Type 2, as specified below and shown in Figures 1(a) and 1(b), respectively.

Type 1 – Shall use a single-word data identification – defined as a data ID (DID) word – that is followed by data block number (DBN) and data count (DC) words.

Type 2 – Shall use a dual-word data identification – defined as a combination of a data ID (DID) word and a secondary data ID (SDID) word – that is followed by a data count (DC) word.



(Figure 1a) Type 1 **(Figure 1b) Type 2**

Figure 1 – Ancillary data types (Component data packets formats shown)

Ancillary data shall be defined as 10-bit words. This is required by the structures of the signal formats and their interfaces. These bits are annotated using b0 for the least significant bits (LSBs) of the 10-bit words and b9 for the most significant bits (MSBs) of the 10-bit words.

A Type 1 ancillary data packet shall be composed of:

a) An ancillary data flag (ADF) word that marks the beginning of the ancillary data packet.

b) A data identification (DID) word that defines the user data format carried in user data words (UDW) in the ancillary data packet.

c) A data block number (DBN) word (for Type 1 only) that distinguishes successive ancillary data packets with a common data ID.

d) A data count number (DC) word that defines the quantity of user data words in the ancillary data packet.

e) The user data words (UDW), comprising up to 255 words in each ancillary data packet, where the user data format is defined in a separate, specific application document.

f) A checksum (CS) word.

A Type 2 ancillary data packet shall be composed of the same elements as a Type 1 ancillary data packet except that the data block number (DBN) shall be replaced by a secondary data identification (SDID) word.

The length of the ancillary data flag (ADF) word may be specified in the document defining the relevant interconnecting interface. Unless specified otherwise in the standard that defines the interface, there shall be three ADF words for a component ancillary data packet and one word for a composite ancillary data packet.

Both data identification types may be used on either component or composite interfaces while retaining the same ancillary data packet payload definitions.

Assigned DID and DID/SDID value combinations shall be neither changed nor deleted and shall remain in the assigned register in perpetuity.

5.2 Component Interface Ancillary Data Packet Format

The format of the component ancillary data packet shall be as shown in Figure 2.

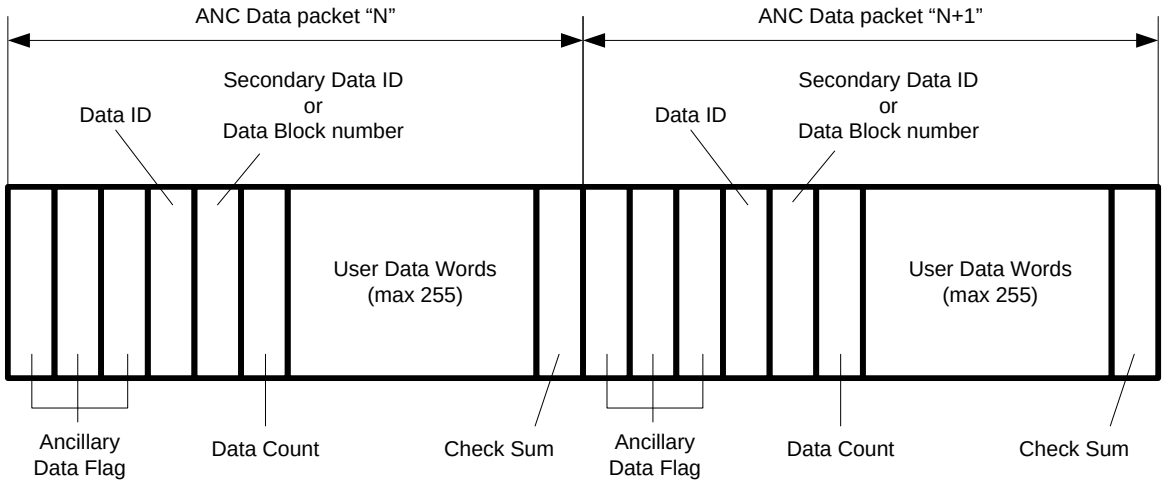


Figure 2 – Component interface ancillary data packet format

Unless specified otherwise in the standard defining the component interface, the ancillary data flag for the component ancillary data packet format shall be:

000h 3FFh 3FFh

Note: To maximize compatibility between 8-bit and 10-bit equipment, equipment designers are advised to process ADF data values using only the 8 most significant bits. Thus, values in the ranges of 000h to 003h and of 3FCh to 3FFh need to be treated as identical to one another. References in this standard to any specific ADF data values assume that only the 8 most significant bits are considered significant

Definitions of individual packet format data elements are specified in Sections 6.1 through 6.7.

5.3 Composite Interface Ancillary Data Packet Format

The format of the composite ancillary data packet shall be as shown in Figure 3.

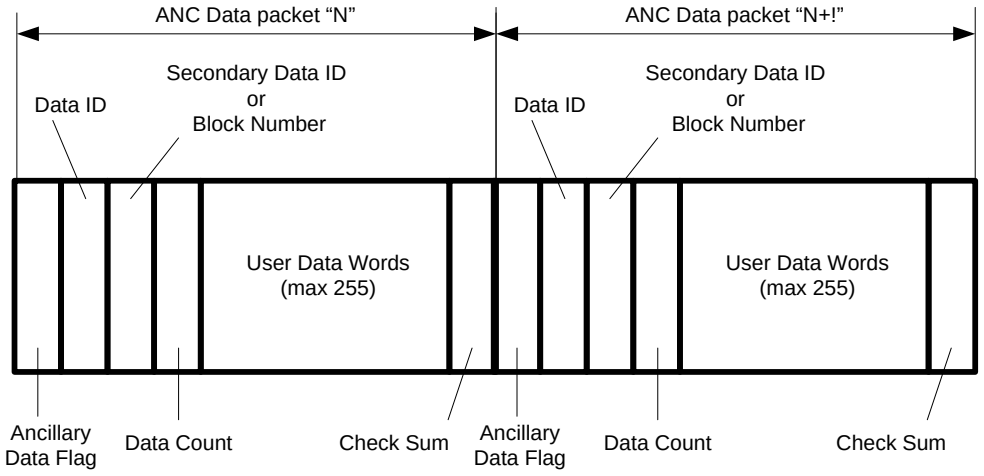


Figure 3 – Composite interface ancillary data packet format

Unless specified otherwise in the standard defining the composite interface, the Ancillary Data Flag for the composite ancillary data packet format shall be 3FCh.

Note: Equipment designers are advised that the value of the composite ancillary data flag (3FCh) is expected to be processed as described in the note in Section 5.2.

Definitions of individual packet format data elements are specified in Sections 6.1 through 6.7.

6 Ancillary Packet Format Data Elements

6.1 Data Identification Word (DID) (Type 1 and 2 Data)

The data ID (DID) word shall consist of 10 bits, comprising an 8-bit identification word plus even parity and its inverse, as follows:

bits b7 (MSB) through b0 (LSB) shall define the 8-bit DID word (00h - FFh)

bit b8 shall be even parity for bits b7 through b0

bit b9 = NOT b8.

DID words shall be divided into Type 1 and Type 2 categories, as defined in Figures 4a and 4b. The setting of bit b7=1 shall indicate Type 1 data identification, and b7=0 shall indicate Type 2 data identification.

DID words shown as SMPTE-registered in Figures 4a and 4b shall be restricted to values in the ranges shown and shall be assigned by SMPTE according to the process defined in Section 4.1. These DID values are used for ancillary data applications of general interest; therefore, strict compliance with this standard assures interoperability between equipment utilizing these applications.

DID words shown as SMPTE-Registered to External Entities shall be restricted to values in the range shown in figure 4b and shall be assigned by SMPTE according to the process defined in Section 4.2. These DID values are used for ancillary data applications defined by external Entities. Certain of the DID/SDID values for External Entities (viz., 43h/01h, 04h) assigned prior to this revision of this document shall be exempted from this rule.

DID words shown as User Application are not registered, and User Applications shall be restricted to the use of values in the ranges shown. They may be assigned by the end user and/or by the manufacturer of the specific equipment. Some unregistered applications may provide application documents defining specific DID use to minimize conflicts.

User Applications that employ User DID/SDID values and that subsequently are registered following documentation of their specific implementations shall not continue to employ User Application DID/SDID values, and new DID/SDID values from the SMPTE-registered space defined in Figure 4b shall be assigned to them. Exceptions from the rule regarding employment of User-assigned DID/SDID code combinations are code pairs 50h/01h and 51h/01h.

Note: Equipment designers are encouraged to make equipment employing User DID/SDID values user-configurable to enable minimizing contention problems.

DID words shown in Figure 4b as reserved for 8-bit applications shall be restricted to three values in the range shown. Of the values 04h – 0Fh reserved for 8-bit applications, the only valid values shall be 04h, 08h, 0Ch. Other values in the range reserved for 8-bit application should be truncated to these three values. Other values in the reserved range should not be used in an 8-bit system because they will be truncated and become indistinguishable from DIDs such as the value having the meaning “Packet Marked for Deletion.”

DID words shown as “Reserved” are reserved for future use.

6.2 Secondary Data Identification Word (SDID) (Type 2 Data only)

The secondary data ID (SDID) word shall consist of 10 bits, comprising an 8-bit identification word plus even parity and its inverse, as follows:

bits b7 (MSB) through b0 (LSB) shall define the 8-bit SDID word (00h through FFh)

bit b8 shall be even parity for bits b7 through b0

bit b9 = NOT b8.

SDID words, which apply only to the Type 2 data identification format, shall be in the range of values from 01h through FFh, as shown in Figure 4b. The value 00h is reserved.

When an SDID word value is used for an 8-bit application, the SDID shall be restricted to the 63 values (excluding 00h) indicated below:

x0h, x4h, x8h, xCh,

where x may be any value in the range 0h through Fh.

Data Type	Data Value DID	Data Assignment
	00h	Reserved
Type 1 (1 Word ID)	80h	Packet Marked for Deletion (see section 6.3)
	81h 83h	Reserved
	84h	Reserved
	85h 87h	Reserved
	88h	Reserved
	89h 8Bh	Reserved
Type 1 (1 Word ID)	8Ch 9Fh	Reserved
	A0h AFh	SMPTE registered
	B0h BFh	SMPTE registered
	C0h CFh	User Application
	D0h DFh	SMPTE registered
	E0h EFh	SMPTE registered
	F0h FFh	SMPTE registered

Figure 4a – DID values for Type 1 ancillary data packets

Data Type	Data Value DID	Data Assignment
	00h	Reserved
Type 2 (2 Word ID)	01h 03h	Reserved
	04h 0Fh	Reserved for 8-bit Application (see 6.1)
	10h 1Fh	SMPTE Registered External Entity Space (see 6.1)
	20h 3Fh	Reserved
	40h 4Fh	SMPTE registered
	50h 5Fh	User Applications (see 6.1)
	60h 7Fh	SMPTE registered

Data Type	Data Value SDID	Data Assignment
	00h	Reserved
Type 2 (2 Word ID)	01h FFh	Used by Specific Application

Figure 4b – DID and SDID values for Type 2 ancillary data packets

Figure 4 – Data type and data identification word assignment ranges

6.3 Data Identification Word for Deletion of an Ancillary Data Packet

An ancillary data packet with a DID word value equal to 80h may be deleted by any equipment during a subsequent processing cycle (see Annex C). The occupied ancillary data space, however, shall remain contiguous as defined in Section 7.3.

Note: Designers of equipment are advised that, in 8-bit systems, ancillary data packets with DID words in the range of 80h – 83h all are considered to be marked for deletion.

6.4 Data Block Number (DBN) (Type 1 Data only)

The data block number (DBN) word shall be incremented by one, from 1 through 255 and then recycling, for each consecutive Type 1 data packet sharing a common DID and requiring a continuity indication.

The DBN word in the Type 1 data identification system shall consist of 10 bits, comprising an 8-bit data block number plus even parity and its inverse, as follows:

bits b7 (MSB) through b0 (LSB) shall define the data block (packet) number word

bit b8 shall be even parity for bits b7 through b0

bit b9 = NOT b8.

If the number of packets in a message is longer than 255 packets, then the DBN shall be recycled continuously from 1 through 255 with subsequent groups of packets. Equipment designers are encouraged to include additional information about the message length in the user data words.

When bits b7 through b0 of the data block number (DBN) are set to zero, the DBN shall be inactive and shall not be used by the receiver to determine data continuity.

Note: Due to the truncation of the two least significant bits, 10-bit DBN words become invalid in systems processing only 8-bit data words. Designers intending to enable processing of 10-bit ancillary data packets using 8-bit equipment need to define specific data block number determination algorithms in their application documents.

6.5 Data Count (DC)

The data count (DC) word shall represent the number of user data words (UDW) to follow – from a minimum of 0 up to a maximum of 255 words. In 10-bit applications, it shall consist of 10 bits, comprising an 8-bit data count word plus even parity and its inverse, as follows:

bits b7 (MSB) through b0 (LSB) shall define the data count number

bit b8 shall be the even parity for bits b7 through b0

bit b9 = NOT b8

Note: Due to the truncation of the two least significant bits, 10-bit DC words become invalid in systems processing only 8-bit data words. Designers intending to enable processing of 10-bit ancillary data packets using 8-bit equipment need to define specific data block number determination algorithms in their application documents.

6.6 User Data Words (UDW)

User data words shall be used to convey information as identified by the DID word or the DID and SDID words and shall not include protected codes as defined in Section 9.

The maximum number of user data words in a single packet shall be 255.

In 10-bit applications, user data words shall consist of 10-bit words formed by:

bit b9 (MSB) through b0 (LSB).

In 8-bit applications, user data words shall consist of 8-bit words formed by:

bit b9 (MSB) through b2 (LSB).

6.7 Checksum Word (CS)

The checksum (CS) word shall be used to determine the validity of the ancillary data packet from the data identification (DID) word through the user data words (UDW). It shall consist of 10 bits, wherein:

bits b8 (MSB) through b0 (LSB)shall define the checksum value

bit b9 = NOT b8.

In 10-bit applications, the checksum value shall be equal to the nine least significant bits of the sum of the nine least significant bits of the data identification (DID) word, the data block number (DBN) or secondary data identification (SDID) word, the data count (DC) word, and all user data words (UDW) in the packet.

Prior to the start of the checksum count cycle, all CS bits shall be preset to zero, and any end carry resulting from the checksum count cycle shall be ignored.

Due to the limited capability of the checksum system, equipment designers are encouraged to include in specific User Applications additional data protection algorithms to protect data in the user data areas applicable to 10-bit or 8-bit payloads.

7 Ancillary Data Space Formatting (Component or Composite Interface)

7.1 Component Data Space

Multiple ancillary data packets may be located in any space defined as available for ancillary data. For an SDI interface, the first such packet shall follow immediately after the End of Active Video (EAV) or the Start of Active Video (SAV) code denoting the start of that space. For an HD-SDI interface, the first packet shall follow immediately after the CRC code of the timing reference or SAV denoting the start of that space. Any sequence of multiple packets shall be contiguous within that space.

7.2 Composite Data Space

Multiple ancillary data packets may be located in any space defined as available for ancillary data, including all broad pulses. The first such packet shall follow immediately after the TRS-ID or the start of the broad pulse denoting the start of that space. Any sequence of multiple packets shall be contiguous within that space.

7.3 Presence, Positioning, and Deletion of Ancillary Data Packets in Available Space

An ancillary data packet shall be wholly contained within the ancillary data space in which it is inserted.

Insertion equipment shall not overwrite an existing packet in the ancillary data space unless the existing packet is marked for deletion.

Ancillary packet application documents defining use of ancillary packets and their payloads shall provide information on recommended packet locations in ancillary data spaces and the relevant stream interfaces.

Ancillary data packet location shall be set by insertion equipment conforming to the relevant interconnecting interface standard.

The contiguity of ancillary data packets within an ancillary data space is required to be maintained only within the interval boundaries of that space. The packets within such an interval shall be concatenated in time (left justified) following its leading boundary.

Receiving equipment shall detect the location of a packet only by its DID for a Type 1 packet and by its DID/SDID for a Type 2 packet.

Note: For example, if some ancillary data packets are marked with DID=80h for deletion from within a specific horizontal blanking interval or a vertical blanking interval (vertical ancillary data space), then contiguity of ancillary data packets within these intervals is maintained, but contiguity of packets between different intervals (horizontal or vertical) is not required.

An ancillary data packet may be marked for deletion by replacing the original data ID (DID) of the ancillary data packet with a DID equal to 80h and reinserting a new checksum for the packet. This will mark the ancillary data packet as invalid while maintaining contiguity of data within the ancillary data space. The rest of the marked ancillary data packet remains unchanged.

It is recommended that ancillary data packets not be transmitted within an ancillary data space following a vertical interval switching point defined in SMPTE RP 168 for a time period covering the remainder of the switched line and the first horizontal ancillary data space interval subsequent to the switched line.

Receiving equipment should process data located in any ancillary data space, as some existing equipment might not conform to the recommendation above on the switching point.

8 Exceptions from Ancillary Data Space Formatting

8.1 Error Detection and Handling Packet

Error detection and handling data, defined in SMPTE RP 165, is required to be located within a fixed part of the ancillary data space and therefore shall not be overwritten, appended to other data packets, or subject to the requirements of Section 7.3.

8.2 SDTI Header Packets

Ancillary data packets representing header packets for Serial Data Transmission over SDI (SMPTE ST 305) always shall be located immediately after EAV in component HANC data space or immediately after TRS-ID in composite ancillary data space.

9 Protected Codes

9.1 Ancillary Data Environment

Except for the Ancillary Data Flag (three words in component systems and one word in composite systems), certain code values shall be protected and not permitted in other parts of the ancillary data packet format. The ten-bit word values 000h, 001h, 002h, 003h and 3FCh, 3FDh, 3FEh, 3FFh shall not be permitted in any ancillary data packet payload.

Annex A Bibliography (Informative)

Note: All references in this document to other SMPTE documents may use the current numbering style (e.g. SMPTE ST 125:1995) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as ANSI/SMPTE 125M-1995). Documents with the same root number (e.g. 125) and publication year (e.g. 1995) are functionally identical.

SMPTE ST 125:1995, Television — Component Video Signal 4:2:2 — Bit-Parallel Digital Interface

SMPTE ST 259:2008, Television — SDTV Digital Signal/Data — Serial Digital Interface

SMPTE ST 274:2008, Television — 1920 × 1080 Image Sample Structure, Digital Representation and Digital Timing Reference Sequences for Multiple Picture Rates

SMPTE ST 292-1:2011, 1.5 Gb/s Signal/Data Serial Interface

SMPTE ST 296:2001, Television — 1280 x 720 Progressive Image Sample Structure — Analog and Digital Representation and Analog Interface

SMPTE ST 305:2005, Television — Serial Data Transport Interface

SMPTE RP 165:1994, Error Detection Checkwords and Status Flags for Use in Bit-Serial Digital Interfaces for Television

SMPTE RP 168:2009, Definition of Vertical Interval Switching Point for Synchronous Video Switching

SECTION XIII – SMPTE ENGINEERING Operations Manual; Revised 23 June 2011

Annex B Example of Ancillary Data Formats (Informative)

Component data stream format 10 bit system interface

	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	Hex
ADF	0	0	0	0	0	0	0	0	0	0	000h
ADF	1	1	1	1	1	1	1	1	1	1	3FFh
ADF	1	1	1	1	1	1	1	1	1	1	3FFh
DID	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
DBN/SDID	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
DC	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
UDW (0)	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	
	|	|	|	|	|	|	|	|	|	|	
UDW (255)	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	
CS	b8/	Check sum									

Composite data stream format 10 bit system interface

	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	Hex
ADF	1	1	1	1	1	1	1	1	0	0	3FCh
DID	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
DBN/SDID	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
DC	p/	p	b7	b6	b5	B4	b3	b2	b1	b0	
UDW (0)	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	
	|	|	|	|	|	|	|	|	|	|	
UDW (255)	b9	b8	b7	b6	b5	B4	b3	b2	b1	b0	
CS	b8/	Check sum									

1. In 8-bit applications of Type 2, bits b0 and b1 of DID and SDID words are set to zero.

2. ADF: Ancillary data flag
   DID: Data identification word
   DBN: Data block number
   p: parity
   SDID: Secondary data identification word
   DC: Data count
   UDW: User data word
   p/: parity not

Annex C Example of a Component Ancillary Data Space Showing Packet Deletion (Informative)

ADF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF			
DID	2FF	1FD	2FC	180	2F5	260	2C0	140	104			
DBN/ SDID	101	101	101	xxx	200	260	xxx	xxx	110			
DC	230	224	206	xxx	108	110	xxx	xxx	xxx			
UDW	48 words	36 words	6 words	xxx	8 words	16 words	xxx	xxx	xxx			
Note	AES 20 bit audio packets Group 1 (Ch 1-4) 4 Samples	AES 20 bit audio packets Group 2 (Ch 5-8) 3 Samples	AES Extended audio packets Group 2 (Ch 5-8) 3 Samples	Marked for deletion	LTC Time code	ATC Ancillary Time code	User defined	User defined	8 bit Application			
Type	Type 1	Type 1	Type 1	Type 1	Type 1	Type 2	Type 1	Type 2	Type 2			
	Contiguous Ancillary data (Prior to deletion of marked packet)									Unused Ancillary space		

ADF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF	000 3FF 3FF				
DID	2FF	1FD	2FC	2F5	260	2C0	140	104				
DBN/ SDID	101	101	101	200	260	xxx	xxx	110				
DC	230	224	206	108	110	xxx	xxx	xxx				
UDW	48 words	36 words	6 words	8 words	16 words	xxx	xxx	xxx				
Note	AES 20 bit audio packets Group 1 (Ch 1-4) 4 Samples	AES 20 bit audio packets Group 2 (Ch 5-8) 3 Samples	AES Extended audio packets Group 2 (Ch 5-8) 3 Samples	LTC Time code	ATC Ancillary Time code	User defined	User defined	8 bit Application				
Type	Type 1	Type 1	Type 1	Type 1	Type 2	Type 1	Type 2	Type 2				
	Contiguous Ancillary Space (Re-formatted after deletion of marked packet)								Unused Ancillary space			

NOTE: (1) All values in the table are shown in hex. (2) Checksum word is omitted. (3) DID, DBN, SDID, & DC values all are shown inclusive of parity bits