SMPTE STANDARD

for Television — Mapping of Vertical Ancillary Data Packets (VANC) into VAUX DIF Blocks of DV-Based 25 Mb/s or 50 Mb/s Streams and Extended Video Line Data into VAUX DIF Blocks of DV-Based 25 Mb/s Stream

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1 Scope

The purpose of this standard is to define a method to uniformly map metadata and data essence present within vertical ancillary packets (VANC) on the serial digital Interface (SDI), into VAUX DIF blocks of a DV-based 25 Mb/s or 50 Mb/s stream. Additionally, the standard defines a mapping method that results in an increase of the video aperture by one video line (extended video line) for the 25 Mb/s DV-based compression scheme.

The VANC mapping is applicable to 525/60 and 625/50 signal formats that use the 25 Mb/s or 50 Mb/s DV-based compression system. The mapping of the extended video line is applicable only to the 25 Mb/s DV-based stream.

This mapping process requires use of a 10-bit SDI interface for the incoming video signal.

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.

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

SMPTE 291M-1997, Television — Ancillary Data Packet and Space Formatting

SMPTE 314M-1999, Television — Data Structure for DV-Based Audio, Data and Compressed Video — 25 and 50 Mb/s

Approved
March 17, 2003

SMPTE 374M-2003, Television — Mapping of Vertical Ancillary Data Packets and Extended Video Line Data into Video DIF Blocks of a DV-Based 50 Mb/s DIF Stream Structure

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

3 General specifications

Metadata and data essence can be carried in the ancillary space of the serial digital interface (SDI), or serial data transport interface (SDTI) video stream structure. The data is formatted according to SMPTE 291M as vertical ancillary packets located in VBI space.

VANC packets are mapped into the VAUX DIF data area of the 25 or 50 Mb/s DV-based DIF streams. During the mapping process, the VANC packets are converted into digital ancillary packets (DANC) and these are then mapped into VAUX DIF blocks, VAUX packs, as defined in SMPTE 314M. A line number generator is used to identify the position of the VANC packet on the SDI signal interface to prevent a possible temporal skew.

NOTE – Data content identification carried in a DIF frame that is defined in SMPTE 314M or IEC 61834 is located in the VSC and VS packs of the VAUX DIF blocks. Designers should be aware that data identification present in the VSC and VS packs of the SMPTE 314M DIF frame differs from data ID present in IEC 61834. The VSC and VS packs carry not only the data content ID of DV-based data (SMPTE 314M), but may also carry ID for DV data defined in IEC 61834. The mapping method proposed in this standard is based on use of two different VAUX pack structures (see figure 3), 5-byte and 75-byte. SMPTE 314M and IEC 61834 specify only a single 5-byte long VAUX pack structure and they do not support the 75-byte VAUX pack structure.

Some broadcast operations require a larger video aperture than that defined by the DV-based compression system standard. The nominal video aperture of the compressed signal in DV-based compression is defined in SMPTE 314M and is equal to 480 lines in 525 TV line systems and 576 lines in 625 TV line systems.

The extended video line video information mapping extends the range of the nominal compressed video aperture by one line in both 525- and 625-line systems. The enlarged video aperture ads line 525 in the 525-line system and line 623 in the 625-line system. In addition, this method can be applied to a user selectable single line video signal. These lines are not processed by the DV-based compression system, and are therefore mapped into the VAUX DIF blocks of the compressed DV-based stream. This standard defines only a mapping of an extended video line into 25 Mb/s VAUX DIF blocks. Mapping of an extended video line into 50 Mb/s DIF video blocks is defined in SMPTE 374M.

Due to a fixed size of the bit space within the VAUX DIF blocks, it is necessary to establish management of the mapped space so maximum benefit of the VAUX DIF block space is achieved (see note 1)

NOTE 1 – Designers should be aware that the size of VANC data can exceed the capacity of the VAUX packs. It is the responsibility of the application to manage the mapping of VANC data into VAUX packs such that only complete VANC packets are mapped into VAUX DIF blocks. Where the VAUX capacity is exceeded, it is the responsibility of the application to manage this mapping in such a way as to minimize the effect on system performance, of not mapping all of the VANC data.

Processing of data content located in VANC packets uses a technique of directly mapping it into VAUX DIF blocks. Data content contained in the extended video line, applies additional 4:2:2/4:1:1 sampling rate conversion before the content is mapped into the VAUX DIF blocks.

The structure of this standard is as shown below:

Clause 3.1 describes the data mapping space in the VAUX DIF block;
Clause 4 describes the VANC data;
Clause 5 describes extended video line data;
Clause 6 describes VAUX pack structure;
Clause 7 describes data mapping in a frame.

3.1 Organization of the VAUX DIF block payload

Figure 1 shows the typical organization of a DIF sequence for 25 and 50 Mb/s stream structures as described in SMPTE 314M.

The VAUX DIF block space consists of three VAUX DIF blocks VA 0,i; VA 1,i; and VA 2,i located in each DIF sequence. Conforming to SMPTE 314M, payload space of each VAUX DIF block is further subdivided into 15 VAUX packs and each VAUX pack is 5-byte long (see figure 3a). These 5-byte long VAUX packs are used in any VAUX DIF blocks, regardless of odd or even DIF sequence.

This standard defines, as well, a different VAUX DIF block payload structure space (see figure 3b) that is not defined in SMPTE 314M. This new structure is a 75-byte long VAUX pack. The reason for additional structures is to increase payload efficiency. The 75-byte long VAUX pack is used with VAUX DIF blocks VA 0,i and VA 1,i of an even DIF sequence, and VAUX DIF blocks VA 1,i and VA 2,i of an odd DIF sequence (see note 2).

A typical DIF sequence (odd or even) containing VAUX DIF blocks for data placement in both DIF sequences is shown in figure 2. VAUX DIF block VA 2,i in an even DIF sequence and VAUX DIF block VA 0,i in an odd DIF sequence contain mandatory VAUX packs called video source (VS) and video source control (VSC). These VAUX packs contain information about the video source and control information defined in other documents. VAUX DIF blocks limit the use of a space for data placement to byte position number 3 to 77 as shown in figure 2. In VAUX DIF block VA 2,i in an even DIF sequence, data is mapped into byte position number 3 to 47; while in VAUX DIF block VA 0,i in an odd DIF sequence, data is mapped into byte position number 33 to 77 (see figure 2).

NOTE 2 – The DIF VAUX payload capacity excluding the pack header is indicated below:

In case of 25 Mb/s stream that uses the 5-byte VAUX Pack structure only:
For 525/60 system: 4 bytes x (15 + 15 + 9) packs x 10 DIF sequences = 1560 bytes/frame
For 625/50 system: 4 bytes x (15 + 15 + 9) packs x 12 DIF sequences = 1872 bytes/frame

In the case of a 25 Mb/s stream that uses the combined 5-byte / 75-byte VAUX pack structure:
For 525/60 system: (74 + 74 + 4 x 9) bytes x 10 DIF sequences = 1840 bytes/frame
For 625/50 system: (74 + 74 + 4 x 9) bytes x 12 DIF sequences = 2208 bytes/frame

In the case of a 50 Mb/s stream that uses the 5-byte VAUX pack structure only:
For 525/60 system: 4 bytes x (15 + 15 + 9) packs x 20 DIF sequences = 3120 bytes/frame
For 625/50 system: 4 bytes x (15 + 15 + 9) packs x 24 DIF sequences = 3744 bytes/frame

In the case of a 50 Mb/s stream that uses the combined 5-byte / 75-byte VAUX pack structure:
For 525/60 system: (74 + 74 + 4 x 9) bytes x 20 DIF sequences = 3680 bytes/frame
For 625/50 system: (74 + 74 + 4 x 9) bytes x 24 DIF sequences = 4416 bytes/frame

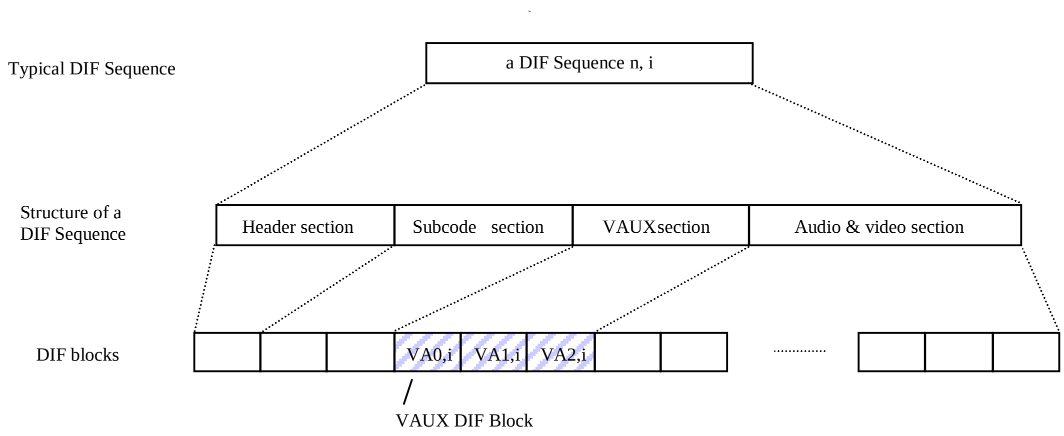


Figure 1 – Organization of a typical DIF sequence structure

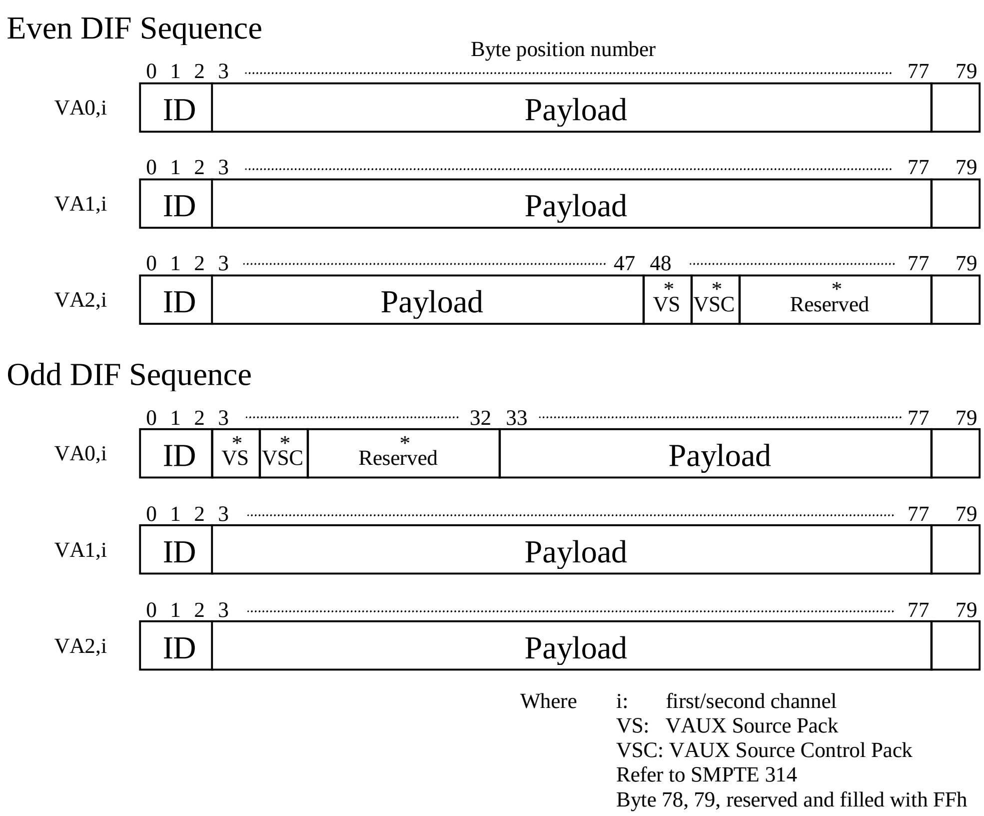
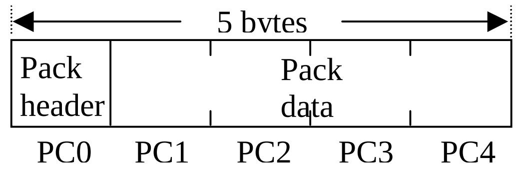
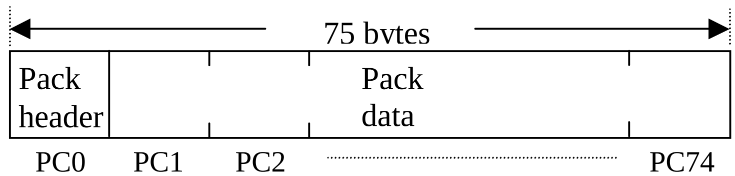


Figure 2 – VAUX payload area for data for 25 or 50 Mb/s DIF blocks



(a) 5-byte pack structure



(b) 75-byte pack structure

Figure 3 – VAUX pack structures

4 Mapping of vertical ancillary data (VANC) packets

VANC data packets present on the 10-bit SDI interface are converted into DIF ancillary data packets (DANC). Figure 4 shows the mapping process between a VANC packet and a DANC packet.

DANC packet length (B0,..., Bm) is identical to the VANC packet length present on the SDI interface. Only the lower 8 bits of the 10 bits DID, SDID (DBN), DC, UDW and CS VANC packet words, are processed.

In space where the original three ADF data bytes of the VANC packet were located, LE, LN, and Res bits are substituted. The ADF flag bytes are discarded during this process. The LE bit defines a line number enable flag. LN bits define the SDI line number on which the original VANC packet resided. Res bits are reserved bits for future use. Default value for Res shall be set to 1.

The LN bits are used in a reverse mapping process, during which the recovered DANC packets are re-mapped back as VANC packets and re-located into VBI data space of the SDI interface. Use of the LN bits assures that possible temporal skew of the recovered VANC packets (based on field/frame location) is prevented during the re-mapping process. When data from a DANC packet is converted back to a VANC packet, the upper 2 bits are generated from the lower 8 bits.

VANC packets that are located in the vertical blanking interval (VBI) are converted into DANC packets. This conversion process is applied only to VANC packets located in one frame. The resulting DANC packets are then mapped into the payload area of VAUX DIF blocks as shown in figure 2.

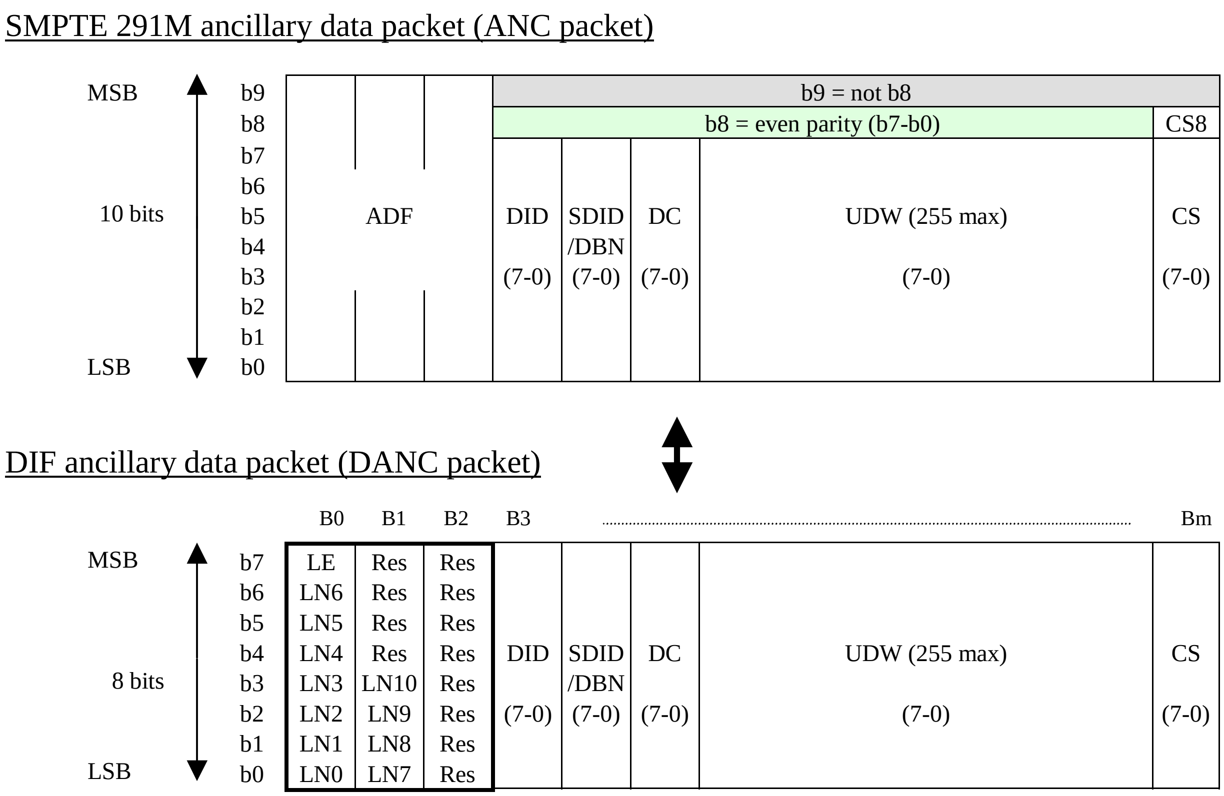


Figure 4 – SMPTE 291M ancillary data packet (VANC) and DIF ancillary data packet (DANC)

LE: Line number Enable flag
If LE = 0 then LN bits are invalid;
LE = 1 then LN bits are valid
LE indicates whether the LN bits are valid or invalid (see note 3)

NOTE 3 – In the case of originally generated information that is placed in a DANC packet (e.g., UMID), LE may be set to 0 or 1, depending on which specific line might be preferred for the mapped data location on the interface.

LN: Line number – a line number identifying where the original VANC packet was located.

An internal television line number generator creates a LN number. This generator is reset at the beginning of every frame, corresponding to the start of a frame, as defined in relevant system standard and increments from 1 to n.

For the 525/60 system LN0 -- LN10 = 1, ··· , 525
For the 625/50 system LN0 -- LN10 = 1, ··· , 625

Res: Reserved bit for future use
Default value shall be set to 1.

The total data size for all mapped DANC packets of a single frame can, at best, be equal to the data capacity available in the existing payload of the VAUX DIF Blocks of a single frame.

4.1 Placement of VANC packets during data recovery into the SDI interface

Placement of vertical ancillary data packets into the VBI (VANC) space may be accomplished by the following means:

a) If LE is set to zero, the placement of the VANC packets into the VBI ancillary space starts one line after the vertical switching point line as defined in SMPTE RP 168. The insertion of packets continues to the last line of the VBI before the start of an active video line in a field. The placement of packets shall conform to SMPTE 291M rules requiring that ancillary packets are contiguous and left justified. A single line can carry multiple VANC packets as long as space is available.

   In this case the recovered VANC data packets are not located at the same place on the interface where they were originally located.

b) If LE is set to one, the placement of the packets into the VBI ancillary space shall be determined by the line number LN indicted in the header of the DANC packet. Recovered VANC data packets are located at the same place on the interface where they were originally found. The placement of packets shall conform to SMPTE 291M rules requiring that ancillary packets are contiguous and left justified.

5 Extended video line data content (applicable to 25Mb/s DV-based compression)

Figure 5 shows video data contained in an extended video line. In general, video lines of a standard definition television signal are sampled in 4:2:2 format. For the extended video line, the conversion of 4:2:2 sampled video data into 4:1:1 sampled video data is required. This type of processing assures that video content of the extended video line is the same as the rest of the compressed signal in a frame.

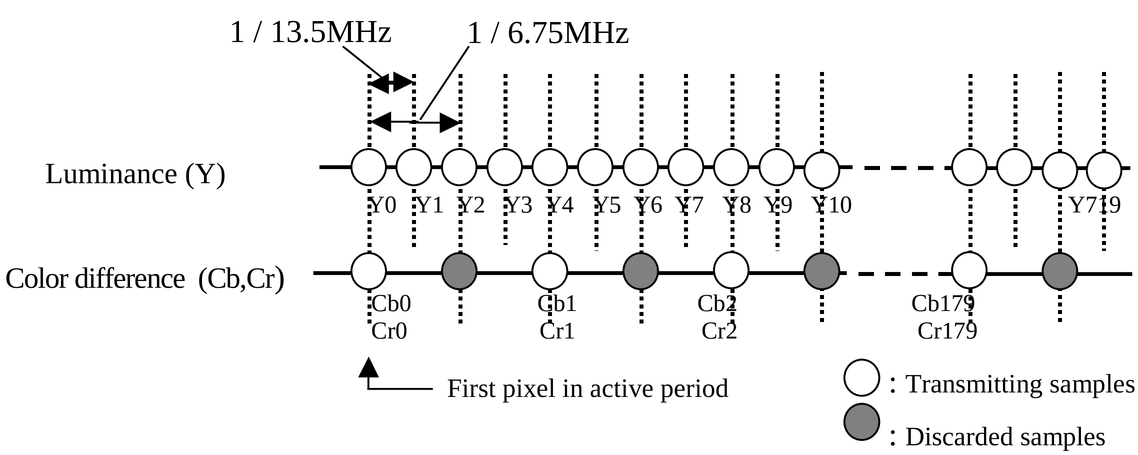


Figure 5 – Extended video line data

6 VAUX pack structures

6.1 Basic pack structure

The process of mapping DANC packets into the VAUX DIF block payload shall utilize a structure based on VAUX packs (see figure 3). There are two types of VAUX packs, type 1 and type 2. A VAUX pack header located at byte position number 3 or 33 of a VAUX DIF block provides an identification of the relevant pack structure type. The DANC packet data mapping process uses 5-byte long structures (see figure 3a), while the extended video line video data shall use only the 75-byte pack structure (see figure 3b).

6.2 VAUX pack with 5-byte long structure

Two different types of 5-byte long VAUX packs are used for mapping each DANC packet. Tables 1 and 2 define the VAUX pack type 1 and type 2, respectively.

Each pack construct consists of 5 bytes, where the first byte (PC0) of a pack serves as a pack header. The data of a single DANC packet is mapped into a single type 1 VAUX pack and multiple type 2 VAUX packs. The type 1 VAUX pack serves additionally as a start indicator of a DANC packet

The type 1 VAUX pack and type 2 VAUX pack have different VAUX pack header values. Code of the first byte (PC0) E1h is associated with the type 1 VAUXpPack and code E2h is associated with the type 2 VAUX pack.

Byte 2 (PC1) of the VAUX pack type 1 contains Res bits. Res bits are reserved for future use and their default value is set to 1.

Remaining bytes of the type 2 VAUX Pack (PC2, PC3, PC4) carry data from first 3 bytes of a DANC packet B0, B1, B2.

The type 2 of VAUX pack consists of a pack header (PC0) and a payload area (PC1, PC2, PC3 & PC4). Data from B3 to Bm of a DANC packet data is stored in multiple type 2 VAUX Packs that follow the type 1 VAUX pack in sequence.

Bj, Bj+1, Bj+2, Bj+3 correspond to the byte order of the DANC packet. The unused data area of the type 2 VAUX pack that contains the last byte of a DANC packet Bm shall be filled with FFh.

Figure 6 shows packing of a single DANC packet into the VAUX packs.

Table 1 – Type 1 VAUX pack

	MSB							LSB
PC0	1	1	1	0	0	0	0	1
PC1	Res	Res	Res	Res	Res	Res	Res	Res
PC2	B0							
PC3	B1							
PC4	B2							

Table 2 – Type 2 VAUX pack

	MSB							LSB
PC0	1	1	1	0	0	0	1	0
PC1	B j							
PC2	B j+1							
PC3	B j+2							
PC4	B j+3							

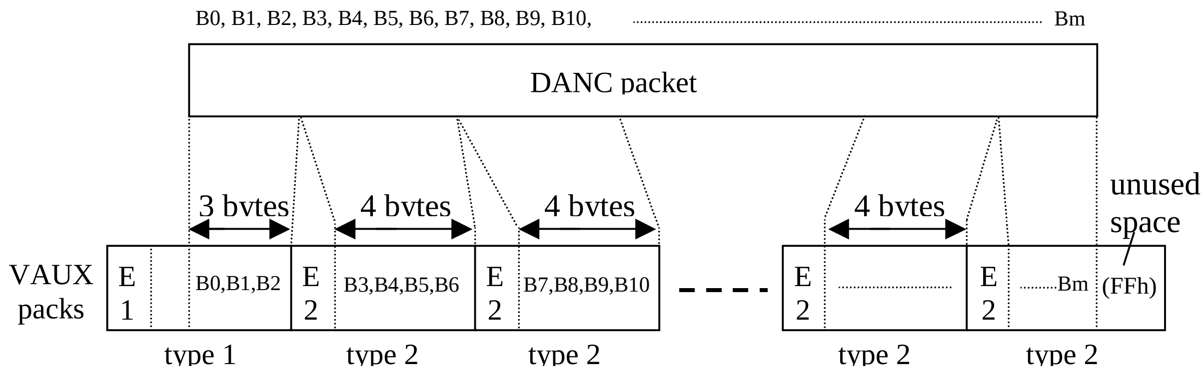


Figure 6 – Packing data contained in one DANC packet into VAUX

6.3 VAUX pack construct for video content within an extended video line (75 bytes long)

Table 3 shows a VAUX pack with 75-byte pack structure for Extended Video Line use. The extended video line VAUX pack consists of a pack header (PC0), which is set to E7h. Byte 2 (PC1) contains Res bits, TYPE, O/E bits and an MSB bit of OLN [8:0]. Byte three (PC2) of the VAUX pack contains the remaining lower 7 bits of OLN[8:0]. OLN bits define an offset line number as shown below. Res bits are reserved bits for future use and their default value is set to 1.

Bytes 4 to 75 (PC3, ..., PC74) contain the line data d, d+1, d+2,..., d+71. This data corresponds to the byte order of the data relative to the byte order of the video line. The exact byte order algorithm is defined in figure 7. Data of a single video line are stored in multiple extended video line VAUX packs as shown in figure 7.

Table 3 – Extended video line VAUX pack

	MSB							LSB
PC 0	1	1	1	0	0	1	1	1
PC 1	Res	Res	TYPE		Res	Res	O/E	OLN[8]
PC 2	OLN[7:0]							
PC 3	LINE DATA d							
PC 4	LINE DATA d+1							
PC 5	LINE DATA d+2							
:	:							
PC 74	LINE DATA d+71							

TYPE: TYPE defines the signal sampling structure arrangement of extended video line VAUX pack.
01b = 1 line of 4:1:1 signal
Other = Reserved

O/E: Odd field / Even field
0 = Odd (first) field:
When extended video line exists from line 10 to 22 and line 263 for the 525/60 system
and from line 6 to 22 for the 625/50 system.
1 = Even (second) field:
When extended video line exists from line 272 to 284 and line 525 for the 525/60 system
and from line 318 to 334 and line 623 for the 625/50 system.

OLN: Offset line number

For the 525/60 system –
For O/E = 0, OLN = Line number – 10
For O/E = 1, OLN = Line number – 272

For the 625/50 system –
For O/E = 0, OLN = Line number – 6
For O/E = 1, OLN = Line number - 318

For example:

For the 525/60 system –
If Line 22, O/E = 0; OLN[8:0] = 12
If Line 525, O/E = 1; OLN[8:0] = 253

For the 625/50 system –
If Line 22, O/E = 0; OLN[8:0] = 16
If Line 623, O/E = 1; OLN[8:0] = 305

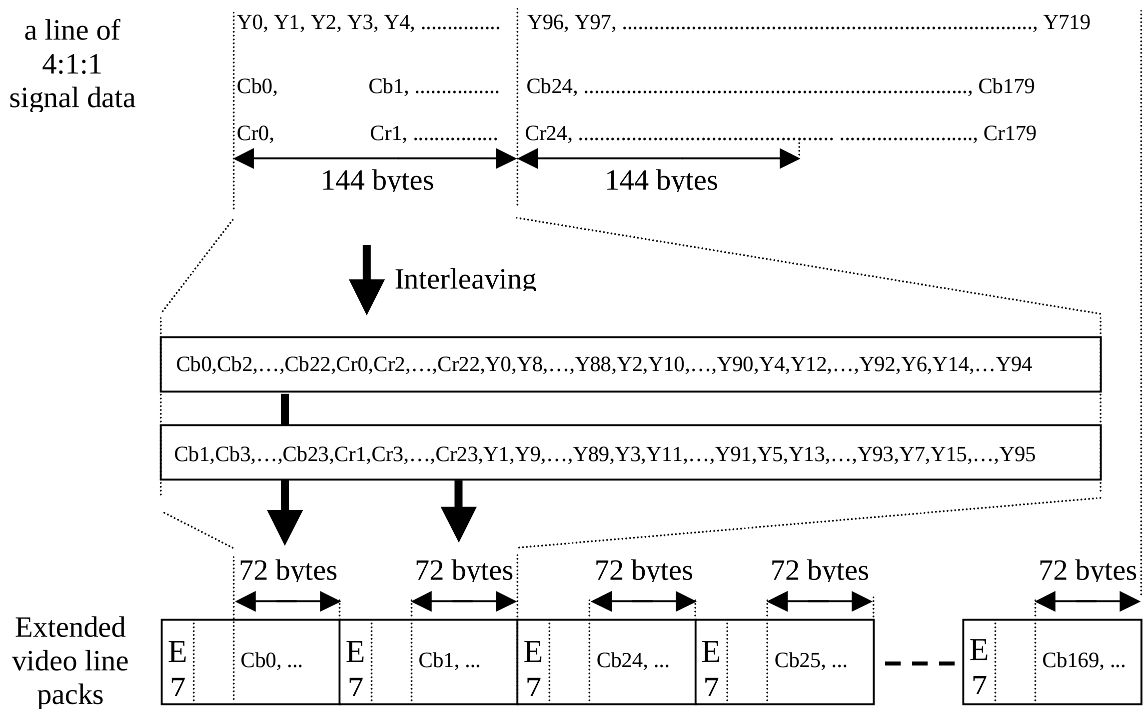


Figure 7 – Mapping video line data into extended video line VAUX packs

7 Data mapping in a frame

7.1 Data mapping for a 25 Mb/s DV-based DIF stream

The VAUX DIF blocks are arranged in a block in the order of a single video frame as shown in table 4. The 5-byte long VAUX packs are used for the mapping of DANC packets data from a single video frame.

Extended video line VAUX packs that use the 75-byte long structure are arranged in the payload of the VAUX DIF blocks as shown in table 5. VAUX packs carrying data contained in DANC packets are only present in the payload of VAUX DIF blocks where the extended video line VAUX packs are not present.

7.1.1 Mapping of a DANC packet data using 5-byte long VAUX packs

Type 1 and type 2 VAUX packs that contain data contained in a DANC packet from B0 to Bm are arranged contiguously and left justified in same order of byte position as in a VAUX DIF block. Arrangement of the VAUX DIF blocks in a frame is shown in table 4. The data of a DANC packet may overflow into the next VAUX DIF block.

When multiple DANC packets are mapped, each DANC packet shall be separately arranged. The last VAUX pack type 2 containing data of the mapped DANC packet is followed either by type 1 VAUX pack or an empty VAUX pack consisting of 5-bytes all set to FFh. A type 1 VAUX pack serves also as a starter pack, indicating the start of a DANC packet data. An example of such multiple DANC packet arrangement within VAUX DIF blocks is shown in figure 8. The first byte of the VAUX pack (byte position number 3 or 33 of the VAUX DIF block) may be either E1h or E2h, depending on the type.

NOTE **–** In the case that data contained in DANC packets and other data not described in this standard are jointly mapped, that data shall be stored in VAUX DIF blocks. In such a case, DANC packet data or other data are identified by the first byte of the VAUX pack (byte position number 3 or 33 of the VAUX DIF block). Designers should be aware that other applications may map data into the VAUX packs with pack header values other than those defined in this standard. Applications that do not recognize a VAUX pack header value should ignore the VAUX pack. In the case that byte position 3 or 33 of the VAUX DIF block is occupied by a mapped DANC packet, an additional DANC packet may be placed after the last VAUX pack of the previous DANC packet, if sufficient space is available.

Table 4 – VAUX DIF block order for a 25 Mb/s stream

DIF sequence number	DIF block
0	VA 0,0
	VA 1,0
	VA 2,0
1	VA 0,0
	VA 1,0
	VA 2,0
2	VA 0,0
	VA 1,0
	VA 2,0
:	:
9	VA 0,0
	VA 1,0
	VA 2,0
(10)	(VA 0,0)
	(VA 1,0)
	(VA 2,0)
(11)	(VA 0,0)
	(VA 1,0)
	(VA 2,0)

VAUX DIF block order (↓)

NOTE **–** Values shown in parenthesis are only for 625/50 system.

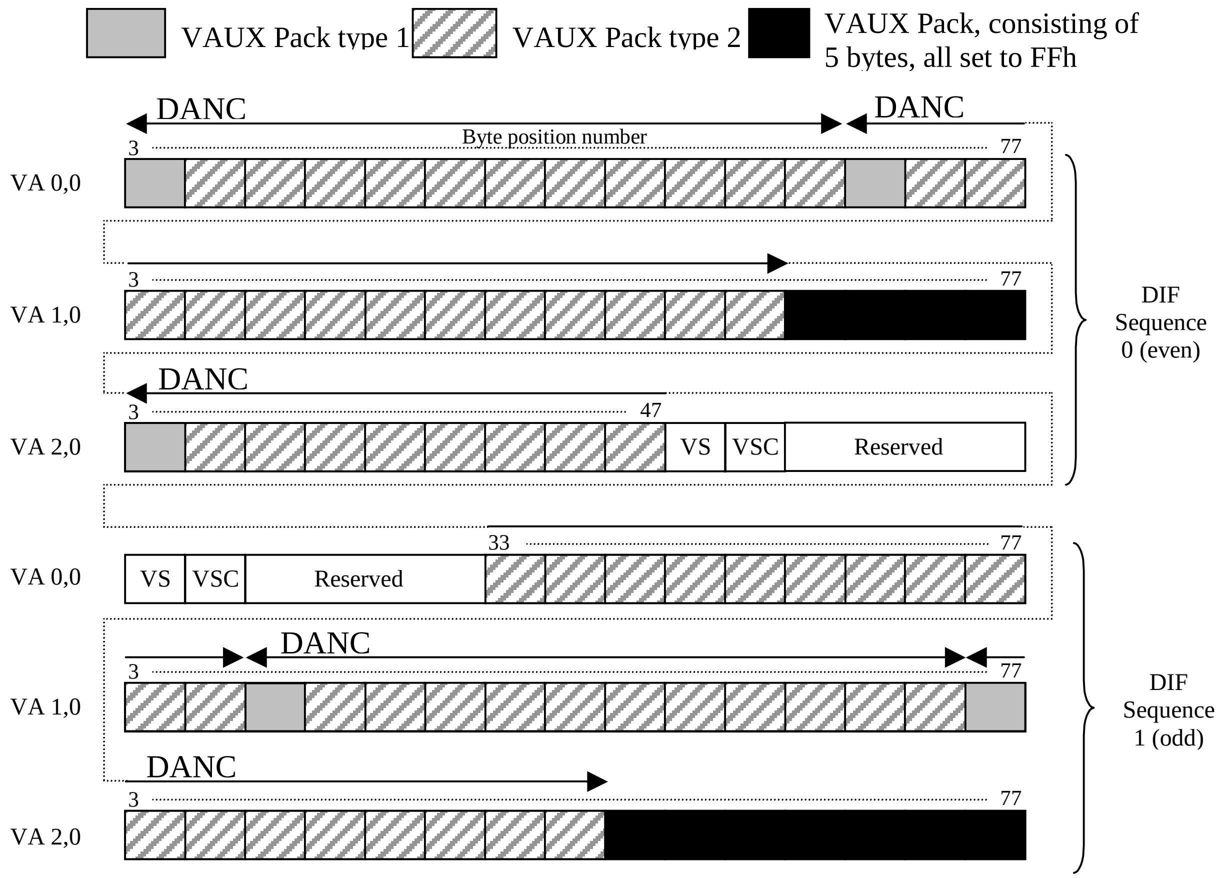


Figure 8 – Example of mapping DANC packets into 25 Mb/s VAUX DID blocks

7.1.2 Mapping of extended video line video data into extended video line VAUX pack

If there are extended video line VAUX packs, they are arranged from a single frame according to the bits of the TYPE flag. VAUX packs that contain with DANC packet data are placed in VAUX DIF blocks where extended video line VAUX packs are not present.

Table 5 shows the relationship between the VAUX DIF blocks, the DANC data area and extended video line video data for TYPE=01b. The extended video line contains data of a single line in the 4:1:1 format. The line data Y0,...,Y719, Cb0,...,Cb179, Cr0,...,Cr179 shall be stored as shown in table 5 and figure 7.

The DANC packet data that is stored in the DANC data area is described in 7.1.1. An example of mapping a DANC packet with DANC data and an extended video line into VAUX DIF blocks is shown in figure 9.

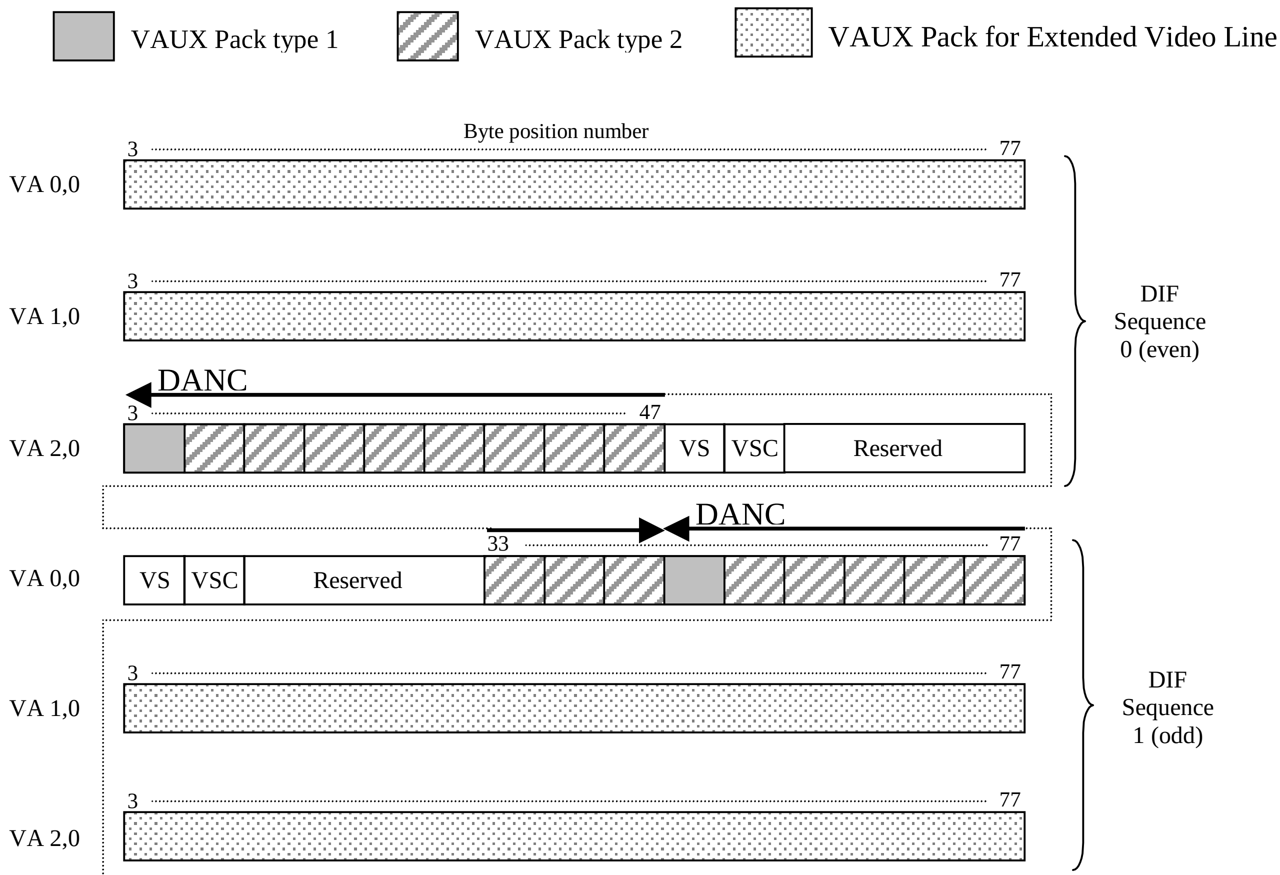


Figure 9 – Example of mapping DANC packets and extended video line data into 25 Mb/s VAUX DIF blocks

Table 5 – VAUX DIF blocks and DANC data area / SINGLE LINE DATA 4:1:1 (TYPE=01)

DIF sequence number	DIF block	Cb, Cr, Y: Extended Video Line DATA DANC : DANC data area
0	VA0,0	Cb0,Cb2,…,Cb22,Cr0,Cr2,…,Cr22,Y0,Y8,…,Y88,Y2,Y10,…,Y90,Y4,Y12,…,Y92,Y6,Y14,…Y94
	VA1,0	Cb1,Cb3,…,Cb23,Cr1,Cr3,…,Cr23,Y1,Y9,…,Y89,Y3,Y11,…,Y91,Y5,Y13,…,Y93,Y7,Y15,…,Y95
	VA2,0	DANC
1	VA0,0	DANC
	VA1,0	Cb24,…,Cb46,Cr24,…,Cr46,Y96,…,Y184,Y98,…,Y186,Y100,…,Y188,Y102,…,Y190
	VA2,0	Cb25,…,Cb47,Cr25,…,Cr47,Y97,…,Y185,Y99,…,Y187,Y101,…,Y189,Y103,…,Y191
2	VA0,0	Cb48,…,Cb70,Cr48,…,Cr70,Y192,…,Y280,Y194,…,Y282,Y196,…,Y284,Y198,…,Y286
	VA1,0	Cb49,…,Cb71,Cr49,…,Cr71,Y193,…,Y281,Y195,…,Y283,Y197,…,Y285,Y199,…,Y287
	VA2,0	DANC
3	VA0,0	DANC
	VA1,0	Cb72,…,Cb94,Cr72,…,Cr94,Y288,…,Y376,Y290,…,Y378,Y292,…,Y380,Y294,…,Y382
	VA2,0	Cb73,…,Cb95,Cr73,…,Cr95,Y289,…,Y377,Y291,…,Y379,Y293,…,Y381,Y295,…,Y383
4	VA0,0	Cb96,…,Cb118,Cr96,…,Cr118,Y384,…,Y472,Y386,…,Y474,Y388,…,Y476,Y390,…,Y478
	VA1,0	Cb97,…,Cb119,Cr97,…,Cr119,Y385,…,Y473,Y387,…,Y475,Y389,…,Y477,Y391,…,Y479
	VA2,0	DANC
5	VA0,0	DANC
	VA1,0	Cb120,…,Cb142,Cr120,…,Cr142,Y480,…,Y568,Y482,…,Y570,Y484,…,Y572,Y486,…,Y574
	VA2,0	Cb121,…,Cb143,Cr121,…,Cr143,Y481,…,Y569,Y483,…,Y571,Y485,…,Y573,Y487,…,Y575
6	VA0,0	Cb144,…,Cb166,Cr144,…,Cr166,Y576,…,Y664,Y578,…,Y666,Y580,…,Y668,Y582,…,Y670
	VA1,0	Cb145,…,Cb167,Cr145,…,Cr167,Y577,…,Y665,Y579,…,Y667,Y581,…,Y669,Y583,…,Y671
	VA2,0	DANC
7	VA0,0	DANC
	VA1,0	Cb168,…,Cb178,dummy(6bytes),Cr168,…,Cr178,dummy(6bytes),Y672,…,Y712,dummy(6bytes), Y674,…,Y714,dummy(6bytes), Y676,…,Y716,dummy(6bytes), Y678,…,Y718,dummy(6bytes)
	VA2,0	Cb169,…,Cb179,dummy(6bytes),Cr169,…,Cr179,dummy(6bytes),Y673,…,Y713,dummy(6bytes), Y675,…,Y715,dummy(6bytes), Y677,…,Y717,dummy(6bytes), Y679,…,Y719,dummy(6bytes)
8	VA0,0	DANC
	VA1,0	DANC
	VA2,0	DANC
9	VA0,0	DANC
	VA1,0	DANC
	VA2,0	DANC
(10)	(VA0,0)	(DANC)
	(VA1,0)	(DANC)
	(VA2,0)	(DANC)
(11)	(VA0,0)	(DANC)
	(VA1,0)	(DANC)
	(VA2,0)	(DANC)

NOTE **–** For sample sequence placements of individual samples, see figure 7. Values shown in parenthesis are only for the 625/50 system.

7.2 Data mapping for a 50 Mb/s DV-based DIF stream

The VAUX DIF blocks are arranged in the block order of a single video frame as shown in table 6. The 5-byte long VAUX packs may be used for mapping DANC packet data from a single video frame.

7.2.1 Mapping of DANC data using 5-byte long VAUX packs

Type1 and type 2 VAUX packs that contain data within a DANC packet from B0 to Bm are arranged contiguously and left justified in the same order of byte position as in a VAUX DIF block. An arrangement of VAUX DIF blocks in a frame is shown in table 6. DANC packet data is permitted to overflow into the next VAUX DIF block from the same DANC packet.

When multiple DANC packets are mapped, each DANC packet shall be arranged separately as shown in table 6. The last VAUX pack type 2 containing data of the mapped DANC packet is either followed by type 1 VAUX pack or an empty VAUX pack consisting of 5-bytes all set to FFh. A type 1 VAUX pack serves also as a starter pack, indicating the start of a DANC packet data.

An example of multiple DANC packet arrangement within VAUX DIF blocks is shown in figure 10. The first byte of the VAUX pack (byte position number 3 or 33 of the VAUX DIF block) may be either E1h or E2h, depending on the type.

NOTE **–** In the case that data contained in DANC packets and other data not described in this standard are jointly mapped, that data shall be stored in a DIF block. In such a case, DANC packet data or other data are identified by the first byte of the VAUX pack (byte position number 3 or 33 of the VAUX DIF block). Designers should be aware that other applications may map data into the VAUX packs with pack header values other than those defined in this standard. Applications that do not recognize a VAUX Pack header value should ignore the VAUX pack. In case that the byte position 3 or 33 of the VAUX DIF block is occupied by a mapped DANC packet, an additional DANC packet may be placed after the last VAUX pack of the previous DANC packet, if sufficient space is available.

Table 6 – VAUX DIF block order for a 50 Mb/s stream

DIF sequence number	DIF block
0	VA 0,0
	VA 0,1
	VA 1,0
	VA 1,1
	VA 2,0
	VA 2,1
1	VA 0,0
	VA 0,1
	:
:	:
9	:
	VA 2,0
	VA 2,1
(10)	:
	(VA 2,0)
	(VA 2,1)
(11)	:
	(VA 2,0)
	(VA 2,1)

DIF VAUX block order

NOTE **–** Data from VAUX DIF blocks are interleaved between first and second DIF channel. Values shown in parenthesis are only for the 625/50 system.

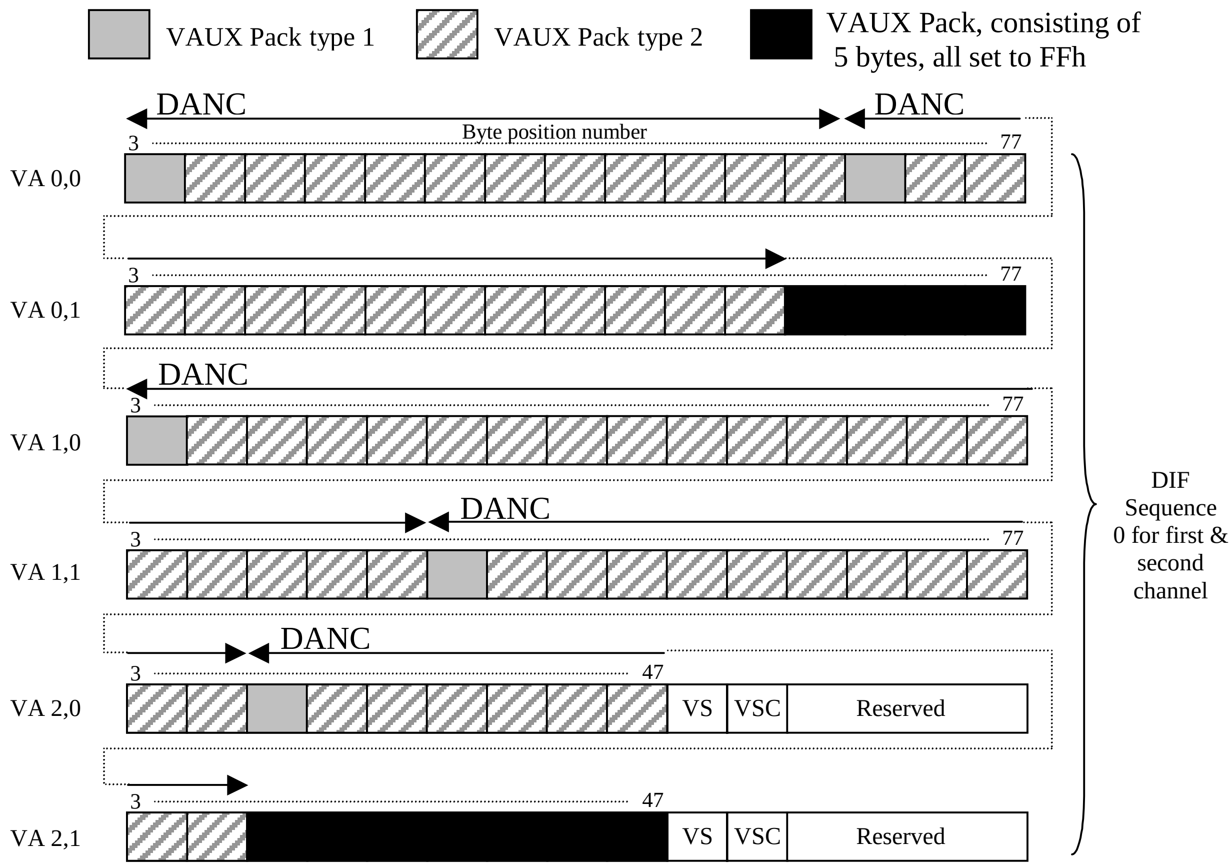


Figure 10 – Example of mapping DANC packets into 50 Mb/s VAUX DIF blocks

Annex A (informative) **Abbreviations**

ANC: Ancillary data packet located in ancillary space.
Bm, Bj: A byte name (B) and a byte number (m) or (j) of a DANC packet.
DANC packet: A digital ancillary data packet is a VANC packet converted into DANC space and of the same length as the original VANC packet.
DANC packet string: A string of DANC packets that are contiguous and left justified.
DIF: Digital interface format.
DIF sequence: A sequence of 150 DIF blocks that form a DIF sequence. Several DIF sequences form a compressed DIF stream frame.
LE: Line number enable flag.
LN: Line number.
OLN: Offset line number.
Res: A bit Reserved for future use.
S: Size of a DANC packet string.
SDI: Serial digital interface.
VANC: Vertical ancillary data packets located in the vertical blanking interval of the SDI interface.
VAUX DIF block: A DIF block carrying VAUX data
VAUX pack: A pack that subdivides the payload space of a VAUX DIF block. VAUX pack may be 5-byte or 75-byte long.
VBI: Vertical blanking interval where VANC packets are located.
VS: VAUX source pack defined in SMPTE 314M.
VSC: VAUX source control pack defined in SMPTE 314M.