SMPTE 435-2-2009
Revision of
SMPTE 435-2-2007

SMPTE STANDARD

10 Gb/s Serial Signal/Data Interface — Part 2: 10.692[1] Gb/s Stream — Basic Stream Data Mapping

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[1]Nominal bit rate. The interface is also capable of transmitting streams with the data rate of 10.692/1.001 Gb/s.

Approved March 4, 2008
Corrected the Intellectual Property Section on December 2, 2009

Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative Practices.

SMPTE 435-2 was prepared by Technology Committee N26.

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SMPTE draws attention to the fact that it is claimed that compliance with this Standard may involve the use of one or more patents or other intellectual property rights (collectively, "IPR"). The Society takes no position concerning the evidence, validity, or scope of this IPR.

Each holder of claimed IPR has assured the Society that it is willing to License all IPR it owns, and any third party IPR it has the right to sublicense, that is essential to the implementation of this Standard to those (Members and non-Members alike) desiring to implement this Standard under reasonable terms and conditions, demonstrably free of discrimination. Each holder of claimed IPR has filed a statement to such effect with SMPTE. Information may be obtained from the Director, Standards & Engineering at SMPTE Headquarters.

Attention is also drawn to the possibility that elements of this Standard may be subject to IPR other than those identified above. The Society shall not be responsible for identifying any or all such IPR.

1 Scope

This Standard specifies the basic stream data mapping structure of the 10 Gb/s Serial Interface. The mapping also supports transmission of the embedded audio, payload ID and other ancillary data defined in SMPTE 291M in the source stream.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and 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.

3 Normative References

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

SMPTE 292-2006, 1.5 Gb/s Signal/Data Serial Interface

SMPTE 435-1-2009, 10 Gb/s Serial Signal/Data Interface — Part 1: Basic Stream Distribution

ANSI INCITS 230-1994 (R1999), Information Technology — Fibre Channel — Physical and Signaling Interface (FC-PH)

4 Definition of Terms

10.692 Gb/s: The term “10.692 Gb/s” is used as a generic term for 10.692 Gb/s and 10.692/1.001 Gb/s in this standard.

Basic stream: A 10-bit parallel stream which has the same structure as the source data defined in SMPTE 292.

CRC: Cyclic Redundancy Codes defined in SMPTE 292.

EAV: The term EAV used in this standard designates all of timing information around an end of active video area; i.e., EAV bytes plus line number and CRC defined in SMPTE 292.

Even basic stream: CH2, CH4, CH6 and CH8 (Link Bs) of basic streams defined in § 6.3 (Mode C) and § 6.4 (Mode D).

HANC Data: Data included in a digital line blanking interval.

K28.5: Special codes for the word boundary detection of 8B/10B coding defined in ANSI INCITS 230.

LN: Line Number data defined in SMPTE 292.

Odd basic stream: CH1, CH3, CH5 and CH7 (Link As) of basic streams defined in § 6.3 (Mode C) and § 6.4 (Mode D).

SAV: Timing information around a start of active video area defined in SMPTE 292.

Stuffing data: The term “stuffing data” designates one of the data byte D0.0 of 8B/10B coding defined in ANSI INCITS 230.

5 Mapping Overview

The source data of the 10.692 Gb/s data stream shall be multiple numbers of basic streams that complies with 1.5 Gb/s SDI source data stream.

Figure 1 shows the overall block diagram of the 10.692 Gb/s interface.

The outline of the data processing shall be as follows:

- The 10-bit basic streams shall be realigned to 8-bit words.
- The generated byte array shall be converted to the 8B/10B encoded data.
- The encoded data shall be interleaved and serialized into the 10.692 Gb/s serial stream.

Note: HANC data in some of the basic streams are not interleaved into 10.692 Gb/s stream in case of mapping Mode B, C or D. Details are defined in § 6.2, § 6.3 and § 6.4.

Figure 1 illustrates the signal processing involved at the TX and Rx ends of the transport.. Default data values (040h for Y’ data and 200h for C’b/C’r data) shall be inserted into unused HANC data area of a basic stream if it has not been mapped onto 10.692 Gb/s stream.

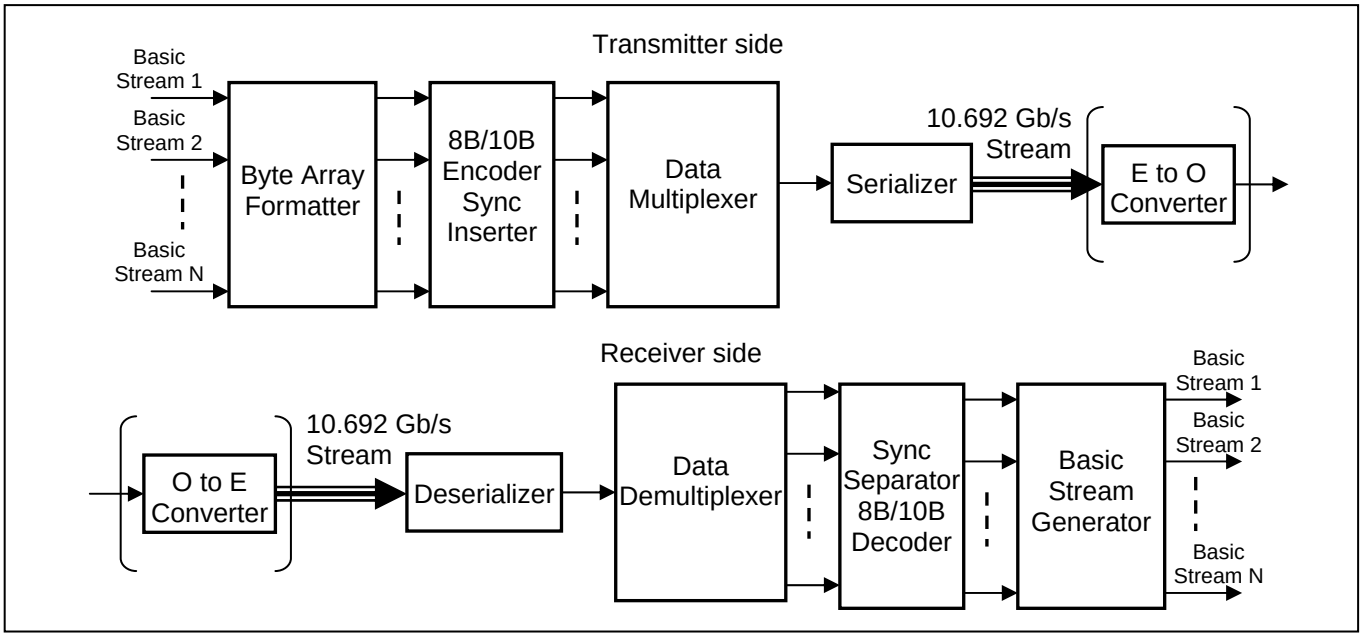

Figure 1 – Overall Block Diagram

6 Basic Stream Data Mapping

This section defines 4 data mapping structures. Mode A and Mode B shall be used for System 1.1 through System 4.4 image. Mode C shall be used for System 8.1 image exclusively. Mode D shall be used for System 8.2 through System 8.7 images, up to four pairs of System 2.2 through System 2.5 images or up to two pairs of System 4.1 through System 4.3 images.

System numbers shall be as defined in SMPTE 435-1.

Multiple stream transmission of up to 5 basic streams is possible in at Mode A, and transmission of up to 6 basic streams is possible in Mode B. In case of Mode A, Mode B and Mode D, all basic streams that are mapped together onto a 10.692 Gb/s stream shall have the same frame rate and the same total line number per frame.

Basic streams shall be as defined in SMPTE 435-1.

The word clock frequency of each basic stream, as defined by SMPTE 435-1, shall be 148.5 MHz or 148.5/1.001 MHz. The word clock frequency shall be locked to the serial clock frequency (10.692 GHz or 10.692/1.001 GHz).

6.1 292 5-Channel Mode (Mode A)

Up to 5 basic streams may be embedded into the 10.692 Gb/s stream of mapping Mode A. The mapping shall maintain all the information included in each of the 5 basic streams.

The 8B/10B encoded 50-bit block data from each basic stream shall be multiplexed into a single stream by the 50-bit block interleaving. The detail of the 50-bit blocking is defined in § 6.1.1.

Channel 1 basic stream data shall always be present for decoder synchronizing. Other channels, when not used for image data, shall be filled with stuffing data.

Figure 2 defines the basic concept of Mode A mapping.

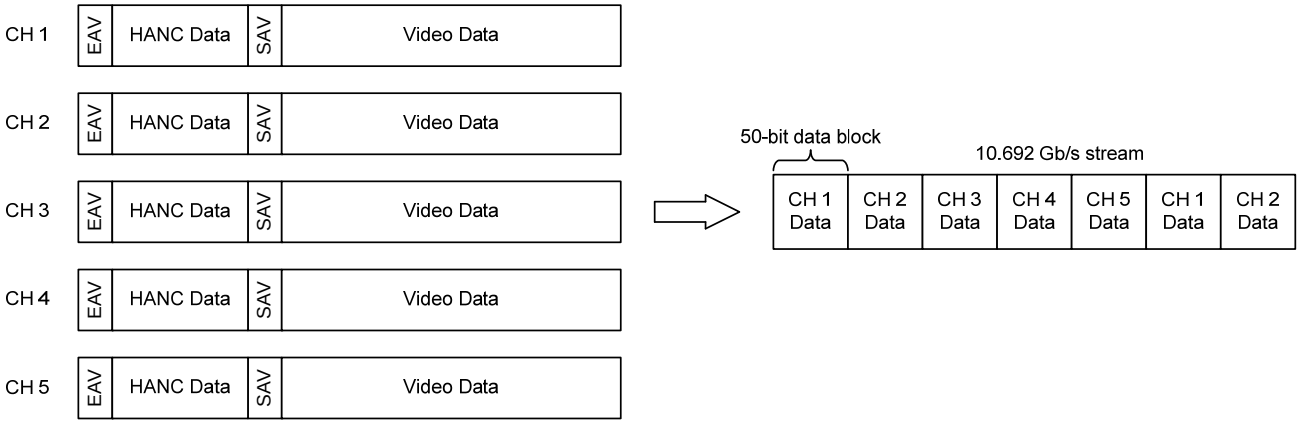

Figure 2 – Basic stream interleaving for Mode A

6.1.1 50-Bit Data Blocking and 8B/10B Encoding

4-word (40-bit) data blocking of the source basic stream data starting from the first SAV data shall be used for the blocking process.

Each 40-bit data block shall be realigned to five 8-bit words and then shall be encoded with 8B/10B coding as defined in Section 11 of ANSI INCITS 230. Consequently a 50-bit data block shall be generated from a 40-bit data block. Figure 3 defines the blocking process.

Encoding disparity in a 10.692 Gb/s stream shall be alternated at every 10-bit word. Initial value of negative disparity shall be assigned to CH 1 first SAV word of each line.

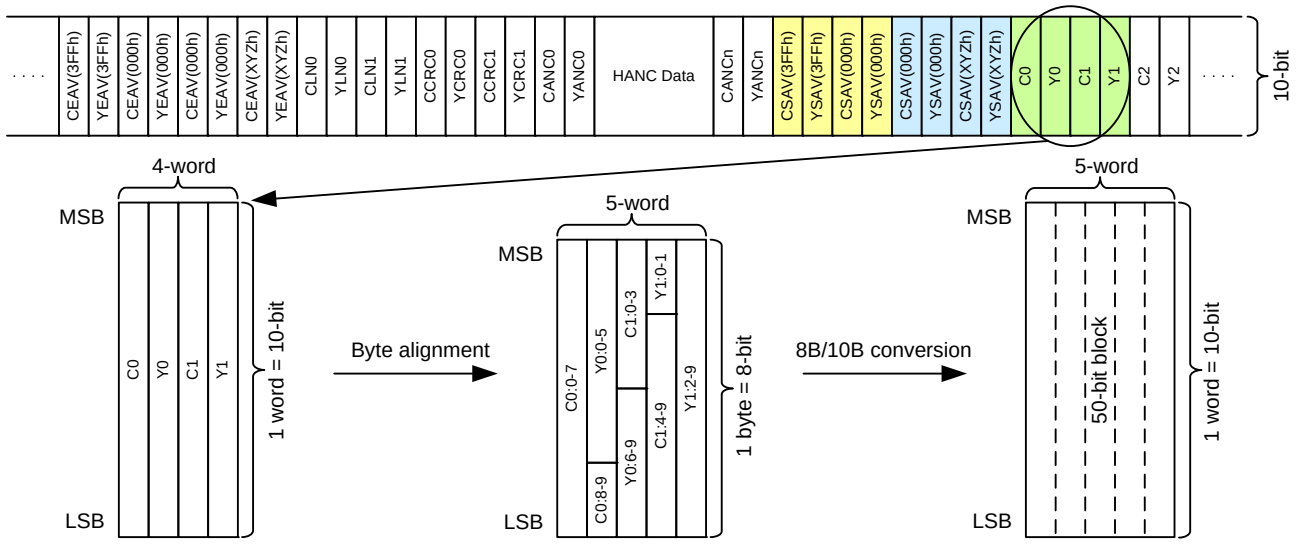

Figure 3 – Data alignment and 8B/10B encode process of 4-word data block

6.1.2 Data Replacement of SAV Part of Channel 1

As for Channel 1 stream, data replacement of synchronization word shall be done on the byte aligned data at the beginning of SAV. This process shall be executed before 8B/10B encoding.

First 2 bytes of SAV of the byte aligned data shall be replaced with two K28.5 special characters defined in 8B/10B Code, and successive 3 words of the byte aligned data shall be replaced with the Content ID as defined in Table 1.

These processes are defined in Figure 4. The System ID information as defined in Table 2 shall be a representation of the System Number of CH 1 basic stream as defined in Table 2. Mapping Structure shall be assigned as defined in Table 3. If the data derived from System 2.7, 4.4 or 8.1 image is embedded into CH 1, DCDM bit in ID 1 word shall be set to 1. Otherwise the DCDM bit shall be set to 0. Table 1 defines the layout of Content ID words.

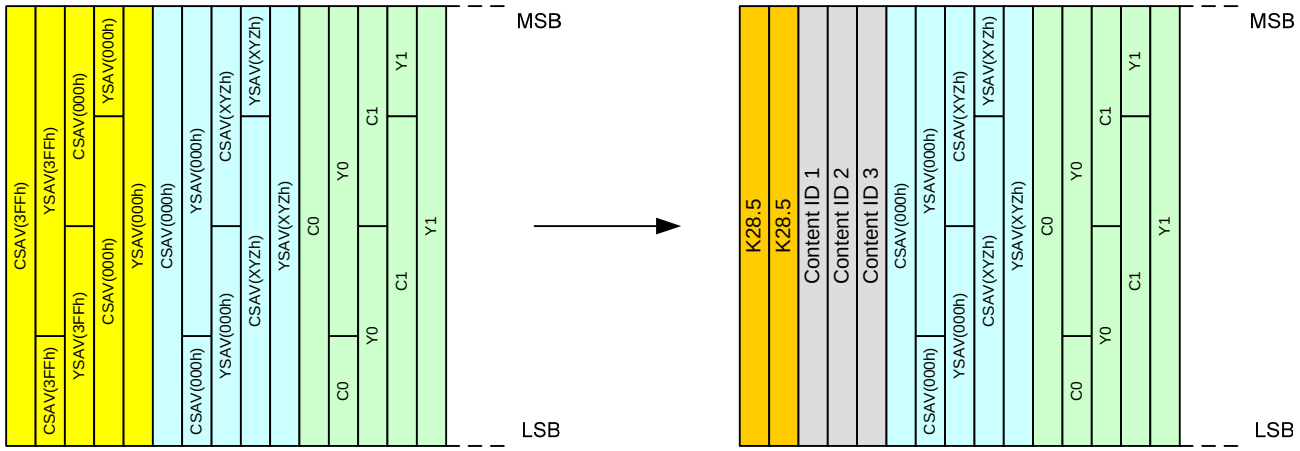

Figure 4 – SAV data replacement for Channel 1 data

Table 1 – Content ID data arrangement

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
ID 1	DCDM	Mapping Structure		System ID				
ID 2	Reserved (00h)							
ID 3	Reserved (00h)							

Table 2 – System ID assignment

System ID	System Number
00000	1.1
00001	1.2
00010 ~ 00011	Reserved
00100	2.1
00101	2.2
00110	2.3
00111	2.4
01000	2.5
01001	2.6
01010	2.7
01011~ 01111	Reserved
10000	4.1
10001	4.2
10010	4.3
10011	4.4
10100 ~ 10101	Reserved
10110	8.2
10111	8.3
11000	8.4
11001	8.5
11010	8.6
11011	8.7
11100	8.1
11101 ~ 11111	Reserved

Table 3 – Mapping Structure value

00: Mode A	01: Mode B	10: Mode C	11: Mode D

6.1.3 10.692 Gb/s Stream for Mode A Transmission

The 50-bit code block units from 5 source streams shall be interleaved from CH 1 through CH 5 as defined in Figure 5. The stuffing data shall be appended to the end of the HANC code blocks to adjust a line data period of Mode A is consistent with a line period of a source stream. Table 4 defines the word length for the data areas of the interleaved stream.

The interleaved stream shall be serialized to 10.692 Gb/s stream with LSB first order.

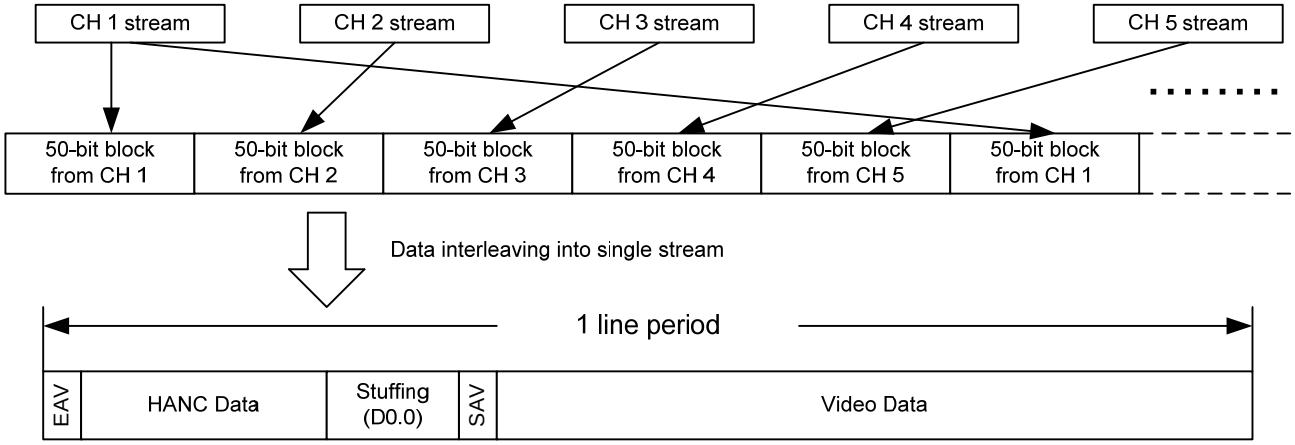

Figure 5 – Data alignment process for a total line

Table 4 –Data length in a line (Mode A)

System No.	Frame rate	Total word for a line	HANC and EAV/SAV data	Video Data	Stuffing data
1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 4.1, 4.2, 4.3	23.98Hz or 24Hz	39600	10375	24000	5225
	25Hz or 50Hz	38016	9000	24000	5016
	29.97Hz, 30Hz 59.94Hz or 60Hz	31680	3500	24000	4180
1.2, 2.6	50Hz	28512	8750	16000	3762
	59.94Hz or 60Hz	23760	4625	16000	3135
2.7, 4.4	24Hz or 48Hz	39600	8775	25600	5225

6.2 292 6-Channel Mode (Mode B)

Up to 6 basic streams may be embedded in mapping Mode B.

The mapping for this mode shall maintain all of the information included in channel 1 through 4 basic streams and shall map all the data with the exception of HANC data in basic stream assigned to channel 5 and 6.

CH 1 stream shall always be present for decoder synchronizing. Other channels, where not used for image data, shall be wholly filled with stuffing data.

Figure 6 defines the basic concept of Mode B mapping.

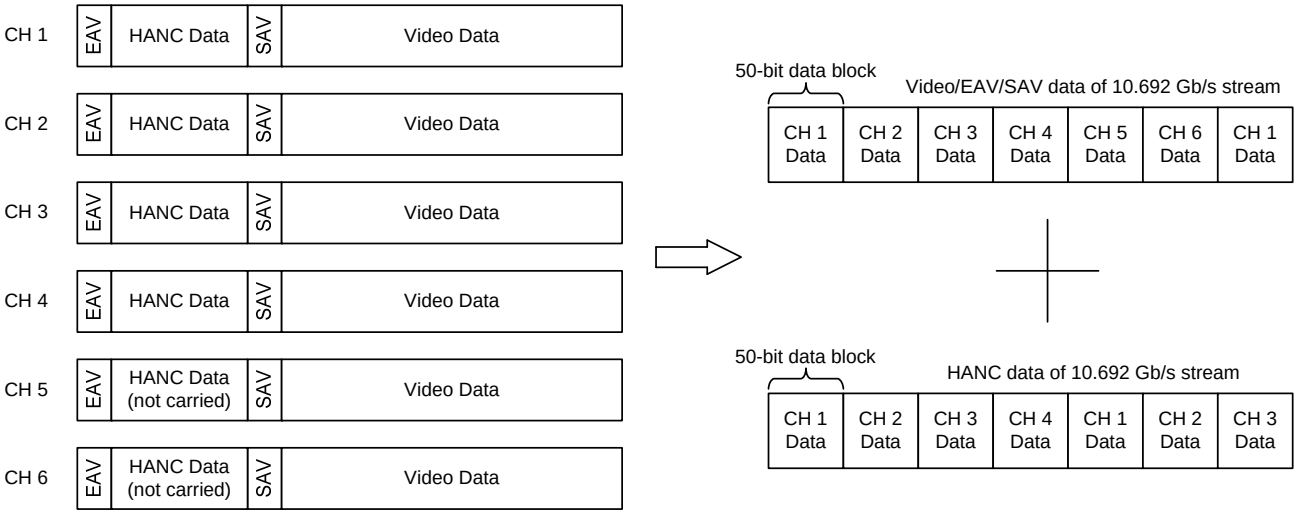

Figure 6 – Basic stream interleaving for Mode B

6.2.1 Data Blocking and 8B/10B Encoding

4-word (40-bit) data block of the source stream starting from the first SAV data shall be used for mapping operation.

Each 4-word block shall be re-aligned to five 8-bit words and then shall be encoded with 8B/10B coding as the same way as defined in § 6.1.1.

6.2.2 Data Replacement of SAV Part of Channel 1

Data replacement of SAV part of CH 1 basic stream shall be the same way as defined in § 6.1.2.

6.2.3 10.692 Gb/s Stream for Mode B Transmission

Figure 7 defines the stream structure of Mode B transmission. HANC data included in CH 1 through CH 4 shall be interleaved and embedded to the 10.692 Gb/s stream. HANC data included in CH 5 and CH 6 shall be discarded. All other data included in CH 1 to CH 6 shall be embedded in the same way as Mode A transmission. Stuffing data shall be appended to the end of the HANC code blocks to adjust the line data period of Mode B to be consistent with the line period of source stream. See Table 5 for the word length for the data areas of the interleaved stream.

The interleaved stream shall be serialized into 10.692 Gb/s stream with LSB first.

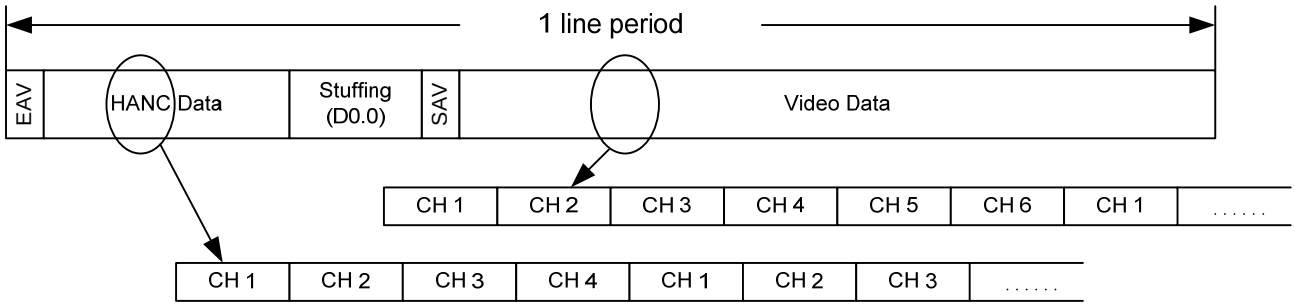

Figure 7 – Data alignment structure of Mode B stream

Table 5 – Data length in a line (Mode B)

System No.	Frame rate	Total word for a line	HANC and EAV/SAV data	Video Data	Stuffing data
1.1, 2.1, 2.2, 2.3, 2.4, 2.5, 4.1, 4.2, 4.3	23.98Hz or 24Hz	39600	8360	28800	2440
	25Hz or 50Hz	38016	7260	28800	1956
	29.97Hz, 30Hz 59.94Hz or 60Hz	31680	2860	28800	20
1.2, 2.6	50Hz	28512	7060	19200	2252
	59.94Hz or 60Hz	23760	3760	19200	800
2.7, 4.4	24Hz or 48Hz	39600	7080	30720	1800

6.3 292 8-Channel Mode (Mode C)

Mode C shall be used for System 8.1 image format. The mapping for this mode shall carry all the data included in channel 1 basic stream. Mode C also carries all the data with the exception of the HANC data area in CH 2 through CH 8.

A pair of four word blocks from each of odd and even basic stream derived from each sub image shall be combined to make a 90-bit block. The detail of the 90-bit blocking is described in § 6.3.1. Blocks for the CH 1 HANC data area shall be as defined in § 6.1.1. Figure 8 defines the basic concept of Mode C mapping.

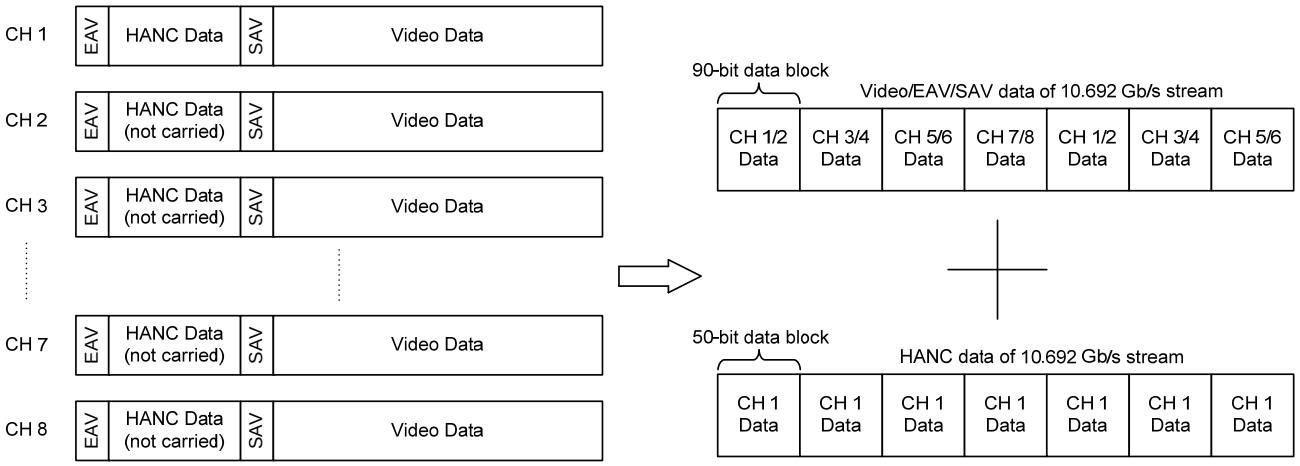

Figure 8 – Basic stream interleaving for Mode C

6.3.1 Video Data Blocking and 8B/10B Encoding

4-word (40-bit) data blocks of the source stream starting from the first SAV data shall be used for the mapping operation.

Each 4-word block in an odd basic stream shall be re-aligned to a 5-byte block as defined in § 6.1.1.

For an even basic stream, the parity bits and the reserved bits included in an alpha channel data block shall be discarded before the blocking. The remaining 32-bits of data from a 4-word block shall be aligned to a 4-byte length. In the case of LN or CRC values in an alpha channel, the data blocking process defined in § 6.3.2 shall be used.

The 5-byte block from an odd stream and the 4-byte block from an even stream shall be combined to a 9-byte block, the block shall be 8B/10B encoded to make a 90-bit data block. Figure 9 illustrates the detail of the process.

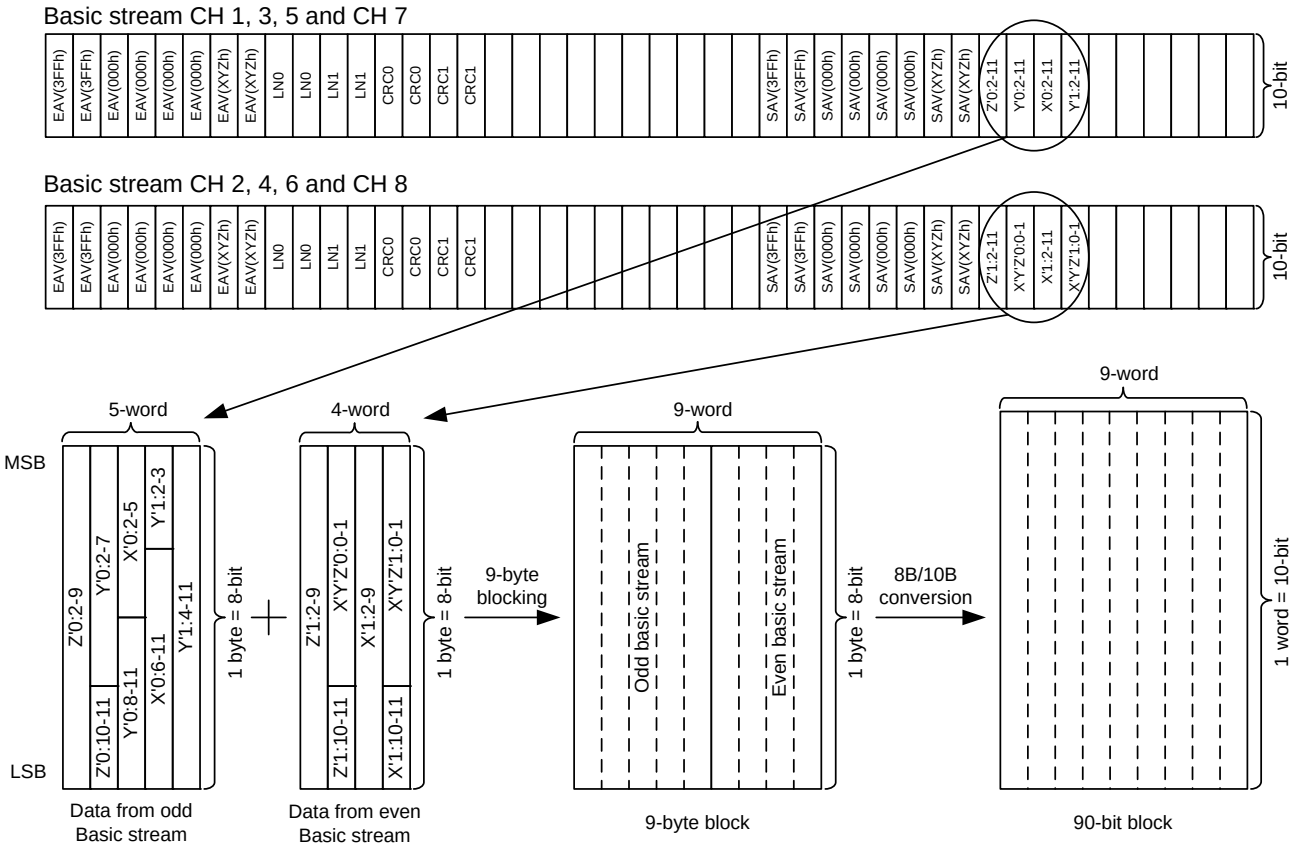

Figure 9 – 90-bit blocking in Mode C

6.3.2 Data Blocking for CRC and LN Area in an Even Basic Stream

18-bits of CRC data in the alpha channel of an even basic stream shall be aligned to three 6-bit areas within two 4-byte data blocks as illustrated in Figure 10. The parity bit (b9) in CRC words shall be discarded before blocking.

The lower 6-bits of word YCR0 shall be aligned to follow after the CLN1 word.

The higher 3-bits of word YCR0 and the lower 3-bits of YCR1 word shall be aligned to just after word CCR0.

The higher 6-bits of word YCR1 shall be aligned to just after the CCR1 word.

These blocking processes shall be used for 4-word blocking of the CRC and LN values in an even basic stream.

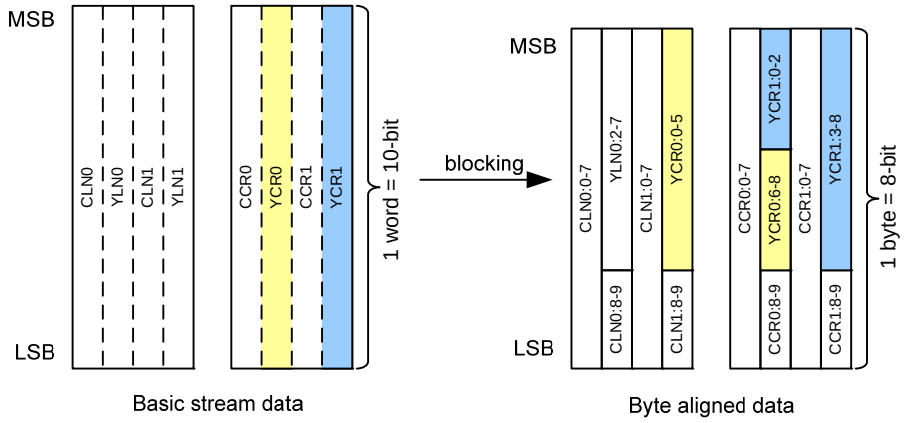

Figure 10 – Blocking of CRC and LN words

6.3.3 Data Replacement of SAV Part of Channel 1

Data replacement of SAV of the CH 1 basic stream shall be as defined in § 6.1.2.

6.3.4 10.692 Gb/s Stream for Mode C Transmission

Figure 11 illustrates the stream structure of video data in Mode C transmission. Data from each sub image shall be interleaved with a unit of 90-bit Blocks

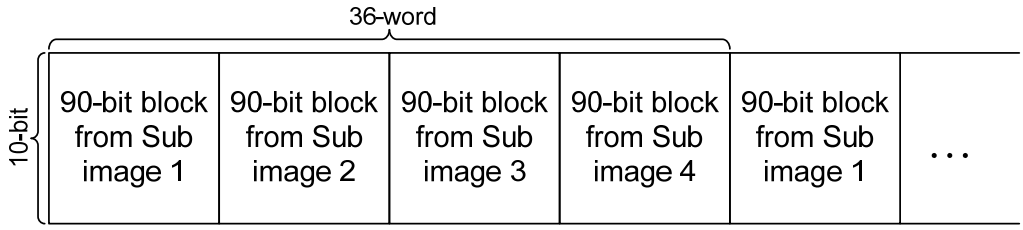

Figure 11 – 90-bit array interleaving derived from Basic stream pair

Figure 12 illustrates the stream structure of Mode C transmission. ANC data included in CH 1 shall be embedded in the 10.692 Gb/s stream with 50-bit blocking. ANC data included in CH 2 through CH 8 shall be discarded. All other data included in CH 1 to CH 8 shall be embedded with 90-bit block interleaving. See Table 6 for the word length for the data areas of the interleaved stream.

The interleaved stream shall be serialized to 10.692 Gb/s stream with LSB first order.

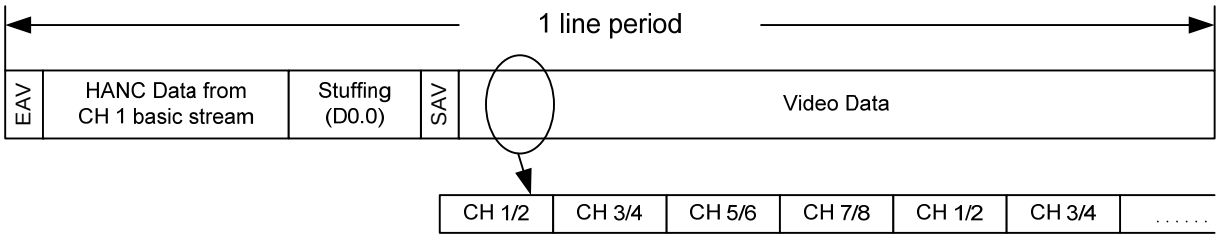

Figure 12 – Data alignment structure of Mode C

Table 6 – Data length in a line (Mode C)

System No.	Frame rate	Total word for a line	HANC and EAV/SAV data	Video Data	Stuffing data
8.1	24Hz	39600	1941	36864	795

6.4 292 8-Channel Mode (Mode D)

Mode D shall be used for System 8.2 through System 8.7 images, Up to four pairs of System 2.2 through System 2.5 images or up to two pairs of System 4.1 through System 4.3 images may be carried. The mapping for this mode shall carry all the data included in the CH 1 basic stream. Mode D also carries all the data with the exception of the HANC data in CH 2 through CH 8.

A pair of four word blocks from each of odd and even basic stream after scrambling and 8B/10B encoding derived from each sub image shall be combined to make an 80-bit block. The details of the 80-bit blocking is described in § 6.4.1. Blocking for CH 1 HANC data area shall be as defined in § 6.1.1.

CH 1 basic stream data shall always be present for decoder synchronizing. Other channels, when not used for image data, shall be filled with stuffing data.

Figure 13 illustrates the basic concept of Mode D mapping.

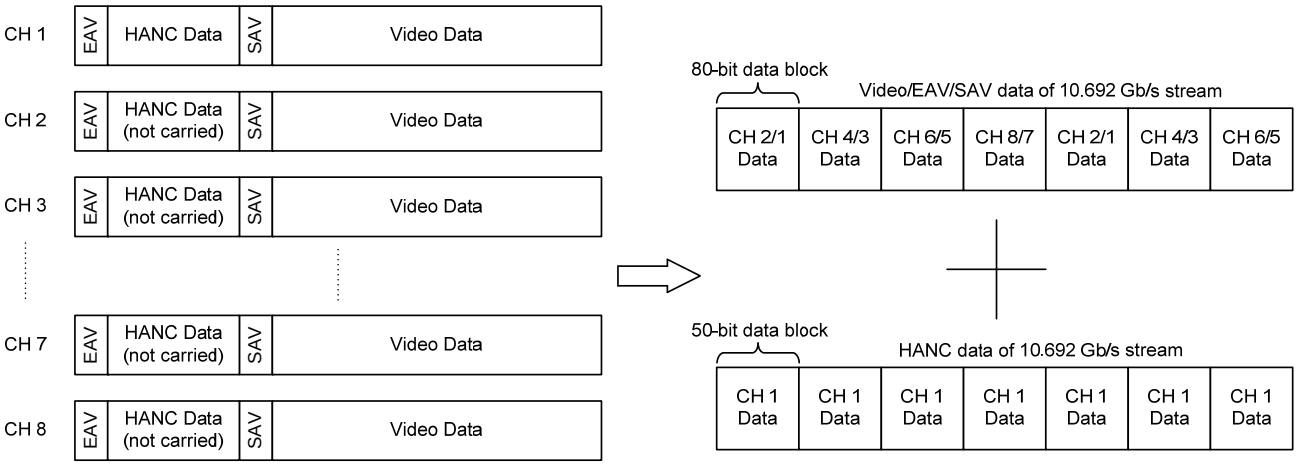

Figure 13 – Basic stream interleaving for Mode D

6.4.1 Video Data Blocking, Scrambling and 8B/10B Encoding

4-word (40-bit) data blocks of the source stream starting from the first SAV data shall be used for the mapping operation. Figure 14 illustrates the detail of the blocking process.

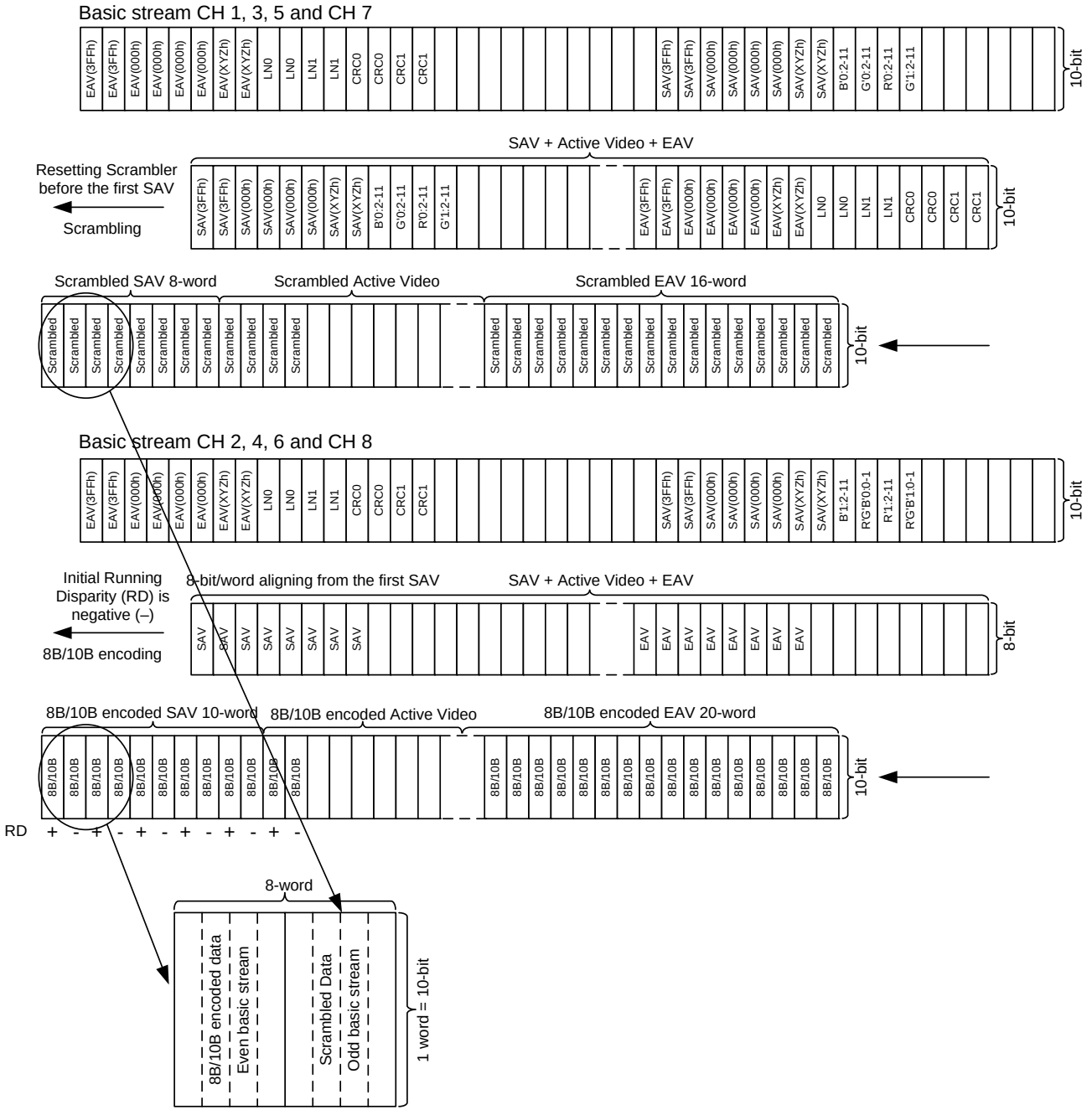

Figure 14 – 80-bit blocking in Mode D

Each 4-word block of each odd basic stream shall be scrambled using the same scrambling polynomial as defined in SMPTE 292 with the initial value of the scrambler set to zero before the first SAV of each line. Bits B0 and B1 of XYZh(C) in the SAV of CH 1, CH 3, CH 5 and CH 7 shall be set to (0,0), (0,1), (1,0) and (1,1) respectively to randomize each scrambled data.. The scrambled data starts from 1F5h, that is the scrambled 3FFh(C) and does not include initial register value of 0.

At the receiver side, de-scrambling shall be performed with the initial value of the de-scrambler set to zero before the first SAV of each line. After descrambling, bits B0 and B1 of XYZh(C) of the SAV shall be set to (0,0).

For an even basic stream, bits B8 and B9 of the parity bits,and bits B0 and B1 of the reserved bits included in an alpha channel data block shall be discarded before the blocking. The remaining 32-bit data from a 4-word block shall be aligned to 4-byte length.Except in the case of LN and CRC values in an alpha channel,where the data blocking process defined in § 6.4.2 shall be used.

The 4-byte block from an even basic stream shall be 8B/10B encoded to make a 40-bit data block. Running Disparity (RD) of the 8B/10B encoded data shall alternate positive and negative from the first SAV.

A 40-bit 8B/10B encoded data block from an even basic stream and a 40-bit scrambled data block from an odd basic stream shall be interleaved in the order of an even basic stream followed by an odd basic stream and shall be combined to make an 80-bit block.

In case of system 8.2 image (3840×2160/4:2:2 or 4:2:0/10-bit), unused input channels for even basic streams (Link B) shall not be used.

6.4.2 Data Blocking for CRC and LN Area in an Even Basic Stream

18-bits of CRC data in the alpha channel of an even basic stream shall be aligned to three 6-bit areas within two 4-byte data blocks as illustrated in Figure 15 and as defined in § 6.3.2. The parity bit (b9) in CRC words shall be discarded before blocking.

The lower 6-bits of word YCR0 shall be aligned to follow after the CLN1 word. The higher 3-bits of word YCR0 and the lower 3-bits of wordYCR1 shall be aligned to follow after the CCR0 word. The higher 6-bits of word YCR1 shall be aligned to follow after the CCR1 word.

These blocking processes shall be used for 4-word blocking of CRC and LN values in an even basic stream.

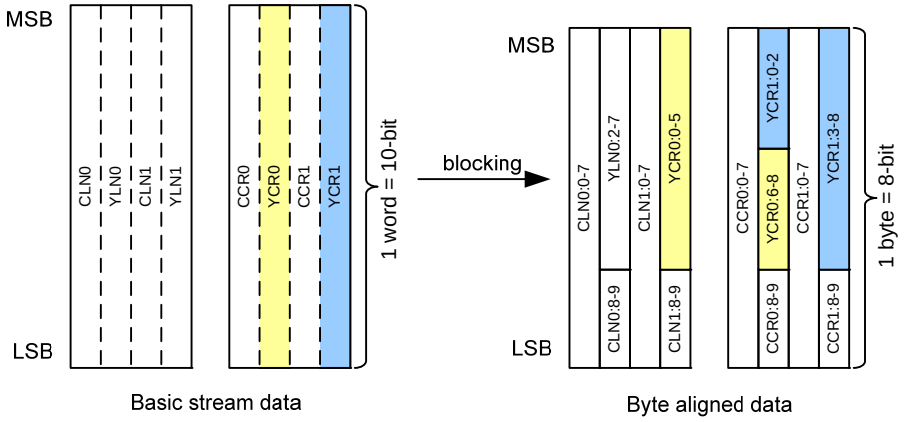

Figure 15 – Blocking of CRC and LN word

6.4.3 Data Replacement of SAV Part of Channel 2

Data replacement of the synchronization word shall be done on the byte aligned data at the beginning of the SAV of the CH 2 basic stream in Mode D. This process shall be executed before 8B/10B encoding.

The first 2 words of theSAV shall be replaced with two K28.5 special characters defined in 8B/10B coding and successive 2 words of the byte aligned data shall be replaced with Content IDs. These processes are illustrated in Figure 16.

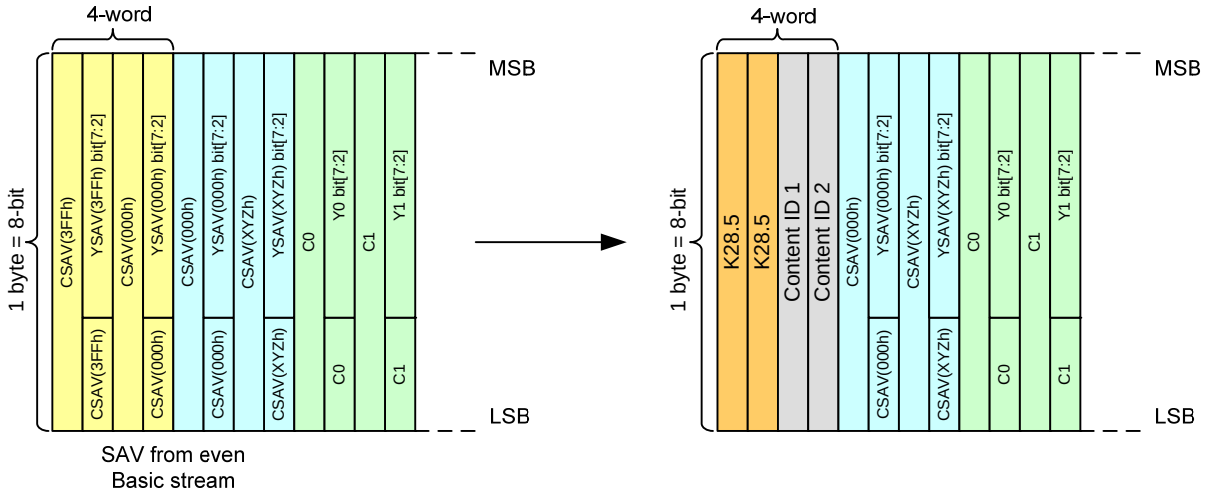

Figure 16 – SAV data replacement for Channel 2 data

See Table 7 for the layout of the Content ID words for Mode D. ID 1 shall have the same value as defined in § 6.1.2 and upper 2 Bytes of Content IDs (ID 1 and ID 2) shall be as defined for with Mode A, B and C. The System ID information shall be a representation of the System Number of CH 1 basic stream as illustrated in Table 2. Bit 7 of ID 2 shall be set to 0 in case of the “Square division” and set to 1 in case of the “2-sample interleave division”.

The Square division and the 2-sample interleave division is defined in § 6.4.2 of SMPTE 435-1.

Table 7 – Content ID data arrangement for Mode D

Bit	7 (MSB)	6	5	4	3	2	1	0 (LSB)
ID 1	DCDM = 0	Mapping Structure = 11		System ID				
ID 2	Division	Reserved (00h)						

6.4.4 10.692 Gb/s Stream for Mode D Transmission

Figure 17 illustrates the stream structure of video data in Mode D transmission. Data from each sub image shall be interleaved with a unit of 80-bit Block.

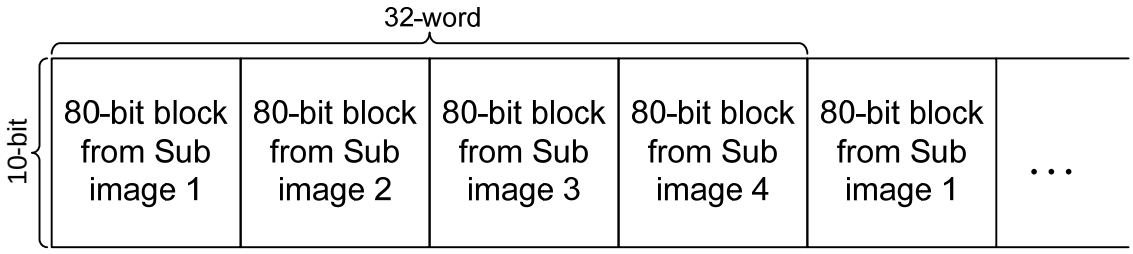

Figure 17 – 80-bit array interleaving derived from Basic stream pair

Figure 18 illustrates the stream structure of Mode D transmission. ANC data included in CH 1 shall be 8B/10B encoded in the same way as that defined in Mode C and embedded in the 10.692 Gb/s stream with the 50-bit blocking. ANC data included in CH 2 through CH 8 shall be discarded. All other data included in CH 1 to CH 8 shall be embedded with 80-bit block interleaving. Table 8 illustrates the word length for the data areas of the interleaved stream.

The interleaved stream shall be serialized to 10.692 Gb/s stream with LSB first .

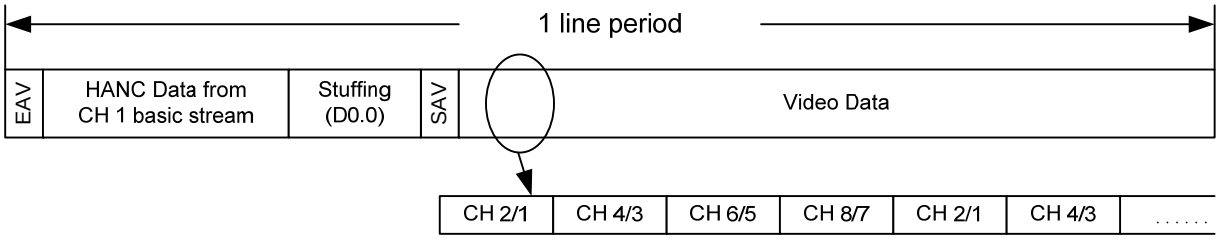

Figure 18 – Data alignment structure of Mode D

Table 8 – Data length in a line (Mode D)

System No.	Frame rate	Total word for a line	HANC and EAV/SAV data	Video Data	Stuffing data
8.2, 8.3, 8.4, 8.5, 8.6, 8.7	23.98Hz or 24Hz	39600	2237	30720	6643
	25Hz	38016	1962	30720	5334
	29.97Hz, 30Hz	31680	862	30720	98

Annex A (Informative)
Channel Assignment of the Basic Streams

Tables A.1, A.2, A.3 and A.4 show examples of the channel assignment of the 10.692 Gb/s interface. However, this annex does not exclude other possible channel assignment schemes.

Channel 1 is used as the reference channel in all channel assignment schemes.

A.1 Mode A Channel Assignment Examples

Mode A is used to transmit up to 5 channels of 1.5 Gb/s class data streams, up to two pairs of the dual link 1.5 Gb/s class data streams, the quad link 1.5 Gb/s class data stream or the combination of these classes as long as the total number of input channels are not greater than 5. Table A.1 shows assignment examples.

Table A.1 – Channel assignment examples for Mode A

<table>
<tr><th>CH 1</th><th>CH 2</th><th>CH 3</th><th>CH 4</th><th>CH 5</th></tr>
<tr><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td></tr>
<tr><td colspan="2">System 2.1
1920/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.1
1920/50P, Link(Basic Stream) A, B</td><td>System 1.1
1920/25P</td></tr>
<tr><td colspan="2">System 2.1
1920/50P Link(Basic Stream) A, B</td><td>System 1.1
1920/50I</td><td>System 1.1
1920/25P</td><td>System 1.1
1920/25P</td></tr>
<tr><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 3
1920/24P Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 3
1920/24P, Link(Basic Stream) A, B</td><td>System 1.1
1920/24P or None</td></tr>
<tr><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 3
1920/24P, Link(Basic Stream) A,B</td></tr>
<tr><td colspan="4">System 4.1, 4.2 or 4.3 *Note 3
1920/50P, Basic Stream A, B, C, D</td><td>System 1.1
1920/24P</td></tr>
<tr><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td></tr>
<tr><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td><td>System 1.2
1280/50P</td></tr>
<tr><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td><td>
None</td></tr>
<tr><td colspan="4">System 4.4
2048/48P, Basic Stream A, B, C, D</td><td>
None</td></tr>
</table>

NOTES

1. Frame rates shown in this table are the lowest case of each image system. Other frame rates also can be applicable so far as the image format allows.
2. Use of shaded area is optional.
3. Mixed transmission of different image systems is possible if the frame rates and total line number per frame of the basic streams are consistent with each other.

A.2 Mode B Channel Assignment Examples

Mode B is used to transmit up to 6 channels of the 1.5 Gb/s class data streams, up to three pairs of the dual link 1.5 Gb/s class data streams, the quad link 1.5 Gb/s class or the combination of these classes as long as the total number of input channels are not greater than 6. Table A.2 shows the assignment examples.

Table A.2 – Channel assignment examples for Mode B

<table>
<tr><th>CH 1</th><th>CH 2</th><th>CH 3</th><th>CH 4</th><th>CH 5</th><th>CH 6</th></tr>
<tr><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td><td>System 1.1
1920/24P</td></tr>
<tr><td colspan="2">System 2.1
1920/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.1
1920/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.1
1920/50P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="4">System 4.1, 4.2 or 4.3 *Note 4
1920/50P, Basic Stream A, B, C, D</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 Note 4
1920/24P Link(Basic Stream) A, B</td></tr>
<tr><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td></tr>
<tr><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="2">System 2.6
1280/50P, Link(Basic Stream) A, B</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td><td>System 1.2
1280/50P</td></tr>
<tr><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="4">System 4.4
2048/48P, Basic Stream A, B, C, D</td><td colspan="2">System 2.7
2048/24P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="6">NOTES
1. HANC data included in CH 5 and CH 6 are discarded.
2. Frame rates shown in this table are the lowest case of each image system. Other frame rates also can be applicable so far as the image format allows.
3. Use of shaded area is optional.
4. Mixed transmission of different image systems is possible if the frame rates and total line number per frame of the basic streams are consistent with each other.</td></tr>
</table>

A.3 Mode C Channel Assignments

This mode is used for the System 8.1 octal link 1.5 Gb/s class exclusively. Table A.3 shows the assignment.

Table A.3 – Channel assignment for Mode C

<table>
<tr><th>CH 1</th><th>CH 2</th><th>CH 3</th><th>CH 4</th><th>CH 5</th><th>CH 6</th><th>CH 7</th><th>CH 8</th></tr>
<tr><td colspan="8">System 8.1, 4096×2160/24P, Basic Stream CH 1, 2, 3, 4, 5, 6, 7 and 8</td></tr>
<tr><td colspan="8">NOTE: HANC data included in CH 2 through CH 8 are discarded.</td></tr>
</table>

A.4 Mode D Channel Assignment Examples

Mode D is used for the Systems 8.2, 8.3, 8.4, 8.5, 8.6 or 8.7 octa link 1.5 Gb/s classes. Mode D is also used to transmit up to four pairs of the dual link 1.5 Gb/s Systems 2.2, 2.3, 2.4 or 2.5, up to two pairs of the quad link 1.5 Gb/s System 4.1, 4.2 or 4.3 or the combination of these classes as long as the total number of input channels are not greater than 8. Table A.4 shows the assignment examples.

Table A.4 – Channel assignment for Mode D

<table>
<tr><th>CH 1</th><th>CH 2</th><th>CH 3</th><th>CH 4</th><th>CH 5</th><th>CH 6</th><th>CH 7</th><th>CH 8</th></tr>
<tr><td colspan="8">System 8.2, 8.3, 8.4, 8.5, 8.6 or 8.7
3840/24P, Basic Stream CH 1, 2, 3, 4, 5, 6, 7 and 8</td></tr>
<tr><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="4">System 4.1, 4.2 or 4.3 *Note 4
1920/50P, Basic Stream A, B, C, D</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td><td colspan="2">System 2.2, 2.3, 2.4 or 2.5 *Note 4
1920/24P, Link(Basic Stream) A, B</td></tr>
<tr><td colspan="4">System 4.1, 4.2 or 4.3 *Note 4
1920/50P, Basic Stream A, B, C, D</td><td colspan="4">System 4.1, 4.2 or 4.3 *Note 4
1920/50P, Basic Stream A, B, C, D</td></tr>
<tr><td colspan="8">NOTES
1. HANC data included in CH 2 through CH 8 are discarded.
2. Frame rates shown in this table are the lowest case of each image system. Other frame rates also can be applicable so far as the image format allows.
3. Use of shaded area is optional.
4. Mixed transmission of different image systems is possible if the frame rates and total line number per frame of the basic streams are consistent with each other.</td></tr>
</table>