SMPTE ST 435-1:2012
Revision of
SMPTE 435-1-2009

SMPTE STANDARD

10 Gb/s Serial Signal/Data Interface — Part 1: Basic Stream Derivation

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Approved
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Foreword

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

SMPTE ST 435-1 was prepared by Technology Committee 32NF.

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Introduction

This 10 Gb/s interface is based upon multiplexing multiple 1.5 Gb/s Basic Streams that comply with the data structure of SMPTE ST 292-1. The ancillary data structure as defined by SMPTE ST 291 is utilized for the mapping of the data into HANC and VANC data areas of a Basic Stream. Audio data mapping is based upon the requirements defined in SMPTE ST 299-1.

1 Scope

The source data of the 10 Gb/s data stream is composed from multiple 1.5 Gb/s Basic Streams. This standard classifies applicable source image formats carried on 10 Gb/s interfaces, and defines their system numbers. The standard also defines how the source image formats are divided into one or more Basic Streams. The Basic Streams comply with the interleaved data stream structure defined in SMPTE ST 292-1 and are utilized as the input streams to the mapping part of SMPTE ST 435-2. The source image formats for the interface are defined in SMPTE ST 274, SMPTE ST 296, SMPTE ST 428-11, SMPTE ST 2048-1, SMPTE ST 2036-1 and Recommendation ITU-R BT.1769. The interface also supports transmission of the embedded audio, payload ID and other ancillary data with a data format defined in SMPTE ST 291. The Basic Streams are utilized as the input streams to SMPTE ST 435-2.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or text 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.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

3 Normative References

Note: All references in this document to other SMPTE documents use the current numbering style (e.g. SMPTE ST 274:2008) although, during a transitional phase, the document as published (printed or PDF) may bear an older designation (such as SMPTE 274M-2008). Documents with the same root number (e.g. 274) and publication year (e.g. 2008) are functionally identical.

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

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

SMPTE ST 291:2011, Ancillary Data Packet and Space Formatting

SMPTE ST 292-1:2012, 1.5 Gb/s Signal/Data Serial Interface

SMPTE ST 296:2012, 1280 × 720 Progressive Image 4:2:2 and 4:4:4 Sample Structure — Analog and Digital Representation and Analog Interface

SMPTE ST 299-1:2009, 24-Bit Digital Audio Format for SMPTE 292 Bit-Serial Interface

SMPTE ST 352:2011, Payload Identification Codes for Serial Digital Interfaces

SMPTE ST 372:2011, Dual Link 1.5 Gb/s Digital Interface for 1920 × 1080 and 2048 × 1080 Picture Formats

SMPTE ST 428-9:2008, D-Cinema Distribution Master — Image Pixel Structure Level 3 — Serial Digital Interface Signal Formatting

SMPTE ST 428-19:2010, D-Cinema Distribution Master — Additional Frame Rates Level AFR2 and Level AFR4 — Serial Digital Interface Signal Formatting

SMPTE ST 2036-1:2009, Ultra High Definition Television — Image Parameter Values for Program Production

SMPTE ST 2048-1:2011, 2048 × 1080 and 4096 × 2160 Digital Cinematography Production Image Formats FS/709

SMPTE ST 2048-2:2011, 2048 × 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface

Recommendation ITU-R BT.1769, Parameter Values for an Expanded Hierarchy of LSDI Image Formats for Production and International Programme Exchange

4 Definition of Terms

4.1 Basic Stream
a 10-bit parallel stream which has the same structure as the interleaved data stream defined in SMPTE ST 292-1. This interleaved data stream carries the image structure defined in the source format data defined in SMPTE ST 292-1

4.2 CRC
Cyclic Redundancy Check Codes defined in SMPTE ST 292-1

4.3 EAV
the term EAV used in this standard designates 4 bytes of timing information at the end of the active video area

4.4 HANC Data
data included in the digital line blanking interval between EAV/LN/CRC and SAV

4.5 LN
Line Number data defined in SMPTE ST 292-1

4.6 SAV
timing information at the start of the active video area as defined in SMPTE ST 292-1

5 System Overview

The source data of the 10 Gb/s data stream shall be composed of multiple Basic Streams that each comply with the 1.5 Gb/s SDI interleaved data stream defined in SMPTE ST 292-1. Ancillary data mapping into a Basic Stream, shall comply with SMPTE ST 291. Audio data, mapping shall comply with SMPTE ST 299-1. Each 10-bit Basic Stream is packed into an 8-bit data block structure, which is then 8B/10B encoded. Multiple encoded blocks are multiplexed and serialized into a single 10 Gb/s data stream in one of several modes as defined in SMPTE ST 435-2. The physical interface specification is defined in SMPTE ST 435-3.

The basic 1.5 Gb/s stream structure is shown in Figure 1.

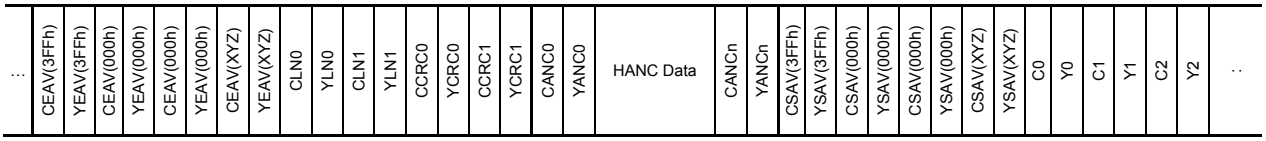

Figure 1 – Structure of 1.5 Gb/s Basic Stream (Informative)

6 Source Image Formats

6.1 Single Link 1.5 Gb/s Class Image Formats

Table 1 defines the image formats that shall be mapped into one Basic Stream structure compliant with SMPTE ST 292-1. The interleaved stream derived from each image format shall be assigned to a single Basic Stream defined in this standard.

Table 1 – Single Link 1.5 Gb/s Class Source Image Formats

System Number	Reference SMPTE Standard	Picture Format	Signal Format sampling structure/pixel Depth	Frame/Field Rates
1.1	ST 274	1920 × 1080	4:2:2 ($Y'C'_BC'_R$)/10-bit	24, 25 and 30 Frames/s Progressive, PsF 50 and 60 Fields/s Interlace
				23.98 and 29.97 Frames/s Progressive, PsF 59.94 Fields/s Interlace
	ST 2048-2	2048 × 1080	4:2:2 ($Y'C'_BC'_R$)/10-bit	24, 25 and 30 Frames/s Progressive, PsF
				23.98 and 29.97 Frames/s Progressive, PsF
1.2	ST 296	1280 × 720	4:2:2 ($Y'C'_BC'_R$)/10-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive

6.2 Dual Link 1.5 Gb/s Class Image Formats

Table 2 defines the image formats that shall be mapped into two Basic Streams. A source stream shall be divided into two Basic Streams which have the same structure as dual link stream defined in SMPTE ST 372.

Table 2 – Dual Link 1.5 Gb/s Class Source Image Formats

System Number	Reference SMPTE Standard	Picture Format	Signal Format sampling structure/pixel Depth	Frame/Field Rates
2.1	ST 274	1920 × 1080	4:2:2 (Y'C'$_B$C'$_R$)/10-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive
	ST 2048-2	2048 × 1080	4:2:2 (Y'C'$_B$C'$_R$)/10-bit	48, 50 and 60 Frames/s Progressive
				47.95 and 59.94 Frames/s Progressive
2.2	ST 274	1920 × 1080	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B'+A)/10-bit	24, 25,and 30 Frames/s Progressive, PsF 50 and 60 Fields/s Interlace
				23.98 and 29.97 Frames/s Progressive, PsF 59.94 Fields/s Interlace
	ST 2048-2	2048 × 1080	4:4:4 (R'G'B'^{1}), 4:4:4:4 (R'G'B'^{1}+A)/10-bit	24, 25 and 30 Frames/s Progressive, PsF
				23.98 and 29.97 Frames/s Progressive, PsF
2.3	ST 274	1920 × 1080	4:4:4 (R'G'B')/12-bit	24, 25 and 30 Frames/s Progressive, PsF 50 and 60 Fields/s Interlace
				23.98 and 29.97 Frames/s Progressive, PsF 59.94 Fields/s Interlace
	ST 2048-2	2048 × 1080	4:4:4 (R'G'B'^{1})/12-bit	24, 25 and 30 Frames/s Progressive, PsF
				23.98 and 29.97 Frames/s Progressive, PsF
2.4	ST 274	1920 × 1080	4:4:4 (Y'C'$_B$C'$_R$)/10-bit, 4:4:4:4 (Y'C'$_B$C'$_R$+A) /10-bit	24, 25 and 30 Frames/s Progressive, PsF 50 and 60 Fields/s Interlace
				23.98 and 29.97 Frames/s Progressive, PsF 59.94 Fields/s Interlace
	ST 2048-2	2048 × 1080	4:4:4 (Y'C'$_B$C'$_R$)/10-bit, 4:4:4:4 (Y'C'$_B$C'$_R$+A) /10-bit	24, 25 and 30 Frames/s Progressive, PsF
				23.98 and 29.97 Frames/s Progressive, PsF

2.5	ST 274	1920 × 1080	4:2:2 (Y'C'$_B$C'$_R$), 4:4:4 (Y'C'$_B$C'$_R$) /12-bit	24, 25 and 30 Frames/s Progressive, PsF 50 and 60 Fields/s Interlace
				23.98 and 29.97 Frames/s Progressive, PsF 59.94 Fields/s Interlace
	ST 2048-2	2048 × 1080	4:2:2 (Y'C'$_B$C'$_R$), 4:4:4 (Y'C'$_B$C'$_R$) /12-bit	24, 25 and 30 Frames/s Progressive, PsF
				23.98 and 29.97 Frames/s Progressive, PsF
2.6	ST 428-9	2048 × 1080	4:4:4 (*X'Y'Z'*)/12-bit	24 Frames/s Progressive, PsF
	ST 428-19	2048 × 1080	4:4:4 (*X'Y'Z'*)/12-bit	25 and 30 Frames/s Progressive, PsF

[1] R'G'B' indicates either R'G'B' or R'$_{FS}$G'$_{FS}$B'$_{FS}$.

6.3 Quad Link 1.5 Gb/s Class Image Formats

Table 3 defines the image formats that shall be mapped into four Basic Streams as defined in Section 6.3.1.

Table 3 – Quad Link 1.5 Gb/s Class Source Image Formats

System Number	Reference SMPTE Standard	Picture Format	Signal Format sampling structure/pixel Depth	Frame/Field Rates
4.1	ST 274	1920 × 1080	4:2:2 (Y'C'$_B$C'$_R$)/12-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive
	ST 2048-2	2048 × 1080	4:2:2 (Y'C'$_B$C'$_R$)/12-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive
4.2	ST 274	1920 × 1080	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B'+A)/10-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive
	ST 2048-2	2048 × 1080	4:4:4 (R'G'B'[1]), 4:4:4:4 (R'G'B'[1]+A)/10-bit	48, 50 and 60 Frames/s Progressive
				47.95 and 59.94 Frames/s Progressive
4.3	ST 274	1920 × 1080	4:4:4 (R'G'B')/12-bit	50 and 60 Frames/s Progressive
				59.94 Frames/s Progressive
	ST 2048-2	2048 × 1080	4:4:4 (R'G'B'[1])/12-bit	48, 50 and 60 Frames/s Progressive
				47.95 and 59.94 Frames/s Progressive

[1] R'G'B' indicates either R'G'B' or R'$_{FS}$G'$_{FS}$B'$_{FS}$.

6.3.1 4 way division of source data

A pair of frames as defined in Table 3 shall be divided and mapped into two Sub images equivalent to the System 2.2, 2.3 or System 2.5 image data using the line demultiplexing method illustrated in Figure 2 of SMPTE ST 372. Each of these Sub images shall be word demultiplexed into two Basic Streams as defined in SMPTE ST 372. In this document, Sub image shall have the active digital sample structure as defined in SMPTE ST 274 or SMPTE ST 2048-2.

Figure 2 defines 4 way division of the System 4.1, 4.2, and 4.3 streams.

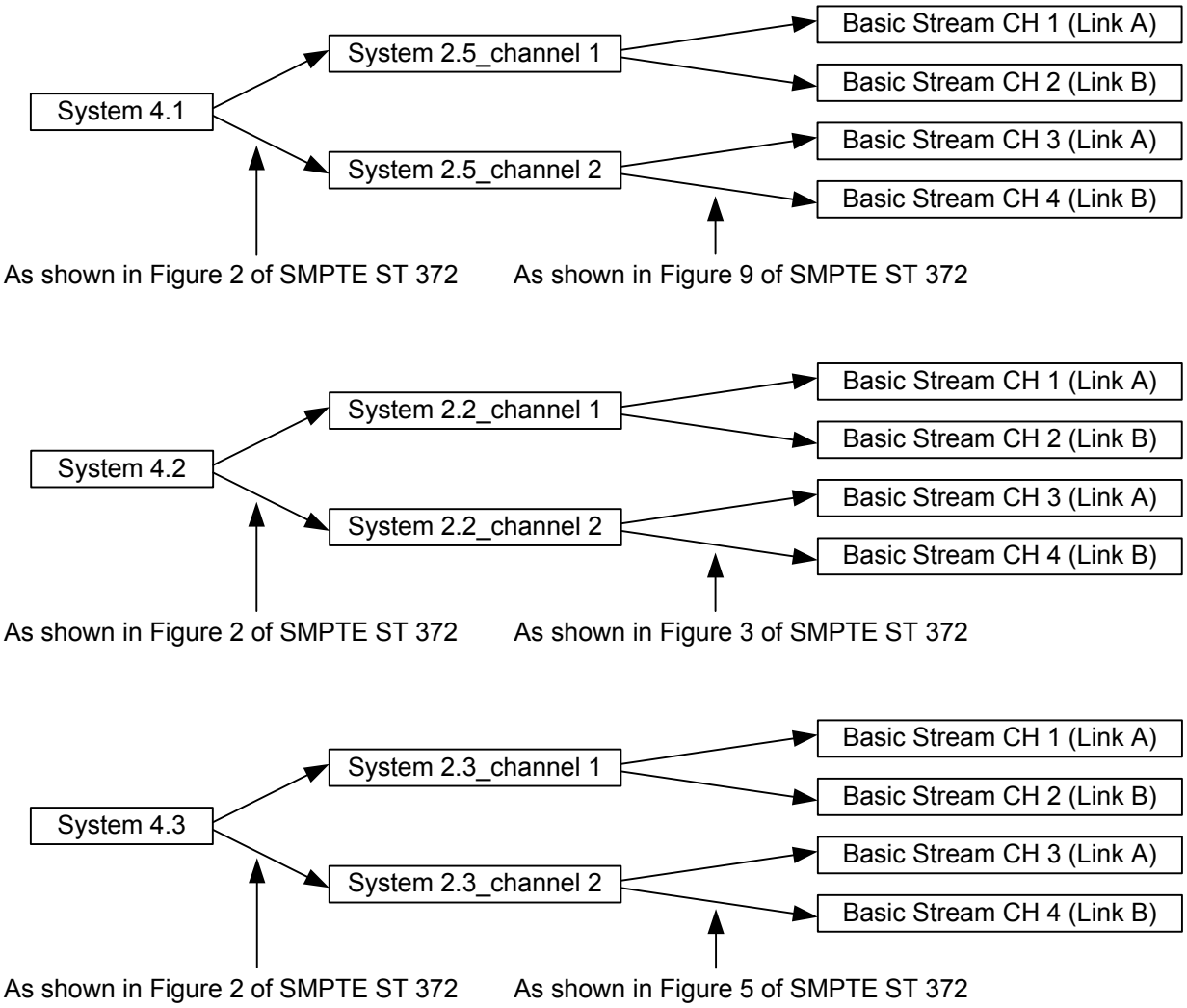

Figure 2 – 4 way division for source stream of System 4.1, 4.2, and 4.3

6.4 Octa Link 1.5 Gb/s Class

Table 4 lists the image formats that shall be mapped into eight Basic Streams. Each of the 4K image formats listed in Table 4 shall be divided and mapped to the active area of four 2K Sub images by one of two methods and then each Sub image shall be converted into two Basic Streams. The detail of the process is defined in Section 6.4.1.

Table 4 – Octa Link 1.5 Gb/s Class Source Image Formats

System Number	Reference SMPTE/ITU Standard	Picture Format	Signal Format sampling structure/pixel Depth	Frame/Field Rates
8.2	Rec. ITU-R BT.1769	3840 × 2160	4:2:0 (Y'C'$_B$C'$_R$), 4:2:2 (Y'C'$_B$C'$_R$)/10-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:2:2 (Y'C'$_B$C'$_R$)/10-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive
8.3	Rec. ITU-R BT.1769	3840 × 2160	4:4:4 (R'G'B')/10-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:4:4 (R'G'B'[1]), 4:4:4:4 (R'G'B'[1]+A)/10-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive
8.4	Rec. ITU-R BT.1769	3840 × 2160	4:4:4 (Y'C'$_B$C'$_R$)/10-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:4:4 (Y'C'$_B$C'$_R$)/10-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive
8.5	Rec. ITU-R BT.1769	3840 × 2160	4:2:0 (Y'C'$_B$C'$_R$), 4:2:2 (Y'C'$_B$C'$_R$)/12-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:2:2 (Y'C'$_B$C'$_R$)/12-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive
8.6	Rec. ITU-R BT.1769	3840 × 2160	4:4:4 (R'G'B')/12-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:4:4 (R'G'B'[1])/12-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive
8.7	Rec. ITU-R BT.1769	3840 × 2160	4:4:4 (Y'C'$_B$C'$_R$)/12-bit	24, 25 and 30 Frames/s Progressive[2]
	ST2036-1			23.98 and 29.97 Frames/s Progressive
	ST2048-1	4096 × 2160	4:4:4 (Y'C'$_B$C'$_R$)/12-bit	24, 25 and 30 Frames/s Progressive
				23.98 and 29.97 Frames/s Progressive

Notes:

[1] R'G'B' indicates either R'G'B' or R'$_{FS}$G'$_{FS}$B'$_{FS}$.

[2] Shall also include 23.98 and 29.97 frame rates

6.4.1 8 way division of source data

Figure 3 shows sample structures of 4:4:4 (R'G'B') or (Y'C'$_B$C'$_R$), 4:2:2 (Y'C'$_B$C'$_R$) and 4:2:0 (Y'C'$_B$C'$_R$) systems for System 8.2 through 8.7 images defined in Recommendation ITU-R BT.1769, SMPTE ST 2036-1 and SMPTE ST 2048-1. C'$_B$ and C'$_R$ signals shall be horizontally sub-sampled by a factor of two in case of a 4:2:2 system and horizontally and vertically sub-sampled by a factor of two in case of a 4:2:0 system.

When transporting 4:2:0 system image data through a transport which has a 4:2:2 data structure, the 0 components of the 4:2:0 (even-numbered samples on odd-numbered lines of unassigned C'$_B$C'$_R$) system image data shall be assigned 200h in case of a 10-bit system and 800h in case of a 12-bit system.

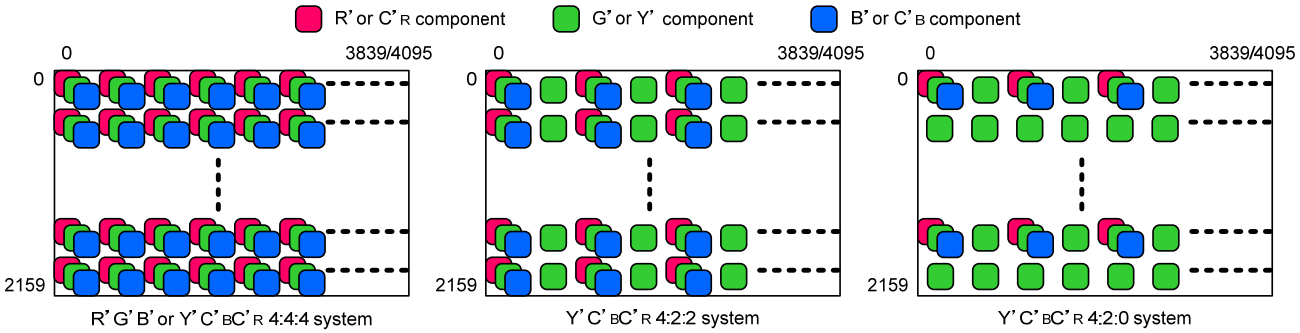

Figure 3 – Sample structures of 4:4:4 (R'G'B') or (Y' C'$_B$C'$_R$), 4:2:2 (Y'C'$_B$C'$_R$) and 4:2:0 (Y'C'$_B$C'$_R$) Systems

The active area of a 4K image of the systems listed in Table 4 shall be divided and mapped into the active area of four 2K Sub images equivalent to the System 1.1 or System 2.2 through System 2.5 image data.

Source image formats listed in Table 4 shall be mapped into 4 sub images using either 2-sample interleave division as shown in Figure 4 or square division as shown in Figure 5. Figure 3 illustrates how each four Sub images created by 2-sample interleave division has the same sampling structure 4:4:4 or 4:2:2.

Figure 4 illustrates 2-sample interleave division at 30 frames/s which requires less memory size and the signal processing delay is much less than that of the Square division. Even lines of image formats listed in Table 4 shall be divided and mapped to the active area of Sub image 1 and 2 as per 2 consecutive horizontal samples and odd lines shall be divided and mapped to the active area of Sub image 3 and 4 as per 2 consecutive horizontal samples. This division results in equivalent Sub image 1, 2, 3 and 4.

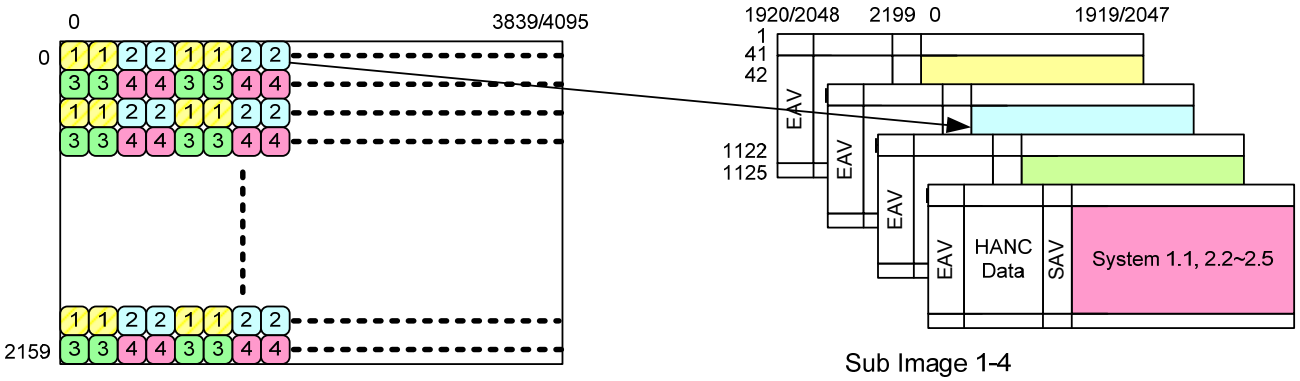

Figure 4 – 2-sample interleave division to Sub image 1 through 4

Table 5 defines the relation between sample/line (horizontal/vertical pixel) numbers of the original 3840 × 2160 or 4096 × 2160 image and sample/line numbers of the mapped 1920 × 1080 or 2048 × 1080 Sub image 1, 2, 3 and 4 of the 2-sample interleave division. Each sub image shall be divided and mapped into the active area as defined in SMPTE ST 274 or SMPTE ST 2048-2.

Table 5 – Relation between original image sample/line (horizontal/vertical pixel) and mapped Sub image sample/line of 2-sample interleave division

Sub image	Original 3840×2160 or 4096×2160 sample number Original 3840×2160 or 4096×2160 line number	Mapped 1920×1080 or 2048×1080 sample number Mapped 1920×1080 or 2048×1080 line number
1	4M, 4M+1 samples 2N line	2M, 2M+1 samples 42 + N line
2	4M+2, 4M+3 samples 2N line	
3	4M, 4M+1 samples 2N+1 line	
4	4M+2, 4M+3 samples 2N+1 line	
Note: M = 0, 1, 2, 3…959 or 1023, N = 0, 1, 2, 3…1079		

Figure 5 defines the 4 way division (Square division) at 24 frames/s. The image formats listed in Table 4 shall be divided and mapped into the active area of four Sub images equivalent to the system 1.1 or 2.2 through 2.5 image data.

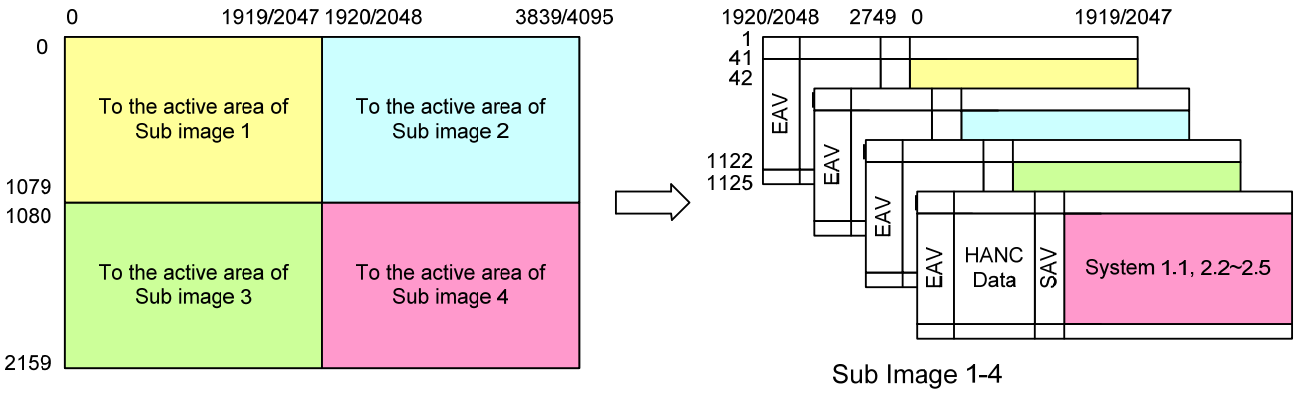

Figure 5 – 4 way division (Square division) to Sub image 1 through 4

Each sub image created by the Square division or the 2-sample interleave division shall be virtually divided to the dual link stream of the sub image system number as shown in Table 2. The digital stream derived from each link shall be assigned to a Basic Stream defined in this standard. Figure 6 illustrates the division.

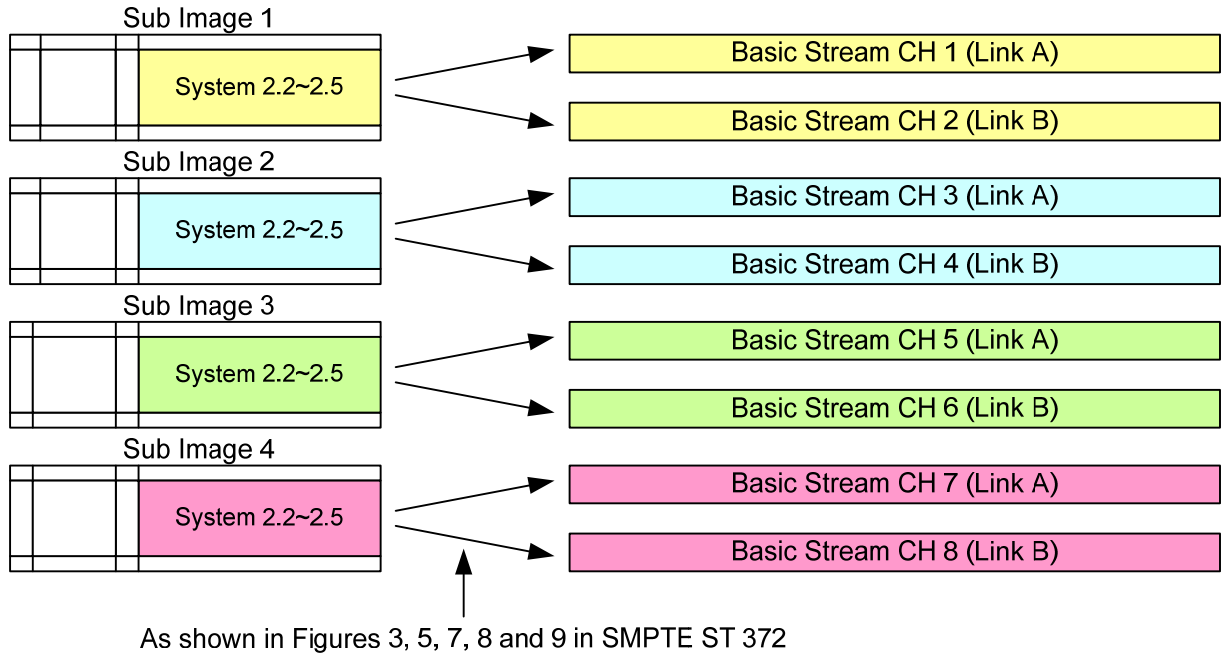

Figure 6 – 8 way division

In case of System 8.2 image (3840×2160, 4096×2160/4:2:2 or 4:2:0/10-bit), Sub images 1 to 4 are equivalent to System number 1.1 and Link As shall be assigned for the image transmission.

7 Payload Identifier

A payload identifier shall be mapped into each Basic Stream in conformance with SMPTE ST 352. The precise definition of the 4 byte payload identifier packet for 1080-active line payloads shall be as defined below and these definitions shall supersede the definitions contained in Annex B of SMPTE ST 352.

7.1 Payload Identifier for 1.5 Gb/s Class

The payload identifier for 1.5 Gb/s class shall be in conformance with SMPTE ST 292-1.

7.2 Payload Identifier for Dual Link 1.5 Gb/s Class

The payload identifier for Dual Link 1.5 Gb/s class shall be in conformance with SMPTE ST 372.

7.3 Payload Identifier for Quad Link 1.5 Gb/s Class

When identifying 1080-line video payloads mapped onto a quad-link 1.485 Gb/s serial digital interface, the following limitations shall apply (see Table 6):

- Byte 1 shall be set to 90h.

- The picture rate shall only use the values permitted for quad link interfaces in Section 6.3 of this document.

The sampling structure shall be set to the value as defined in Table 7. This shall include the use of the alpha channel as a carrier of data as well as video. The value of 7h shall be assigned when the Color VANC packet defined in SMPTE ST 2048-2 is carried;

- Bit 6 of byte 3 shall be used to identify 1920 active Luma/R'G'B' samples (0) or 2048 active R'G'B'/$X'Y'Z'$ samples (1) as defined by the horizontal Luma/R'G'B'/ $X'Y'Z'$ sample count;

- The channel number in bit b6 and b7 of byte 4 shall be set to a value of 0h for the first link, to 1h for the second link, to 2h for the third link, and to 3h for the fourth link;

- The bit depth shall be identified by bits b1 and b0 of byte 4 having the following values:

  - 0h shall identify quantization using 8 bits per sample;

  - 1h shall identify quantization using 10 bits per sample;

  - 2h shall identify quantization using 12 bits per sample.

Note: In the case where the bit depth field indicates 12-bits per sample, it should be noted that these bits have been mapped into a 10-bit interface.

Table 6 – Payload identifier definitions for 1080-line video payloads on a quad-link 1.485 Gb/s (nominal) serial digital interface

Bits	Byte 1	Byte 2	Byte 3	Byte 4
Bit 7	1	Interlaced (0) or progressive (1) transport	Reserved	Channel assignment Ch1 (0h), Ch2 (1h), Ch3 (2h) or Ch4 (3h)
Bit 6	0	Interlaced (0) or progressive (1) picture	Horizontal sampling 1920 (0) or 2048 (1)	
Bit 5	0	Reserved	Aspect Ratio 16:9 (1) Unknown (0)	Reserved
Bit 4	1	Reserved	Reserved	Reserved
Bit 3	0	Picture rate (see Table 8)	Sampling structure (see Table 7)	Reserved
Bit 2	0			Reserved
Bit 1	0			Bit depth 8-bit (0h), 10-bit (1h), 12-bit (2h), Reserved (3h)
Bit 0	0			

Table 7 – Sampling Structure

Value	Sampling	Value	Sampling	Value	Sampling	Value	Sampling
0h	4:2:2 ($Y'/C'_B/C'_R$)	1h	4:4:4 ($Y'/C'_B/C'_R$)	2h	4:4:4 (G'B'R')	3h	4:2:0
4h	4:2:2:4 ($Y'/C'_B/C'_R$/A)	5h	4:4:4:4 ($Y'/C'_B/C'_R$/A)	6h	4:4:4:4 (G'B'R'/A)	7h	SMPTE ST 2048-2 FS[1]
8h	4:2:2:4 ($Y'/C'_B/C'_R$/D)	9h	4:4:4:4 ($Y'/C'_B/C'_R$/D)	Ah	4:4:4:4 (G'B'R'/D)	Bh	Reserved
Ch	Reserved	Dh	Reserved	Eh	4:4:4 (*X'Y'Z'*)	Fh	Reserved

Table 8 – Picture rate values

Value	Picture rate	Value	Picture rate	Value	Picture rate	Value	Picture rate
0h	No defined value	1h	Reserved	2h	24/1.001	3h	24
4h	48/1.001	5h	25	6h	30/1.001	7h	30
8h	48	9h	50	Ah	60/1.001	Bh	60
Ch	Reserved	Dh	Reserved	Eh	Reserved	Fh	Reserved

[1] SMPTE ST 2048-2 requires the Color VANC packet to describe the FS characteristics. See SMPTE ST 2048-2.

7.4 Payload Identifier for Octa Link 1.5 Gb/s Class

When identifying 1080-line video payloads mapped onto an octa-link 1.485 Gb/s serial digital interface, the following limitations shall apply (see Table 9):

- Byte 1 shall be set to A0h.

- The picture rate shall only use the values as permitted for octa link interfaces in Section 6.4.

The sampling structure shall be set to the value as defined in Table 7. This shall include the use of the alpha channel as a carrier of data as well as video. The value of 7h shall be assigned when the Color VANC packet defined in SMPTE ST 2048-2 is carried;

- Bit 6 of byte 3 shall be used to identify 1920 active Luma/R'G'B' samples (0) or 2048 active R'G'B'/$X'Y'Z'$ samples (1) as defined by the horizontal Luma/R'G'B'/ $X'Y'Z'$ sample count;

- The channel number in bit b5, b6 and b7 of byte 4 shall be set to the following values:
  - 0h shall identify the first link;
  - 1h shall identify the second link;
  - 2h shall identify the third link;
  - 3h shall identify the fourth link;
  - 4h shall identify the fifth link;
  - 5h shall identify the sixth link;
  - 6h shall identify the seventh link;
  - 7h shall identify the eighth link.

- The bit depth shall be identified by bits b1 and b0 of byte 4 having the following values:
  - 0h shall identify quantization using 8 bits per sample;
  - 1h shall identify quantization using 10 bits per sample;
  - 2h shall identify quantization using 12 bits per sample

Note: In the case where the bit depth field indicates 12-bits per sample, it should be noted that these bits have been mapped into a 10-bit interface

Table 9 – Payload identifier definitions for 1080-line video payloads on an octa-link 1.485 Gb/s (nominal) serial digital interface

<table>
<tr><th>Bits</th><th>Byte 1</th><th>Byte 2</th><th>Byte 3</th><th>Byte 4</th></tr>
<tr><td>Bit 7</td><td>1</td><td>Interlaced (0) or progressive (1) transport</td><td>Reserved</td><td rowspan="3">Channel assignment
Ch1 (0h), Ch2 (1h),
Ch3 (2h), Ch4 (3h),
Ch5 (4h), Ch6 (5h),
Ch7 (6h) or Ch8 (7h)</td></tr>
<tr><td>Bit 6</td><td>0</td><td>Interlaced (0) or progressive (1) picture</td><td>Horizontal sampling
1920 (0) or 2048 (1)</td></tr>
<tr><td>Bit 5</td><td>1</td><td>Reserved</td><td>Aspect Ratio 16:9 (1)
Unknown (0)</td></tr>
<tr><td>Bit 4</td><td>0</td><td>Reserved</td><td>Reserved</td><td>Reserved</td></tr>
<tr><td>Bit 3</td><td>0</td><td rowspan="4">Picture rate
(see Table 8)</td><td rowspan="4">Sampling structure
(see Table 7)</td><td>Reserved</td></tr>
<tr><td>Bit 2</td><td>0</td><td>Reserved</td></tr>
<tr><td>Bit 1</td><td>0</td><td rowspan="2">Bit depth
8-bit (0h), 10-bit (1h),
12-bit (2h),
Reserved (3h)</td></tr>
<tr><td>Bit 0</td><td>0</td></tr>
</table>

7.5 Placement of Payload Identifier

The placement of the payload identifier for each Basic Stream of 10G-SDI shall be immediately after the SAV in the lines defined in SMPTE ST 292-1.

Annex A SMPTE ST 435 Document Road Map (Informative)