

SMPTE STANDARD

Image Format and Ancillary Data Mapping for the Dual Link 3 Gb/s Serial Interface



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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 its Standards Operation Manual.

SMPTE ST 425-3 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 Engineering Document. However, attention is drawn 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.

There is a need in the industry to have an interface for transporting images complying with 4:2:2 and 4:4:4 10 bit and 12-bit image formats defined by SMPTE ST 274, ST 2048-1, ST 2048-2 and ST 2036-1, which can be transported by a dual SMPTE ST 424 serial interfaces. This standard also defines the payload identifier.

1 Scope

This standard defines 1080-line and 2160-line mapping formats as described below;

1080-line mapping specifies:

The mapping of the image formats of 1920×1080 and 2048×1080 pixels listed in Table 2 into four parallel 10-bit data streams (known as data stream one, data stream two, data stream three and data stream four) of a 40-bit virtual interface, followed by the mapping of these four 10-bit data streams onto the Dual Link 3 Gb/s Serial Interface (3G-SDI Link 1 and Link 2) via two 20-bit virtual interfaces.

2160-line mapping specifies:

The mapping of the image formats of 3840×2160 and 4096×2160 pixels listed in Table 3 into four parallel 10-bit data streams (known as data stream one, data stream two, data stream three and data stream four) of a 40-bit virtual interface, followed by the mapping of these four 10-bit data streams on to the Dual Link 3 Gb/s Serial Interface (3G-SDI Link 1 and Link 2) via two 20-bit virtual interfaces.

This standard also defines the carriage of ancillary data such as the audio data, the audio control packets, the payload identifier and the time code.

It is not necessary for implementations to include support for all formats that are included in this standard. Implementers should indicate supported formats in commercial publications.

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.

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.

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.

3 Normative References

The following standards contain provisions that, 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 RP 2077:2013, Full Range Image Mapping

SMPTE ST 12-2:2014, Transmission of Time Code in the Ancillary Data Space

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

SMPTE ST 292-1:2018, 1.5 Gb/s Signal / Data Serial Interface

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

SMPTE ST 299-2:2010, Extension of the 24-Bit Digital Audio Format to 32 Channels for 3 Gb/s Bit-Serial Interfaces

SMPTE ST 352:2013, Payload Identification Codes for Serial Digital Interfaces

SMPTE ST 372:2017, Dual Link 1.5 Gb/s Digital Interface for 1920 x 1080 and 2048 x 1080 Picture Formats

SMPTE ST 425-1:2017, Source Image Format and Ancillary Data Mapping for the 3 Gb/s Serial Interface

SMPTE ST 435-1:2012, 10 Gb/s Serial Signal / Data Interface — Part 1: Basic Stream Distribution

SMPTE ST 2036-1:2014, 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 x 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface

Recommendation ITU-R BT.2100-2 (07/2018), Image parameter values for high dynamic range television for use in production and international programme exchange.

4 Definition of Terms

This section defines terms used in this document.

4.1 3G-SDI Link 1/ 3G-SDI Link 2

Each of the two links that together compose the Dual Link 3 Gb/s Serial Interface

4.2 Alpha Channel

An application dependent auxiliary component that is related to the source image (e.g. R'G'B' or Y'C_BC_R). These interfaces are denoted R'G'B'+A and Y'C_BC_R +A. Key signals as defined in SMPTE RP 157 are one example of an alpha signal.

4.3 Data stream one / data stream two / data stream three / data stream four

Four parallel 10-bit data streams of a 40-bit virtual interface. Each data stream shall have an interface frequency of 148.5 MHz or 148.5/1.001 MHz.

4.4 HANC

Horizontal Ancillary Data Space is the Ancillary Data Space located during the horizontal interval of a video line. The expressions HANC or HANC space are used interchangeably throughout the document.

4.5 Mapping Structure

The term Mapping Structure defines the structure of the virtual interface which the image data are mapped onto. Different mapping structures are used according to the different sampling structures and pixel depths of the images.

The Mapping Structure number, expressed as a roman numeral, changes according to sampling structure and pixel depth. The Mapping Structures I, II, III and IV used in this standard are based on rules defined in SMPTE ST372, as tabulated in Table 1.

The term Level A Mapping Structure 1 used in this standard is based on the rule defined in SMPTE ST 425-1.

Table 1 – Mapping Structure Cross Reference with SMPTE ST 372

Mapping Structure	Section Number of SMPTE ST 372:2017	SMPTE ST 372 Section Heading
I	5.1	4:2:2 (Y'C'B'C _R) or (IC _{TCP})/10-bit Signals at 60, 60/1.001, 50, 48 and 48/1.001 Progressive Frame Rates
II	5.2	4:4:4 (R'G'B') and 4:4:4:4 (R'G'B'+A)/10-bit Signals at 30, 30/1.001, 25, 24 and 24/1.001 Frame Rates, PsF and at 60, 60/1.001 and 50 Field Rates
	5.4.2	4:4:4 (Y'C'B'C _R) or (IC _{TCP}) and 4:4:4:4 (Y'C'B'C _{RA}) or (IC _{CPA})/10-bit Multiplex Structure
III	5.3	4:4:4 (R'G'B' or X'Y'Z')/12-bit Signals at 30, 30/1.001, 25, 24 and 24/1.001 Frame Rates, PsF and 4:4:4 (R'G'B')/12-bit Signals at 60, 60/1.001 and 50 Field Rates*
	5.4.3	4:4:4 (Y'C'B'C _R) or (IC _{TCP})/12-bit Multiplex Structure
IV	5.5	4:2:2:4 (Y'C'B'C _{RA}) or (IC _{CPA})/12-bit Signals at 30, 30/1.001, 25, 24, 24/1.001 Frame Rates, PsF and at 60, 60/1.001 and 50 Field Rates
Note: Mapping Structure III used in this document does not apply to 4:4:4 (X'Y'Z')/12-bit signals.		

4.6 Sub Image

A sub-division of a source image.

4.7 VANC

Vertical Ancillary Data Space is the Ancillary Data Space located between SAV and EAV during the vertical interval of a video frame or field. The expressions VANC or VANC space are used interchangeably throughout the document.

5 Image Formats

5.1 1080-line Source Image Formats

For this interface, the source data shall be an uncompressed 10-bit or 12-bit video signal corresponding to 1080-line source image formats listed in Table 2.

Table 2 – 1080-line Source Image Formats

Mapping Structure (See Table 1)	Reference Standard	Image Format	Signal Format Sampling Structure/pixel Depth	Frame Rate
II	ST 274 Recommendation ITU-R BT.2100	1920 × 1080	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B' + A)/10-bit	50, 60/1.001 and 60 Progressive
	ST 2048-2	2048 × 1080 ^{*2}	4:4:4 (R'G'B' ^{*1}), 4:4:4:4 (R'G'B' ^{*1} + A)/10-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
	ST 274 Recommendation ITU-R BT.2100	1920 × 1080	4:4:4 (Y'C _B C _R), 4:4:4:4 (Y'C _B C _R + A)/10-bit 4:4:4 (IC _{TCP}), 4:4:4:4 (IC _{TCP} + A)/10-bit	50, 60/1.001 and 60 Progressive
	ST 2048-2	2048 × 1080 ^{*2}	4:4:4 (Y'C _B C _R), 4:4:4:4 (Y'C _B C _R + A)/10-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
III	ST 274 Recommendation ITU-R BT.2100	1920 × 1080	4:4:4 (R'G'B')/12-bit	50, 60/1.001 and 60 Progressive
	ST 2048-2 Recommendation ITU-R BT.2100	2048 × 1080 ^{*2}	4:4:4 (R'G'B' ^{*1})/12-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
	ST 274	1920 × 1080	4:4:4 (Y'C _B C _R)/12-bit 4:4:4 (IC _{TCP})/12-bit	50, 60/1.001 and 60 Progressive
	ST 2048-2	2048 × 1080 ^{*2}	4:4:4 (Y'C _B C _R)/12-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
IV	ST274 Recommendation ITU-R BT.2100	1920 × 1080	4:2:2 (Y'C _B C _R)/12-bit 4:2:2 (IC _{TCP})/12-bit 4:2:2:4 (Y'C _B C _R + A)/12-bit 4:2:2:4 (IC _{TCP} + A)/12-bit	50, 60/1.001 and 60 Progressive
	ST2048-2	2048 × 1080 ^{*2}	4:2:2 (Y'C _B C _R)/12-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
	ST 2048-2	2048 × 1080 ^{*2}	4:2:2:4 (Y'C _B C _R + A)/12-bit	48/1.001, 48, 50, 60/1.001 and 60 Progressive
NOTE:				

*1 In this image format R'G'B' indicates either R'G'B' or R'_{FS}G'_{FS}B'_{FS}. An additional Color VANC packet to describe the FS characteristics is defined by SMPTE ST 2048-1 and referenced by ST 2048-2

*2 This is the maximum pixel array, the active image might not fill the maximum array.

5.1.1 Source Sample Number Representation

Each line of G', B' and R' or Y', C'_B and C'_R or I, C_T, C_P signals consists of a total of 2750, 2640 or 2200 samples each comprising 10 or 12 bits. The source samples are designated 0-2749, 0-2639 or 0-2199. For the 10-bit signals, the individual components of the nth sample are designated by suffixes such as, G'n or Y'n. For 12-bit signals, the most significant 10 bits of the nth sample are designated by suffixes such as G'n:2-11 or Y'n:2-11, and the least significant 2 bits of the nth sample are designated by suffixes such as G'n:0-1 or Y'n:0-1. The least significant 2 bits of the R'G'B' nth sample is designated by suffixes such as R'G'B'n:0-1. The mth bit of each R'G'B' component of the nth sample is designated by a suffix such as G'n:m.

5.2 2160-line Source Image Formats

For this interface, the source data shall be an uncompressed 10-bit video signal corresponding to 2160-line image formats in Table 3.

Table 3 – 2160-line Source Image Formats

Reference Standard	Image Format	Signal Format Sampling Structure/Pixel Depth	Frame Rate
ST 2036-1 Recommendation ITU-R BT.2100	3840 × 2160	4:2:2 (Y'C' _B C' _R), 4:2:0 (Y'C' _B C' _R)/10-bit 4:2:2 (I C _T C _P), 4:2:0 (I C _T C _P)/10-bit	24/1.001, 24, 25, 30/1.001 and 30 Progressive
ST 2048-1	4096 × 2160	4:2:2 (Y'C' _B C' _R)/10-bit	24/1.001, 24, 25, 30/1.001 and 30 Progressive

5.2.1 Source Sample Number Representation

Each line of Y', C'_B and C'_R signals consists of a total of 3840 or 4096 samples each comprising 10 bits. The source samples are designated 0-3839 or 0-4095. The individual components of the nth sample are designated by suffixes such as Y'n, C'_Bn and C'_Rn. C'_B and C'_R signals shall each be horizontally subsampled by a factor of two with respect to the Y' component in the case of a 4:2:2 system. C'_B and C'_R components shall be co-sited with even-numbered samples.

For I C_TC_P formats, replace Y' with I, C'_B with C_T and C'_R with C_P.

5.3 Image Mapping Overview

The source images are mapped onto a 40-bit virtual interface, consisting of four 10-bit data streams — data stream one, data stream two, data stream three and data stream four.

The 40-bit virtual interface is divided into two 20-bit virtual interfaces, each as defined in SMPTE ST 425-1. Data stream one and data stream two compose data stream one and data stream two, respectively, of the first 20-bit virtual interface. Data stream three and data stream four compose data stream one and data stream two, respectively, of the second 20-bit virtual interface.

The first and second 20-bit virtual interfaces are then multiplexed into two serial bit streams 3G-SDI Link 1 and 3G-SDI Link 2, respectively, according to SMPTE ST 424. For further information, see the Annex “Level A Mapping Compared to Level B Mapping” of SMPTE ST 425-1.

5.3.1 1080-line Image System Overview

In the case of 1080-line mapping, the source data are the source image signals defined in SMPTE ST 274 and SMPTE ST 2048-2 listed in Table 2. The 1080-line mapping is shown in Figure 1.

With the Level A mapping, the source image is first divided into Sub Image 1 and Sub Image 2 in accordance with the Mapping Structure rules II, III and IV shown in Table 1. Each Sub Image is then mapped into two 10-bit data streams according to the rule defined in Mapping Structure 1. Sub Image 1 is mapped into data stream one and data stream two. Sub Image 2 is mapped into data stream three and data stream four.

With the Level B-DL mapping, the source image is first divided alternately by line into Sub Image 1 and Sub Image 2 in accordance with the Mapping Structure rule I. Each Sub Image is then mapped into two 10-bit data streams in accordance with the Mapping Structure rules II, III and IV shown in Table 1. Sub Image 1 is mapped into data stream one and data stream two. Sub Image 2 is mapped into data stream three and data stream four.

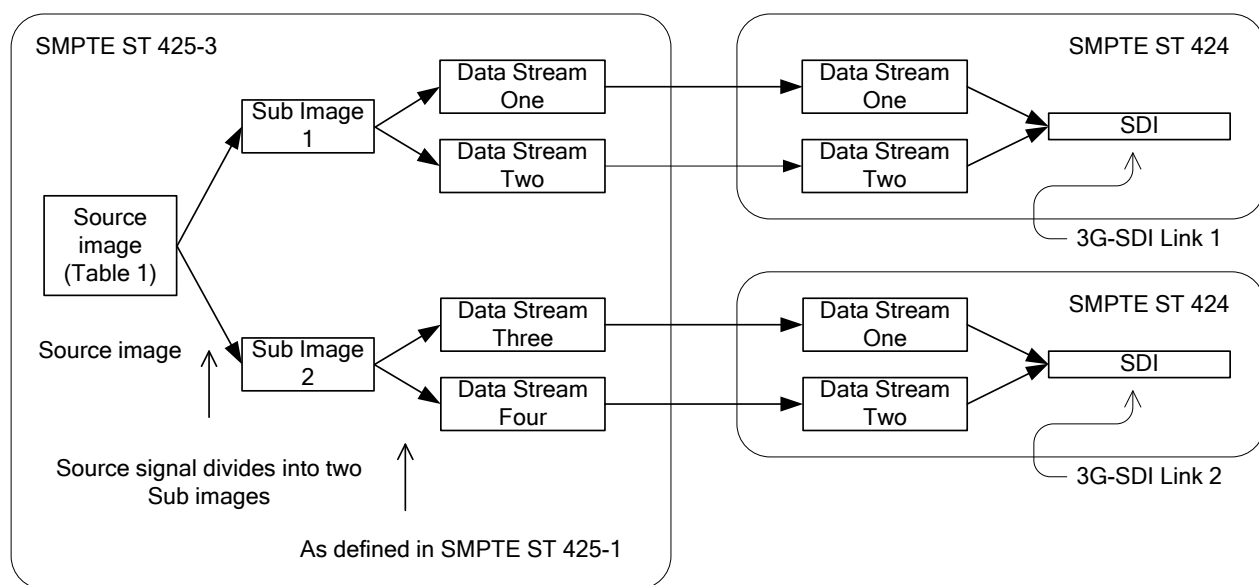


Figure 1 – Signal Flow of Dual Link 3 Gb/s Serial Interface of 1080-line Source Image

5.3.2 2160-line Image System Overview

In the case of 2160-line mapping, the source data are the source image signals defined in SMPTE ST 2036-1 and SMPTE ST 2048-1 listed in Table 3. The 2160-line mapping is shown in Figure 2.

The source image is first divided into four Sub Images. All of the 10-bit data words of Sub Image 1 are mapped into data stream one. Similarly, Sub Images 2 through 4 are mapped into data streams two through four, respectively.

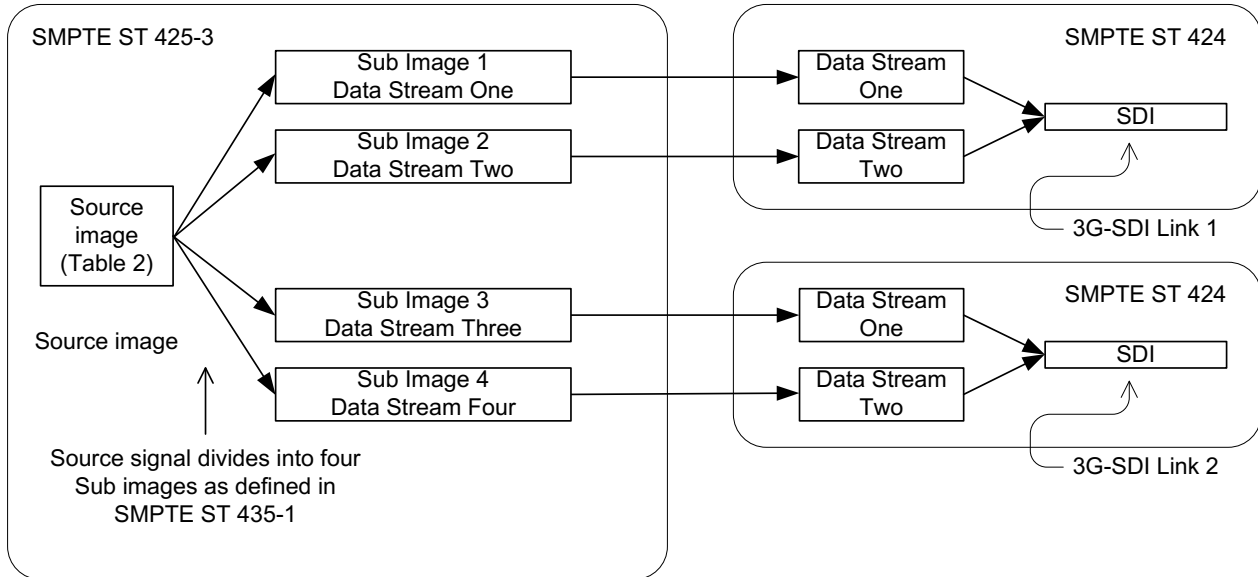


Figure 2– Signal Flow of Dual Link 3 Gb/s Serial Interface of 2160-line Source Image

5.4 Number of Audio Channels

Up to 64 audio channels sampled at 32 kHz, 44.1 kHz or 48 kHz may be mapped into the virtual interface. At 96-kHz sampling, up to 32 audio channels may be mapped into the virtual interface. The maximum number of audio channels that can be mapped into the available HANC space of the data streams varies in accordance with the source image format and frame rate as shown in Table 4.

Table 4 – Number of Audio Channels supported Source Image Format, Frame Rate and Audio Sampling Rate

Image Format	Frame Rate	Maximum number of audio channels at 32-kHz, 44.1-kHz or 48-kHz sampling	Maximum number of audio channels at 96-kHz sampling
1920x1080	50, 60/1.001 and 60 Progressive	Up to 64 channels	Up to 32 channels
2048x1080	48/1.001, 48 and 50 Progressive	Up to 64 channels	Up to 32 channels
	60/1.001 and 60 Progressive	Up to 32 channels	Up to 16 channels
3840x2160	25, 30/1.001 and 30 Progressive	Up to 64 channels	Up to 32 channels
4096x2160	24/1.001, 24 and 25 Progressive	Up to 64 channels	Up to 32 channels
	30/1.001 and 30 Progressive	Up to 32 channels	Up to 16 channels

6 1080-line Level A Mapping

This section defines Level A image and ancillary data mapping for 1080-line image formats listed in Table 2.

6.1 Level A Mapping – 1080-line Source Image

The 1080-line source images listed in Table 2 shall be divided into two Sub Images in accordance with the Mapping Structure rules II, III and IV.

Each Sub Image shall then be mapped into two 10-bit data streams as defined in Level A Mapping Structure 1. Sub Image 1 shall be mapped into data stream one and data stream two. Sub Image 2 shall be mapped into data stream three and data stream four. The Level A mapping is shown in Figure 3.

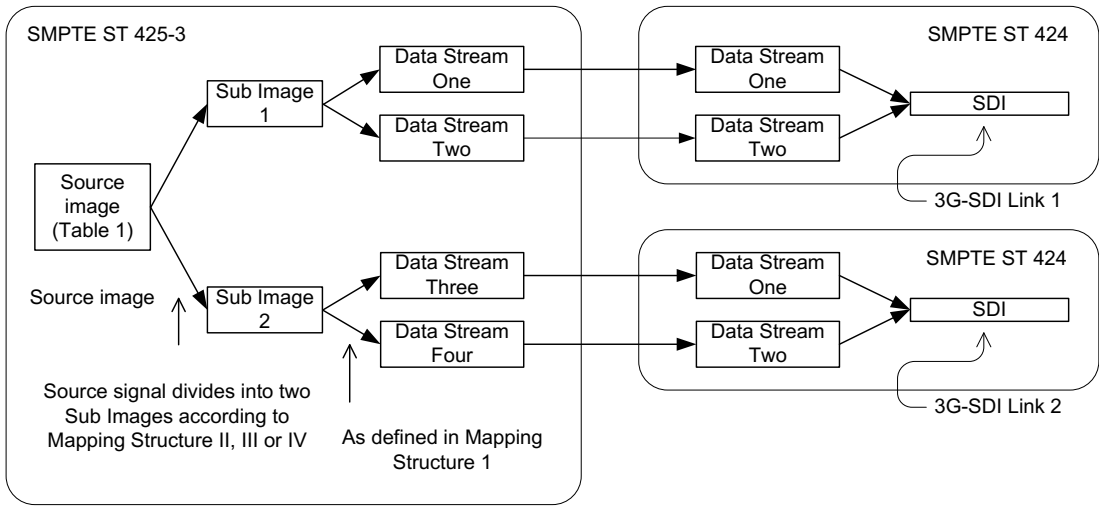


Figure 3 – Overview of 1080-line Level A Mapping

6.1.1 Mapping Structure II – 4:4:4 (R'G'B')/(Y'C'B_{C_R})/(IC_{TCP}+A) and 4:4:4:4 (R'G'B'+A)/(Y'C'B_{C_R}+A)/(IC_{TCP}+A) /10-bit Signals

Sub Image 1 shall consist of the G' samples and the even numbered B' and R' samples of the Source Image.

Sub Image 2 shall consist of the Alpha samples (if present) and the odd numbered B' and R' samples from the Source Image.

If Alpha samples are not present, they shall be replaced with the value 040h.

SOURCE SAMPLE NUMBER							
		0	1	2	3	4	5
Sub Image 1		G'	G'	G'	G'	G'	G'
		B'	B'	B'	B'	B'	B'
		R'	R'	R'	R'	R'	R'
Sub Image 2		A	A	A	A	A	A

Figure 4 – 4:4:4:4 (R'G'B'+A)/10-bit — Sub Image separation using Mapping Structure rule II

The Mapping Structure of the virtual interface onto which the 4:4:4 ($Y'C'_BC'_R$) and the 4:4:4:4 ($Y'C'_BC'_R+A$)/10-bit image data are mapped shall be as defined in this section, Section 6.1.1.1, and Section 6.1.1.1.1, except that:

- The G' samples shall be replaced with Y' samples;
- the B' samples shall be replaced with C'_B samples;
- and the R' samples shall be replaced with C'_R samples.

The Mapping Structure of the virtual interface onto which the 4:4:4 ($IC_T C_P$) and the 4:4:4:4 ($IC_T C_P+A$)/10-bit image data are mapped shall be as defined in this section, Section 6.1.1.1, and Section 6.1.1.1.1, except that:

- The G' samples shall be replaced with I samples;
- the B' samples shall be replaced with C_T samples;
- and the R' samples shall be replaced with C_P samples.

6.1.1.1 Multiplex Structure

Sub Image 1:

data stream one: The data words $Y'0, Y'1, Y'2, Y'3 \dots$ in Level A Mapping Structure 1 data stream one shall be replaced by $G'0, G'1, G'2, G'3 \dots$ from Figure 4, respectively.

data stream two: The data words $C'_B0, C'_R0, C'_B1, C'_R1 \dots$ in Level A Mapping Structure 1 data stream two shall be replaced by $B'0, R'0, B'2, R'2 \dots$ from Figure 4, respectively.

Sub Image 2:

data stream three: The data words $Y'0, Y'1, Y'2, Y'3 \dots$ in Level A Mapping Structure 1 data stream one shall be replaced by $A0, A1, A2, A3 \dots$ from Figure 4, respectively.

data stream four: The data words $C'_B0, C'_R0, C'_B1, C'_R1 \dots$ in Level A Mapping Structure 1 data stream two shall be replaced by $B'1, R'1, B'3, R'3 \dots$ from Figure 4, respectively.

Thus the video data words shall be conveyed in the following order in the data streams:

- data stream one: $G'0, G'1, G'2, G'3 \dots$
- data stream two: $B'0, R'0, B'2, R'2 \dots$
- data stream three: $A0, A1, A2, A3 \dots$
- data stream four: $B'1, R'1, B'3, R'3 \dots$

For $IC_T C_P$ formats, Y' shall be replaced with I , C'_B shall be replaced with C_T and C'_R shall be replaced with C_P .

6.1.1.1.1 3G-SDI Link Multiplex Structure (Informative)

Following the data stream assignment specified in Section 9, and serialization according to SMPTE ST 424, the 3G-SDI data streams are conveyed in the following order:

3G-SDI Link 1 data stream:

$B'0, G'0, R'0, G'1, B'2, G'2, R'2, G'3 \dots$

3G-SDI Link 2 data stream:

$B'1, A0, R'1, A1, B'3, A2, R'3, A3 \dots$

6.1.2 Mapping Structure III – 4:4:4 ($R'G'B'$)/($Y'C'_B C'_R$)/($IC_T C_P$)/12-bit Signals

Sub Image 1 shall consist of the most significant 10 bits of all of the G' samples and the most significant 10 bits of the even numbered B' and R' samples of the Source Image.

Sub Image 2 shall consist of the two least significant bits of all of the G' , B' and R' samples and the most significant 10 bits of the odd numbered B' and R' samples from the Source Image.

		SOURCE SAMPLE NUMBER					
		0	1	2	3	4	5
Sub Image 1		$G':2-11$	$G':2-11$	$G':2-11$	$G':2-11$	$G':2-11$	$G':2-11$
		$B':2-11$	$B':2-11$	$B':2-11$	$B':2-11$	$B':2-11$	$B':2-11$
		$R':2-11$	$R':2-11$	$R':2-11$	$R':2-11$	$R':2-11$	$R':2-11$
Sub Image 2		$R'G'B':0-1$	$R'G'B':0-1$	$R'G'B':0-1$	$R'G'B':0-1$	$R'G'B':0-1$ 1	$R'G'B':0-1$ 1

Figure 5 – 4:4:4 ($R'G'B'$)/12-bit — Sub Image separation using Mapping Structure rule III

The Mapping Structure of the virtual interface onto which the 4:4:4 ($Y'C'_B C'_R$)/12-bit image data are mapped shall be as defined in this section, Section 6.1.2.1, Section 6.1.2.1.1, and Section 6.1.2.2, except that:

The G' samples shall be replaced with Y' samples;

the B' samples shall be replaced with C'_B samples;

and the R' samples shall be replaced with C'_R samples.

The Mapping Structure of the virtual interface onto which the 4:4:4 ($IC_T C_P$)/12-bit image data are mapped shall be as defined in this section, Section 6.1.1.1, and Section 6.1.1.1.1, except that:

The G' samples shall be replaced with I samples;

the B' samples shall be replaced with C_T samples;

and the R' samples shall be replaced with C_P samples.

6.1.2.1 Multiplex Structure

Sub Image 1:

data stream one: The data words $Y'0$, $Y'1$, $Y'2$, $Y'3$... in Level A Mapping Structure 1 data stream one shall be replaced by $G'0:2-11$, $G'1:2-11$, $G'2:2-11$, $G'3:2-11$... from Figure 5, respectively.

data stream two: The data words C'_{B0} , C'_{R0} , C'_{B1} , C'_{R1} ... in Level A Mapping Structure 1 data stream two shall be replaced by $B'0:2-11$, $R'0:2-11$, $B'2:2-11$, $R'2:2-11$... from Figure 5, respectively.

Sub Image 2:

data stream three: The data words $Y'0$, $Y'1$, $Y'2$, $Y'3$... in Level A Mapping Structure 1 data stream one shall be replaced by $R'G'B'0:0-1$, $R'G'B'1:0-1$, $R'G'B'2:0-1$, $R'G'B'3:0-1$...from Figure 5, respectively.

data stream four: The data words C'_{B0} , C'_{R0} , C'_{B1} , C'_{R1} ... in Level A Mapping Structure 1 data stream two shall be replaced by $B'1:2-11$, $R'1:2-11$, $B'3:2-11$, $R'3:2-11$... from Figure 5, respectively.

Thus the video data words shall be conveyed in the following order in the data streams:

data stream one: $G'0:2-11$, $G'1:2-11$, $G'2:2-11$, $G'3:2-11$...

data stream two: $B'0:2-11$, $R'0:2-11$, $B'2:2-11$, $R'2:2-11$...

data stream three: $R'G'B'0:0-1$, $R'G'B'1:0-1$, $R'G'B'2:0-1$, $R'G'B'3:0-1$...

data stream four: $B'1:2-11$, $R'1:2-11$, $B'3:2-11$, $R'3:2-11$...

6.1.2.1.1 3G-SDI Link Multiplex Structure (Informative)

Following the data stream assignment specified in Section 9 and serialization according to SMPTE ST 424, the 3G-SDI data streams are conveyed in the following order:

3G-SDI Link 1 data stream:

$B'0:2-11$, $G'0:2-11$, $R'0:2-11$, $G'1:2-11$, $B'2:2-11$, $G'2:2-11$, $R'2:2-11$, $G'3:2-11$...

3G-SDI Link 2 data stream:

$B'1:2-11$, $G'B'R'0:0-1$, $R'1:2-11$, $G'B'R'1:0-1$, $B'3:2-11$, $G'B'R'2:0-1$, $R'3:2-11$, $G'B'R'3:0-1$...