SMPTE ST 2081-30:2017

SMPTE STANDARD

Transport of Multiple 3Gb/s or 1.5Gb/s signals on a 6G-SDI link

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Foreword

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Intellectual Property

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Introduction

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

SMPTE ST 2081-30 defines the transport of two 3G-SDI signals or four 1.5G-SDI (HD-SDI) signals on a Single-link 6 Gb/s [nominal] SDI bit-serial interface.

Combination

The signals are combined to form a 40-bit virtual interface at 148.5 (x1/1.001) MHz

Multiplex

The 40-bit virtual interface is multiplexed onto a single 6G-SDI 10-bit interface in the order data stream four, data stream two, data stream three, data stream one.

1 Scope

This Standard defines the combination of four HD-SDI signals or two 3G-SDI signals into a 6G-SDI interface.

- **MODE 1:** Carriage of two SMPTE ST 425-1 3G-SDI signals on a 6G-SDI 10-bit interface as defined in section 6 Single-link 6G-SDI 10-bit Multiplex
- **MODE 2:** Carriage of four SMPTE ST 292-1 HD-SDI signals on a 6G-SDI 10-bit interface as defined in section 6 Single-link 6G-SDI 10-bit Multiplex

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; then formal languages; then figures; and then any other language forms.

3 Normative References

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

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

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

SMPTE ST 425-1:2014, Source Image Format and Ancillary Data Mapping for the 3 Gb/s Serial Interface

SMPTE ST 2081-10:2015, 2160-line and 1080-line Source Image and Ancillary Data Mapping for single-link 6G-SDI

4 Mode 1 Carriage of two SMPTE ST 425-1 3G-SDI signals on a single 6G-SDI link

4.1 2 x SMPTE ST 425-1 (3G-SDI) Dual-Stream Mapping

Two parallel 20-bit interfaces of the same line and frame structure, having frame, line and word synchronization and each constructed of two 10-bit data streams, data stream one and data stream two, in

conformance with SMPTE ST 425-1 Level A, shall be mapped into a 40-bit Virtual Interface consisting of four data streams — data stream one, data stream two, data stream three and data stream four.

Data stream one of the 40-bit virtual interface shall consist of data stream one of the first 20-bit interface.

Data stream two of the 40-bit virtual interface shall consist of data stream two of the first 20-bit interface.

Data stream three of the 40-bit virtual interface shall consist of data stream one of the second 20-bit interface.

Data stream four of the 40-bit virtual interface shall consist of data stream two of the second 20-bit interface.

The 10-bit data streams so constructed shall contain timing reference code words (SAV/EAV), line numbers and line based CRC's as defined in SMPTE ST 425-1.

Each 10-bit data stream shall have an interface frequency of 148.5 MHz or 148.5/1.001 MHz.

4.2 Payload Identifier

The payload identifier shall be mapped into the horizontal ancillary data space of each data stream and shall be in conformance with SMPTE ST 352.

The Placement of the packet shall be as defined in SMPTE ST 425-1 "Level A – Direct Mapping of Source Image Formats"

Byte 1 of the payload identifier shall be set in accordance with Table 1.

Bytes 2 through 4 of the payload identifier shall be set in accordance with the picture rate, sampling structure, dynamic range and bit-depth, etc., of the image format being carried on the interface as defined in SMPTE ST 425-1 "Level A – Direct Mapping of Source Image Formats".

Table 1 –Video Payload and Digital Interface Identification for dual stream mapping of 2 x 3G-SDI Mapped on the 6 Gb/s Serial Digital Interface

Mapping Nomenclature	Byte 1: Video Payload and Digital Interface
2 x (SMPTE ST 425-1) 1080-line video payloads on a 6 Gb/s serial digital interface	C3h
2 x (SMPTE ST 425-1) 720-line video payloads on a 6 Gb/s serial digital interface	CBh

4.3 Multiplex

The 40-bit virtual interface shall then be multiplexed onto a 6G-SDI 10-bit interface according to section 6.

5 Mode 2 Carriage of four SMPTE ST 292-1 1.5G-SDI signals on a single 6G-SDI link

5.1 4 x SMPTE ST 292-1 (HD-SDI) Quad-Stream Mapping

Four parallel 10-bit interleaved data streams of the same line and frame structure, having frame, line and word synchronization and each constructed in conformance with SMPTE ST 292-1, shall be mapped into a 40-bit Virtual Interface consisting of four data streams — data stream one, data stream two, data stream three and data stream four.

Data stream one of the 40-bit virtual interface shall consist of the first 10-bit interface.

Data stream two of the 40-bit virtual interface shall consist of the second 10-bit interface.

Data stream three of the 40-bit virtual interface shall consist of the third 10-bit interface.

Data stream four of the 40-bit virtual interface shall consist of the fourth 10-bit interface.

The 10-bit data streams so constructed shall contain timing reference code words (SAV/EAV), line numbers and line based CRC's as defined in SMPTE ST 292-1.

Each 10-bit data stream shall have an interface frequency of 148.5 MHz or 148.5/1.001 MHz.

5.2 Payload Identifier

The payload identifier shall be mapped into the horizontal ancillary data space of each data stream and shall be in conformance with SMPTE ST 352.

The placement of the packet shall be as defined in SMPTE ST 292-1.

Byte 1 of the payload identifier shall be set in accordance with Table 2.

Bytes 2 through 4 of the payload identifier shall be set in accordance with the picture rate, sampling structure, dynamic range and bit-depth, etc., of the image format being carried on the interface as defined in SMPTE ST 292-1.

Table 2 –Video Payload and Digital Interface Identification for quad stream mapping of 4 x HD SDI Mapped on the 6 Gb/s Serial Digital Interface

Mapping Nomenclature	Byte 1: Video Payload and Digital Interface
4 x (SMPTE ST 292-1) 1080-line video payloads on a 6 Gb/s serial digital interface	CCh
4 x (SMPTE ST 292-1) 720-line video payloads on a 6 Gb/s serial digital interface	CDh

5.3 Multiplex

The 40-bit virtual interface shall then be multiplexed onto a 6G-SDI 10-bit interface according to section 6.

6 Single-link 6G-SDI 10-bit Multiplex

Prior to serialization data streams one through four of the 40-bit virtual interface shall be multiplexed word-by-word into a 6G-SDI 10-bit interface.

The 10-bit interface shall be constructed in accordance with the 6G-SDI 10-bit multiplex as defined in SMPTE ST 2081-10, and shall consist of a word multiplex of data streams one through four, in the order data stream four, data stream two, data stream three, data stream one…etc.

The 10-bit parallel interface so produced shall have an interface frequency of 594 MHz or 594/1.001MHz as shown in the illustrative examples of Figure 1 and Figure 2.

This 10-bit interface is then serialized according to SMPTE ST 2081-1 to create the 6G-SDI serial interface.

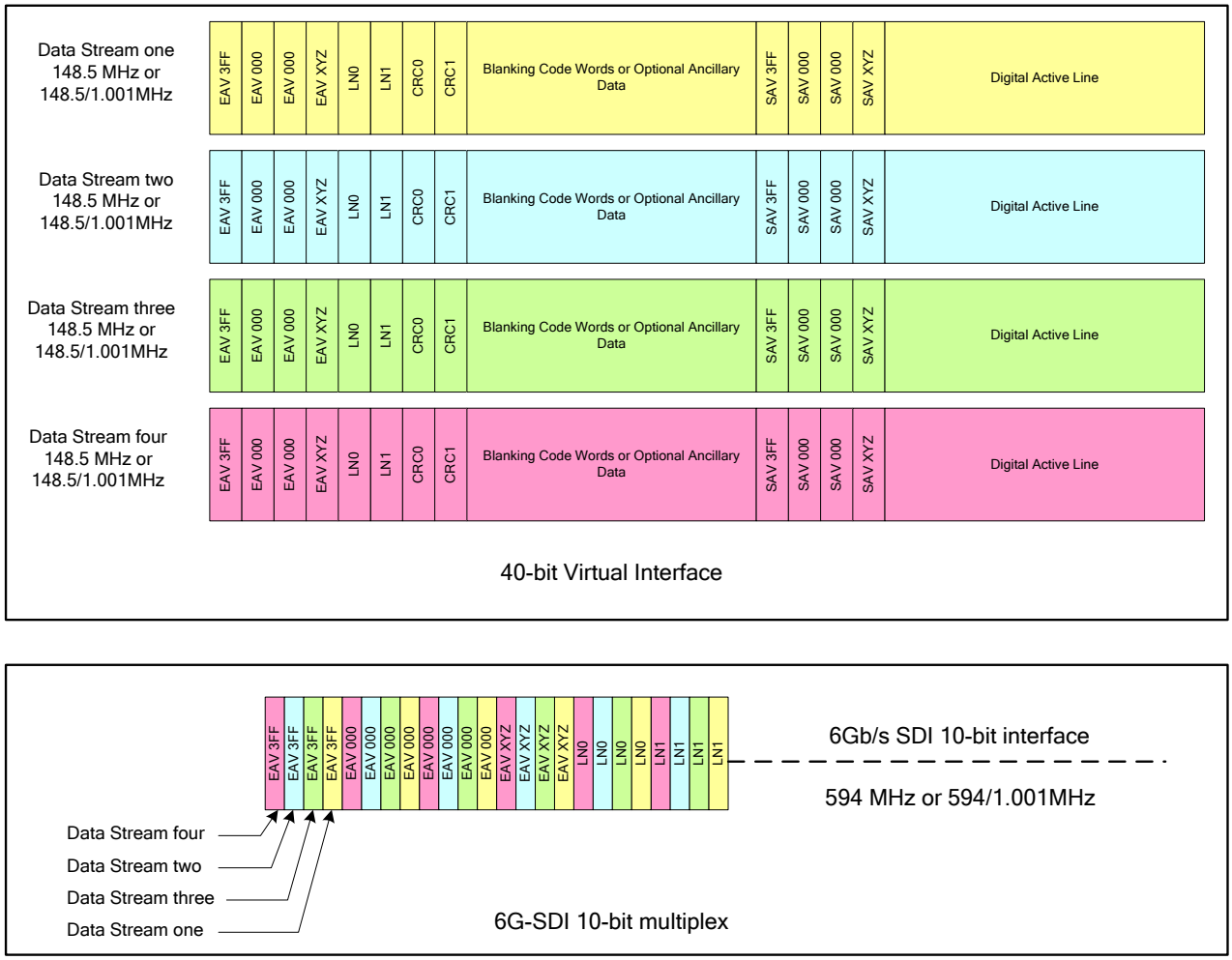

Figure 1 – Single-link 6G-SDI 10-bit Multiplex Type 1 for Mode 1

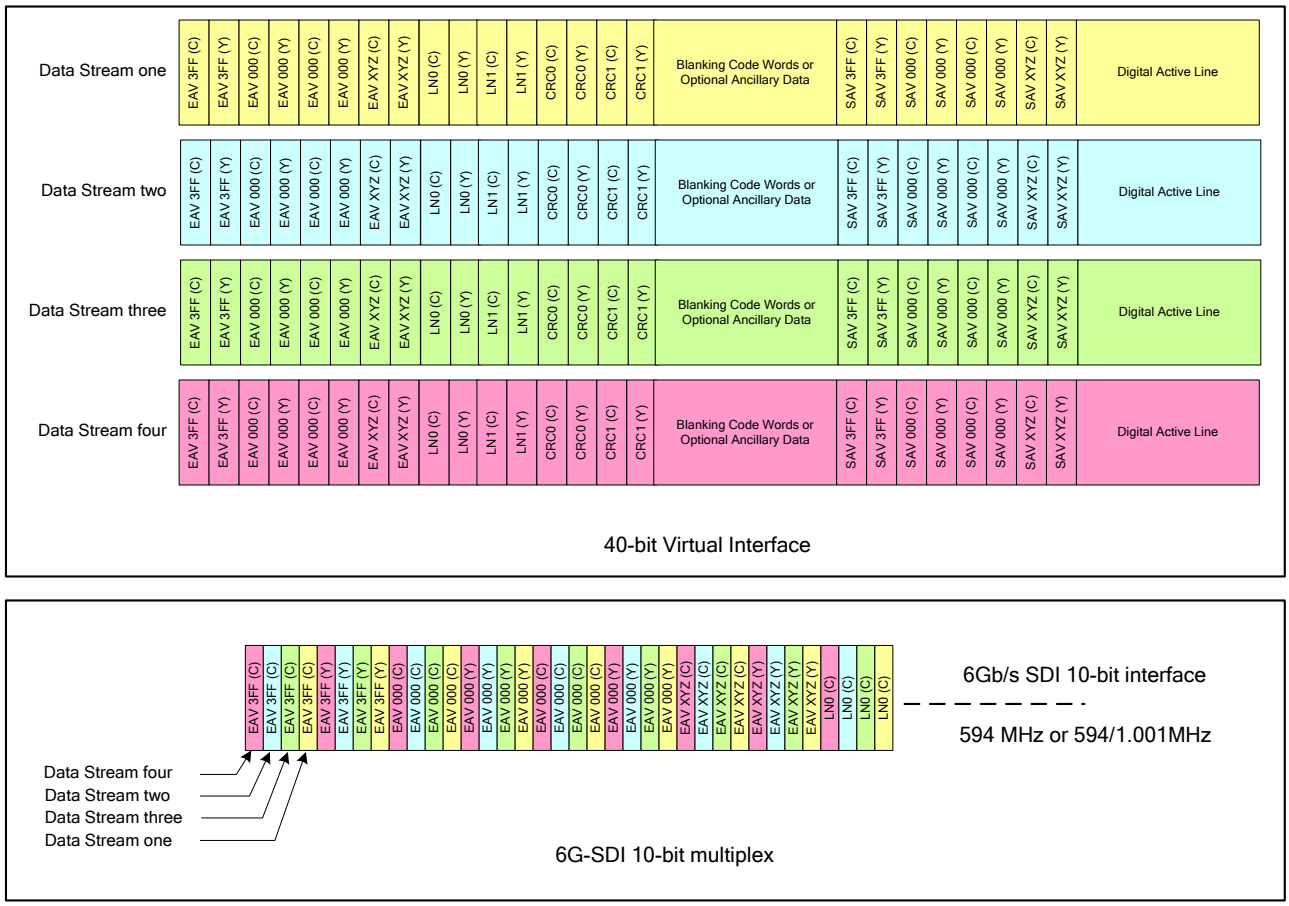

Figure 2 – Single-link 6G-SDI 10-bit Multiplex Type 2 for Mode 2

Note:

Figure 1 shows the Type 1 10-bit multiplex resulting from mapping modes in which each data stream has a single instance of TRS words, Line Numbers, CRC Words, etc.

Figure 2 shows the Type 2 10-bit multiplex resulting from mapping modes in which each data stream has two instances of TRS words, Line Numbers, CRC Words, etc. A type 2 multiplex is the result of SMPTE ST 292-1 mapping of each image or sub image.

Bibliography (Informative)

SMPTE ST 2081-1:2015, 6Gb/s Signal/Data Serial Interface - Electrical