

SMPTE STANDARD

Carriage of Level 65 VC-2 Compressed Video Over the SDTV SDI



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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 Part XIII of its Administrative Practices.

SMPTE ST 2047-4 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 Standard. 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.

This standard defines the provisions for mapping VC-2 bitstreams onto a 270 Mbit/s SDTV SDI link and describes a method by which additional bits are added to ensure that the resultant signal can be viewed on a SDTV SDI monitor, albeit in a somewhat noisy form.

The VC-2 compression standard (SMPTE ST 2042-1) defines a generic intra-frame compression system that can handle all defined video formats and more. A companion recommended practice (SMPTE RP 2047-3) defines constraints (defined as level 65) on the VC-2 specification such that high definition source video images (1080 line interlaced or 720 line progressive) can be compressed such that the resulting compressed bit-rate that can be carried over an SDTV SDI link operating at 270 Mbit/s.

A key feature of this specification is that the transport of compressed data in this way is backwards compatible with installed equipment. The compressed video is mapped entirely into active picture and the signal on the link includes viewable video signal. This aids compatibility with existing equipment such routing and monitoring apparatus and also uncompressed standard definition recording apparatus.

An important feature of this mapping process is that it can be implemented in a practical form using currently available firmware and hardware.

1 Scope

This standard defines the method of mapping VC-2 data onto an SDTV SDI link operating at 270Mbps, based upon the data structures defined in SMPTE ST 259 and ITU-R BT 656 to transport the compressed HD video formats listed in Table 1. The compressed HD video formats supported by this standard are those supported by the low delay profile of VC-2 at level 65. These formats are 1080I at 50 or 60/1.001 fields/s (i.e., SMPTE ST 274 systems 5 and 6), and 720P at 50 or 60/1.001 frames/s (i.e., SMPTE ST 296 systems 2 and 3). Additionally VC-2 level 65 supports the compression of SMPTE ST 274 systems 5 and 6 in which the horizontal sample rate has been reduced to 1440 pixels.

Table 1 – Supported HD Video Formats

Format Name	Frame Height	Frame Width	Frame Rate (Hz)	Scanning	Format Standard	System Number
1920x1080/60/I	1080	1920	29.97	interlace	SMPTE ST 274	5
1920x1080/50/I	1080	1920	25	interlace	SMPTE ST 274	6
1440x1080/60/I	1080	1440	29.97	interlace	SMPTE RP 2047-3	5
1440x1080/50/I	1080	1440	25	interlace	SMPTE RP 2047-3	6
1280x720/60/P	720	1280	59.94	progressive	SMPTE ST 296	2
1280x720/50/P	720	1280	50	progressive	SMPTE ST 296	3

The SDTV SDI link defined herein supports the carriage of embedded audio, ancillary data and payload identification.

A signal coded in accordance with this standard incorporates a noisy but recognizable picture that can be viewed using a standard SMPTE ST 259 / ITU-R BT 656 video monitor.

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.