SMPTE ST 2019-1:2016
Amendment 1:2023

SMPTE STANDARD

VC-3 Picture Compression and Data Stream Format – Amendment 1

Table of contents

Approved September 28, 2022

Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual. This SMPTE Engineering Document was prepared by Technology Committee 10E.

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.

1 Scope

This Amendment to ST 2019-1:2016 extends the support for Alpha information to Compression IDs 1235 through 1260 (HD profile).

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 clause 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 Frame Structure

In Clause 6.3, page 26

Replace

Alpha is broken down into analogous Alpha macroblocks sized 16 samples x 16 lines, matching the location of the macroblocks of the primary video.

with

Alpha is broken into Alpha macroblocks sized 16 samples x 16 lines, matching the location of the macroblocks of the primary video, following either the Y or R component, as applicable.

4 Compressed Frame Size

In Clause 7.1 on page 28

Replace

For HD rasters the number of compressed bytes per frame C_{ref} for a particular Compression ID shall be as specified in Table C.1.

with

For HD rasters the number of compressed bytes per frame C_{ref} for a particular Compression ID shall be as specified in Table C.1 and shall be multiplied by 1.5 if Alpha is present.

5 Header Prefix

In Clause 7.2.1 on page 31

Add:

0x04: Header version 4:	Compression IDs 1235, 1237, 1238, 1241, 1242, 1243, 1244, 1250, 1251, 1252, 1256, 1258, 1259, 1260 (only if Alpha is present).

Strike:

Note: An encoder creating e.g., a Compression ID 1235 bitstream can write HVN=0x01 into the bitstream even when implemented according to this version of the standard. The HVN signals compliance of the bitstream to the definitions of specific Compression IDs, not to a specific version of this standard.

6 Coding Control A

In Clause 7.2, pages 31-32

6.1 ALP

Replace

ALP: Alpha flag (RI-only, shall be 0b for HD rasters)
0b: Alpha channel not present
1b: Alpha channel present; only CID=1270, 1271, 1272 and 1273

with

ALP: Alpha flag (RI: HVN >= 0x03, HD: HVN >= 0x04)
Shall be 0b for CID=1253, 1274
0b: Alpha channel not present
1b: Alpha channel present

6.2 LLA

Replace

LLA: Lossless Alpha flag (only *CID=1270*; shall be 0b for all others)

with

LLA: Lossless Alpha flag (only CID=1256 (HVN=0x04), 1270; shall be 0b for all others)

6.3 PMA

Replace

PMA: Pre-multiplied Alpha (*RI only; shall be 0b for HD rasters*)

with

PMA: Pre-multiplied Alpha (RI: HVN ≥ 0x03, HD: HVN ≥ 0x04)

7 Annex C: Compression IDs

In Table C.1, Compression ID 1260

Replace Active lines entry and NOTE

CID	Source scan type	Samples per line	Active lines	Channel Sub-sampling	Bit depth	Quantization and VLC tables*	Compressed Frame Size (bytes)*	Coding Unit Size (bytes)	Compressed Payload Size (bytes)
1260	interlaced	1440	540 (field)	4:2:2	8	D.7 E.4-E.6	417792	417792	417148

*NOTE The encoder will need to adjust the quantization scale factors qsf of the macroblocks (Clause 8.2.2) to meet the required compressed frame size.

with

CID	Source scan type	Samples per line	Active lines	Channel Sub-sampling	Bit depth	Quantization and VLC tables*	Compressed Frame Size (bytes)*	Coding Unit Size (bytes)	Compressed Payload Size (bytes)
1260	interlaced	1440	1080 (frame)**	4:2:2	8	D.7 E.4-E.6	417792	417792	417148

*NOTE 1 The encoder will need to adjust the quantization scale factors qsf of the macroblocks (Clause 8.2.2) to meet the required compressed frame size.

**NOTE 2 Compression ID 1260 uses adaptive macroblock coding within a single coding unit.