VESA DPX DSC Software Model

Application Note

Version 1.0

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Introduction

This document describes issues related to DPX files and the DSC software model. Many common implementations of the DPX file format do not follow *SMPTE 268M*.

DPX File Format

The DPX file format is a general way of storing picture data for images and video. A header defines the characteristics of each picture, and the pixel data is represented after the header. A magic number in the header is intended to be used to determine the endianness in which the file has been written. There are several things that are ambiguous or frequently misinterpreted in the DPX specification:

1) In some DPX implementations, the DPX header endianness applies to the image data; in other implementations, the image data is always assumed to be big-endian. There is no indication in *SMPTE 268M, Section 3.1*, of which interpretation is correct. *Annex B* (informative) of the specification seems to imply that the detected endianness should apply to all component data, and *Annex C* (informative) seems to imply that the opposite is true.

    a. To configure the reader to follow the endianness of the magic number, clear DPX_READ_FORCE_BE to 0.

    b. To configure the reader to always use big-endian order for the image data (default), set DPXR_FORCE_BE to 1.

    c. For writing files, the model auto-selects the endianness of the magic number and the header so that the data is written big-endian.

2) In some DPX implementations, the component ordering of RGB data is red followed by green followed by blue. *SMPTE 268M*, *Table 1*, *Note 2*, specifies that the ordering of RGB components is blue followed by green followed by red.

    a. To configure the reader to use the *SMPTE 268M* order (BGR, default), clear SWAP_R_AND_B to 0.

    b. To configure the reader to use the RGB order, set SWAP_R_AND_B to 1.

    c. For writing DPX files, configure SWAP_R_AND_B_OUT to either 0 (BGR) or to 1 (RGB).

3) In some DPX implementations, datum ordering is sequential (following the file order). *SMPTE 268M*, *Annex C* (informative), indicates that the first datum is located the least significant *n* bits of the 32-bit words.

    a. To configure the reader to use the *SMPTE 268M* order (default), clear DPXR_DATUM_ORDER to 0.

    b. To configure the reader to use the sequential order, set DPXR_DATUM_ORDER to 1.

    c. For writing files, configure DPXW_DATUM_ORDER, as appropriate.

4) In some DPX implementations, “filling” or padding through the use of zeros is done to 32-bit boundaries at the end of each scan line in 8-bit modes. *SMPTE 268M, Annex C* (informative), seems to indicate that filling is necessary only if the non-filled, non-aligned 10- or 12-bit formats are used.

    a. To configure the reader to use the *SMPTE 268M* filling rules (default), clear DPXR_PAD_ENDS to 0.

    b. To configure the reader to fill scan lines to 32-bit words regardless of mode, set DPXR_PAD_8B_ENDS to 1.

    c. For writing files, configure DPXW_PAD_ENDS, as appropriate.

Table 1 lists recommended switch settings for DSC.EXE configurations of the DPX writer that provide compatibility with various image processing programs.

Table 1. Recommended DPX Writer Switch Settings[a]

Tool and Format	(1)	(2)	(3)	(4)
XnView default	1 0	0 0	1 0	1 1
XnView MSBF option	1	0	1	1
XnView 10 bits/component option				
Little endian (file field 1 is XPDS)	0	0	0	X
Big endian (file field 1 is SDPX)	1	1	1	
XnView 10 bits/component and MSBF options	1 1 0 0	0 1 0 1	0 1 0 1	X
GraphicsMagick 8 bits/component	X X	1 1	1 0	1 1
GraphicsMagick 10 bits/component	X X	0 1	0 1	X
GraphicsMagick 12 bits/component	X	1	1	X
GraphicsMagick 16 bits/component	X	1	1	X
GraphicsMagick 8 bits/component YCbCr	X	X	1	1
GraphicsMagick 10 bits/component YCbCr	X	X	1	X
GraphicsMagick 12 bits/component YCbCr	X	X	1	X
GraphicsMagick 16 bits/component YCbCr	X	X	1	X
GraphicsMagick 8 bits/component YCbCr 4:2:2	X	X	1	1
GraphicsMagick 10 bits/component YCbCr 4:2:2[b]	X	X	1	X
GraphicsMagick 12 bits/component YCbCr 4:2:2	X	X	1	X
GraphicsMagick 16 bits/component YCbCr 4:2:2	X	X	1	X

Tool & Format	(1)	(2)	(3)	(4)
ImageMagick 8 bits/component	X X	1 1	1 0	1 1
ImageMagick 10 bits/component	X X	0 1	0 1	X
ImageMagick 12 bits/component	X	1	1	X
ImageMagick 16 bits/component	X	1	1	X
ImageMagick 8 bits/component YCbCr	X	X	1	1
ImageMagick 10 bits/component YCbCr	X	X	1	X
ImageMagick 12 bits/component YCbCr	X	X	1	X
ImageMagick 16 bits/component YCbCr	X	X	1	X
ImageMagick 8 bits/component YCbCr 4:2:2[c]	X	X	1	1
ImageMagick 10 bits/component YCbCr 4:2:2	X	X	1	X
ImageMagick 12 bits/component YCbCr 4:2:2	X	X	1	X
ImageMagick 16 bits/component YCbCr 4:2:2	X	X	1	X

a. Issues 1 through 4 noted prior to the table correspond to columns (1) through (4), respectively. A value of X indicates = don't care.

b. Widths that are not evenly divisible by 4 are not processed correctly.

c. *These files cannot be read because ImageMagick declares them as 4:4:4, although there is 4:2:2-formatted data in the body.*

Note: *The model will try to auto-detect certain types of files for reading (v1.0 files or files generated by previous DSC C model versions), override the settings, and then process the files correctly.*

To verify that the correct read mode is selected, set PPM_FILE_OUTPUT to 1 to cause the C model to output PPM files that can be verified with an image viewer program. PPM format is more interoperable and renders correctly across different viewers and platforms; however, PPM format is capable of representing only RGB 4:4:4 data.

Revision History

Date	Version	Description
May 8, 2017	1.0	Initial release.

Support for this Application Note

If you have a product that incorporates DSC, ask the company that manufactured your product for assistance. If you are a manufacturer, VESA can assist you with any clarification you might require. Submit all comments to support@vesa.org.

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