VESA DSC 1.2a DSC Tools

Application Note

Version 1.2

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Introduction

This document describes Display Stream Compression (DSC) tools to be used with the *DSC 1.2a Standard* (*DSC 1.2a*).

Overview

Several usability issues have been noted with the *DSC 1.2a* C model:

- It is not easy to generate a PPS data structure without having an image to encode.
- While the C model can automatically compute a recommended slice height when it is unspecified, the algorithm used to do so can result in padding lines in the final slice(s). Such padding lines can be difficult to deal with in the transport because they require an additional allocation of link bandwidth.
- The rate control parameters are configuration-dependent and can be difficult to optimize. Although the *PPS Parameter Spreadsheet Application Note*[1] can help determine good, working rate control parameters, it is not straightforward to port an Excel spreadsheet to a verification environment or device driver code.

This application note provides DSC users with a means to address these issues by providing source code for a number of usability enhancements. None of the enhancements affect any of the standard's normative provisions, and C model behavior remains unchanged if the new configuration file options are not used.

Four C model files are included with this application note:

- codec_main.c
- dsc_utils.c
- dsc_utils.h
- rc_tables.h

[1] *Available from VESA.*

Building the Code

The following steps can be used to build a modified C model that includes the usability enhancements:

1. Unzip the DSC_model_20161212.zip *DSC 1.2a* C model file into a folder.
2. Copy the four files attached to this application note (see **Table 1**) into the **Source** subfolder, overwriting the original files. Note that rc_tables.h is **not** included with the original C model.

Table 1: List of C Files Attached to this Application Note

Filename	Date Modified
codec_main.c	01/09/2018
dsc_utils.c	03/14/2017
dsc_utils.h	03/14/2017
rc_tables.h	03/31/2017

3. Build the C model (v1.57g):
    - **Windows** – Using Microsoft Visual Studio 2010 or later, load the DSC.sln file into the IDE. A Debug or Release executable may be built using the **Build** command.
    - **Linux or Mac** – From the **Source** subfolder, run **make clean**, and then **make**.

Using the Model

The following configuration file options have been modified or added. No other functionality is affected.

- FUNCTION can now be set to 3, which prints the PPS data structure to the console and immediately exits without encoding or decoding. This can be helpful for quickly determining PPS parameter values that are usually calculated by the C model without requiring an image to encode. Note that FUNCTION 3 requires that PIC_WIDTH and PIC_HEIGHT be explicitly specified in the configuration file.
- PRINT_PPS_FORMAT is a new parameter that can be set to the following values:
    - 1 (default) = PPS printout uses the same format as the previous C model printed when using -P option.
    - 2 = PPS printout shows 128 bytes followed by a list of each PPS field with its hex value.

- AUTO_SLICE_HEIGHT_ALGORITHM is a new parameter that can be set to the following values:
    - 0 (default) = If SLICE_HEIGHT is unspecified, the C model tries SLICE_HEIGHT = PIC_HEIGHT. If that does not result in a valid PPS, the SLICE_HEIGHT is recursively divided by 2 until a valid PPS is created.
    - 1 = Select smallest SLICE_HEIGHT ≥ 96 that results in a valid PPS and minimizes the number of padding lines required for the final slice.
    - 2 = Select largest SLICE_HEIGHT ≥ 96 that results in a valid PPS and minimizes the number of padding lines required for the final slice.
- GENERATE_RC_PARAMETERS is a new parameter that can be set to the following values:
    - 0 (default) = Model does not override any rate control parameters. Default values designed for RGB 8bpc/8bpp are used if there are unspecified parameters.
    - 1 = Model will override rate control parameters (RC_QUANT_INCR_LIMIT0, RC_QUANT_INCR_LIMIT1, INITIAL_FULLNESS_OFFSET, INITIAL_DELAY, FLATNESS_MIN_QP, FLATNESS_MAX_QP, FLATNESS_DET_THRESH, RC_MIN_QP, RC_MAX_QP, RC_OFFSET) with recommended parameters derived using the same formulae as the *PPS Parameter Spreadsheet Application Note*.

Revision History

Date	Version	Description
January 16, 2018	1.2	Fixed the following bugs in **codec_main.c**: • initial_scale_value and second_line_bpg_ofs are now correctly computed when GENERATE_RC_PARAMETERS = 1 • SLICE_HEIGHT = PIC_HEIGHT was previously not tried for AUTO_SLICE_HEIGHT_ALGORITHM = 1 • Fixed error message when running GENERATE_RC_PARAMETERS = 1 for DSC 1.1 YCbCr mode
July 17, 2017	1.1	Update **Building the Code** section to include list of attached files and C model version number.
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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