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1. Overview

**HEVC/H.265 Video ES Viewer** solution provides a visual representation of the structure of HEVC/H.265 (High Efficiency Video Coding) video elementary stream according to the JCT-VC specification. The application allows the user to investigate the video sequence parameter set, picture parameter set and video parameter set with their extensions and inner structures. Supported are HEVC/H.265 video elementary streams, which have NAL unit separation with start code prefixes as per Annex B in the HEVC specification. The solution supports basic HEX data editing of Access Units.

### 1.1 General Features of HEVC/H.265 Video ES Viewer

- Visual representation of HEVC/H.265 video elementary stream with start code prefix NAL unit separation
- NAL units list view representation
- NAL units tree view representation
- Automatic hex positioning of the selected block
- Hex data representation of the file
- Hex data editing of the selected Access Unit (AU)
- Extraction of selected Access Unit into a separate file
- SEI messages removal
- Access Unit Delimiters (AUD) removal
- non-TSA, non-STSA Slices removal
- Sequence Parameter Set (SPS) removal
- Picture Parameter Set (PPS) removal
- Video Parameter Set (VPS) removal
- HEVC/H.265 video elementary stream validation – available in HEVC/H.265 Video ES Viewer Pro
- Stream decoding to raw RGB32/YUY2 – available in HEVC/H.265 Video ES Viewer Pro
- Video frame preview – available in HEVC/H.265 Video ES Viewer Pro
- HEVC/H.265 video elementary stream import from MPEG-2 Transport Stream media container – available in HEVC/H.265 Video ES Viewer Pro
- HEVC/H.265 video elementary stream import from MP4 media container – available in HEVC/H.265 Video ES Viewer Pro

1.2 Supported Structures in HEVC/H.265 Video ES Viewer

- Base NAL unit and Access Unit delimiter structure
- Sequence Parameter Set (SPS)
- SPS VUI parameters
- SPS HRD parameters
- Picture Parameter Set (PPS)
- Video Parameter Set (VPS)
- Slice Segment Header
- Slice layer RBSP
- Supplemental Enhancement Information (SEI) Message
- Buffering Period SEI Message
- Picture Timing SEI Message
- Pan-Scan Rectangle SEI Message
### User Data Unregistered SEI Message
### Recovery Point SEI Message
### Scene Information SEI Message
### Full-Frame Snapshot SEI Message
### Progressive Refinement Segment Start SEI Message
### Progressive Refinement Segment End SEI Message
### Film Grain Characteristics SEI Message
### Post-Filter Hint SEI Message
### Tone Mapping Info SEI Message
### Frame Packing Arrangement SEI Message
### Display Orientation SEI Message
### SOP Description SEI Message
### Active Parameter Set SEI Message

## 2. Installation

### 2.1 Installing HEVC/H.265 Video ES Viewer

Before installing the **HEVC/H.265 Video ES Viewer** solution, make sure that any previous version of the product has been uninstalled refer 2.2.

The installation package of **HEVC/H.265 Video ES Viewer** is distributed in msi file. After downloading the file from the official Jongbel Media Solutions web site – [www.jongbel.com](http://www.jongbel.com), execute the installation by starting the msi file.

First a Welcome dialog pops up. Click “Next” in order to proceed.
After this a License Agreement dialog pops up. Read the agreement carefully, select “I Agree” if you agree all the terms and click “Next” to proceed.
The next window shown specifies the installation product location and user access to the product. Change the destination product folder and user access if needed and click “Next” to proceed.
The next dialog is a confirmation dialog. Confirm by clicking “Next” in order to start the installation procedure.

While the product is being installed an “Installing” window shows the installation progress. Wait until the product is being installed.
At the end an “Installation Complete” dialog pops up, which denotes the successful HEVC/H.265 Video ES Viewer installation. Click “Close” to finalize the process.
2.2 Uninstalling HEVC/H.265 Video ES Viewer

The application can be removed opening the Control Panel – Programs and Features. Select the HEVC/H.265 Video ES Viewer application and click Uninstall.

3. Functions

The following functions are available from the application File menu.

**Open** – Opens a file open dialog box for selecting media file for loading. HEVC/H.265 Video ES Viewer supports HEVC/H.265 video elementary streams.

**Close** – Closes the opened file and clears the tree and hex views.

**Exit** – Closes the application.

The following functions are available from the application Search menu.

**Find Next SPS** – Searches for the next SPS (Sequence Parameter Set) and positions the list view to it if found.

**Find Next PPS** – Searches for the next PPS (Picture Parameter Set) and positions the list view to it if found.

**Find Next VPS** – Searches for the next VPS (Video Parameter Set) and positions the list view to it if found.

**Find Next SEI** – Searches for the next SEI message (Supplemental Enhancement Information) and positions the list view to it if found.

**Find Next IDR Picture** – Searches for the next IDR Picture (Instantaneous Decoding Refresh) and positions the list view to it if found.
Find Next CRA Picture – Searches for the next CRA Picture (Clean Random Access) and positions the list view to it if found.

Find Next non-TSA/non-STSA Picture – Searches for the next non-TSA/non-STSA Picture (Temporal Sub-layer Access / Step-wise Temporal Sub-layer Access) and positions the list view to it if found.

Find Next TSA Picture – Searches for the next TSA Picture (Temporal Sub-layer Access) and positions the list view to it if found.

Find Next STSA Picture – Searches for the next STSA Picture (Step-wise Temporal Sub-layer Access) and positions the list view to it if found.

Find Next RADL Picture – Searches for the next RADL Picture (Random Access Decodable Leading) and positions the list view to it if found.

Find Next RASL Picture – Searches for the next RASL Picture (Random Access Skipped Leading) and positions the list view to it if found.

Find Next BLA Picture – Searches for the next BLA Picture (Broken Link Access) and positions the list view to it if found.

Find Next AUD – Searches for the next AUD (Access Unit Delimiter) and positions the list view to it if found.

Find Next EOS – Searches for the next EOS (End Of Sequence) and positions the list view to it if found.

Find Next EOB – Searches for the next EOB (End Of Bitstream) and positions the list view to it if found.

Find Next Filler Data – Searches for the next Filler Data and positions the list view to it if found.
The following functions are available from the application **Tools** menu.

**Hex Edit Selected AU** – Opens a Hex Exit dialog box for byte hex manipulating the binary data of the selected Access Unit from the list view.

By double-clicking on the byte cell, the form will enter into byte editing mode, making it possible to change the value of the selected byte cell. The byte cells with values different from the values of the original file are marked in red. **Save Changes** button will save the altered bytes to the original file. **Cancel** button will exit the form, without altering the original file.

**Extract Selected AU** – Extracts the selected Access Unit from the list view into a separate file. A Save File dialog box is opened for selecting the destination file name.

Extracting separate Access Unit of one media file, enables easy transfer for further manipulation or examination of the essential header part of the media file.

**Remove SEI** – Removes all SEI messages from the currently opened file and saves the resulting stream into a new file. A Save File dialog box is opened for selecting the destination file name.
Remove AUD – Removes all Access Unit Delimiters from the currently opened file and saves the resulting stream into a new file. A Save File dialog box is opened for selecting the destination file name.

Remove non-TSA/STSA Slices – Removes all non-TSA (Temporal Sub-Layer Access (TSA)) and non-STSA (Step-Wise Temporal Sub-Layer Access (STSA)) access units from the currently opened file and saves the resulting stream into a new file. A Save File dialog box is opened for selecting the destination file name.

Remove VPS – Removes all Video Parameter Set headers, from the loaded HEVC/H.265 video elementary stream, except the first one.

Remove SPS – Removes all Sequence Parameter Set headers, from the loaded HEVC/H.265 video elementary stream, except the first one.

Decode Stream To – RGB32/YUY2 – Decodes the loaded HEVC/H.265 video elementary stream to RGB32 or YUY2 video raw stream. When selected a dialog opens for destination file selection. The decoding process is faster than real-time decoding and depends on the system resources.

Validation – Performs validation and verification of the loaded HEVC/H.265 video elementary stream. The function opens the media validation dialog from where the validation process can be started.
Once the Media Validation dialog is opened, the validation process can be started by pressing the “Start Validation” button. During the validation, the process can be stopped by pressing the “Stop Validation” button. The validation Report table contains four columns. The first column is the index of the validation report starting from 1. The second column denotes the validation module name. At this point HEVC/H.265 Video ES Viewer supports only “HEVC/H.265 Video Validator” module. The third column denotes each report type, which can be “Info” for informational report, “Warning” for warning report and “Error” for error report. The fourth column contains the Validation ID and the report message. The button “Save Report” saves the current report into a XML validation report file. The XML validation report file can be used for integration with third-party systems. “Validation Reports” box represents the information about the total informational, warning and error reports in the current validation.

The button “Validation Module Settings” opens the validation module settings dialog.
From the validation module settings dialog it is possible to control the loading and unloading timeout.

**Load Timeout** denotes the timeout, in milliseconds, for the media file loading process.

**Unload Timeout** denotes the timeout, in milliseconds, for the media file unloading process.

The advances settings are also accessible from this dialog by pressing the “Advanced” button.

From the Validation Settings dialog it is possible to control all validation procedures. All validation procedures can be Disabled/Enabled and the report type of some can be switched to “Info”, “Warning” or “Error” depending on each custom workflow. The validation customization allows easy integration of the product in every workflow.

For more information about the validation checks go to Chapter 4.

The following functions are available from the application **Help** menu.
Registration – Opens the product registration form. This function is available only in the full licensed version of the product.

Check For Updates – Enables/Disables automatic check for updates.

About – Opens the About dialog box of the product.

4. Validation

HEVC/H.265 Video ES Viewer Pro can perform validation of the HEVC/H.265 video elementary stream. Incorrect header structure and errors during decoding process can be detected by this validation module. The supported streams for validation are HEVC/H.265 video elementary streams according to the JCT-VC specification.

The following validation checks are available for this module:

ID : 101
Name : 'Start validation information'
Type : Info
Description : Reports information on file validation start.

ID : 102
Name : 'Loading file information'
Type : Info
Description : Reports information on file load.

ID : 103
Name : 'Unloading file information'
Type : Info
Description : Reports information on file unload.

ID : 104
Name : 'Loading timeout'
Type : Error
Description : Reports load timeout if the loading time is greater than the maximum loading time specified in the main property page of the validation module.

ID : 105
Name : 'Unloading timeout'
Type : Error
Description : Reports unload timeout if the unloading time is greater than the maximum unloading time specified in the main property page of the validation module.

ID : 106
Name : 'Play timeout'
Type : Error
Description : Reports validation start timeout.

ID : 107
Name : 'Stop timeout'
Type : Error
Description : Reports validation stop timeout.

ID : 108
Name : 'Finish validation information'
Type : Info
Description : Reports information on file validation finish.

ID : 201
Name : 'Corrupted Video Frames'
Type : Error
Description : Reports the count of the corrupted HEVC/H.265 video frames, if any.

ID : 202
Name : 'Valid Video Frame Width'
Type : Error
Description : Reports invalid video resolution width.

ID : 203
Name : 'Valid Video Frame Height'
Type : Error
Description : Reports invalid video resolution height.

ID : 204
Name : 'Changing Video Frame Width'
Type : Warning
Description : Reports video resolution width value change throughout the HEVC/H.265 video elementary stream.

ID : 205
Name : 'Changing Video Frame Height'
Type : Warning
Description : Reports video resolution height value change throughout the HEVC/H.265 video elementary stream.

ID : 206
Name : 'Valid Video Frames Per Second'
Type : Error
Description : Reports invalid video Frames Per Second value.

ID : 401
Name : 'Video Frame Width Information'
Type : Info
**Description**: Reports video resolution width value.

**ID**: 402  
**Name**: 'Video Frame Height Information'  
**Type**: Info  
**Description**: Reports video resolution height value.

**ID**: 403  
**Name**: 'Video Frames Per Second Information'  
**Type**: Info  
**Description**: Reports video Frames Per Second value.

**ID**: 501  
**Name**: 'Video Decoded Frames Count Information'  
**Type**: Info  
**Description**: Reports the count of the successfully decoded HEVC/H.265 video frames in the video elementary stream.

**ID**: 502  
**Name**: 'Video Corrupted Frames Count Information'  
**Type**: Info  
**Description**: Reports the count of the corrupted HEVC/H.265 video frames in the video elementary stream.

**ID**: 503  
**Name**: 'HEVC/H.265 Stream Index To Validate Information'  
**Type**: Info  
**Description**: Reports the stream index of the HEVC/H.265 video elementary stream in case of multiplexed media file.

**ID**: 504  
**Name**: 'HEVC/H.265 Program ID To Validate Information'  
**Type**: Info  
**Description**: Reports the program ID of the HEVC/H.265 video elementary stream in case of multiplexed media file.
ID : 505
Name : 'HEVC/H.265 Stream ID To Validate Information'
Type : Info
Description : Reports the stream ID of the HEVC/H.265 video elementary stream in case of multiplexed media file.

ID : 506
Name : 'Demo Restriction Information'
Type : Info
Description : Reports the restriction information in the trial/demo version.

ID : 507
Name : 'Video Processed Frames Count Information'
Type : Info
Description : Reports the processed video frames count.

ID : 509
Name : 'Average Bitrate Information'
Type : Info
Description : Reports the average bitrate of the video stream.

ID : 510
Name : 'Minimum bitrate Information'
Type : Info
Description : Reports the minimum bitrate of the video stream.

ID : 511
Name : 'Maximum bitrate Information'
Type : Info
Description : Reports the maximum bitrate of the video stream.

ID : 512
Name : 'Minimum Number Of Frames In GOP Information'
**ID**: 513  
**Name**: 'Maximum Number Of Frames In GOP Information'  
**Description**: Reports the minimum number of frames in GOP.

**ID**: 514  
**Name**: 'Total Frames Count Information'  
**Description**: Reports the total number of parsed frames in the stream.

**ID**: 515  
**Name**: 'Minimum GOP Size Information'  
**Description**: Reports the size in bytes of the smallest GOP in the stream.

**ID**: 516  
**Name**: 'Maximum GOP Size Information'  
**Description**: Reports the size in bytes of the biggest GOP in the stream.

**ID**: 518  
**Name**: 'Initial VPS Information'  
**Description**: Reports the initial HEVC/H.265 VPS information.
ID : 519
Name: 'Initial SPS Information'
Type: Info
Description: Reports the initial HEVC/H.265 SPS information.

ID : 520
Name: 'Initial PPS Information'
Type: Info
Description: Reports the initial HEVC/H.265 PPS information.