Understanding EDID: An Introduction to AW EDID Editor

Analog Way Worldwide
Europe, Middle East & Africa: +33 (0)1 81 89 08 60
The Americas: +1 212 269 1902
Asia Pacific: +65 6292 5800
www.analogway.com

Introduction

Extended Display Identification Data (EDID) is a data structure standardized by the Video Electronics Standard Association (VESA). Thanks to EDID, a display system provides its capabilities to a source so that the source can take them into account when delivering its content. An EDID contains information such as the manufacturer name, the product ID, the input type (analog or digital), the supported timings, the display size and the luminance characteristics. The goal is to optimize the use of the display and to make interoperability easier for displays with VGA ports (optional), as well as DisplayPort, HDMI, and DVI ports (compulsory).

As consumer displays with HDMI ports require more information (capabilities for audio, 3D, color bit depth), EDID extension blocks were created and standardized as ANSI/CEA-861 by the Consumer Electronics Association (CEA).

At the present time, two versions of the EDID structure are mainly used:

- **Version 1.3** (2000) is the most common version. This version introduces the support of extension blocks and is required to integrate the CEA-861 extension necessary for HDMI support. From this release, an EDID is called an E-EDID (Enhanced EDID)
- **Version1.4** (2006) introduces new features such as CVT support and color bit depth. This version is not supported by HDMI.

1 What does EDID look like?

The basic EDID structure is a mandatory 128-byte array. The structure is the same for versions 1.3 and 1.4. This array contains the following fields:

Address	Size	Name
00h	8 bytes	Header
08h	10 bytes	Vendor/Product Identification
12h	2 bytes	EDID Structure Version/Revision
14h	5 bytes	Basic Display Parameters/Features
19h	10 bytes	Color characteristics
23h	3 bytes	Established timings
26h	16 bytes	Standard Timings Identification (1 to 8)
36h	72 bytes	Detailed Timing Description
7Eh	1 bytes	Extension flag
7Fh	1 bytes	Checksum

Depending on the Extension Flag, one or several optional 128-byte extension blocks are following this first block (for example, the CEA-861 extension).

Example
Analog Way standard EDID for the HDMI input plugs of **Midra™ series**

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	00	FF	FF	FF	FF	FF	FF	00	05	D7	02	61	00	00	00	00
10	14	17	01	03	80	3D	00	78	06	EE	91	A3	54	4C	99	26
20	0F	50	54	FF	EF	80	81	00	81	40	81	80	81	C0	90	40
30	95	00	A9	40	B3	00	02	3A	80	18	71	38	2D	40	58	2C
40	45	00	F4	36	11	00	00	1E	28	3C	80	A0	70	B0	23	40
50	30	20	63	00	F4	36	11	00	00	1A	00	00	00	FD	00	17
60	78	0F	64	11	04	11	00	00	F8	38	00	01	00	00	00	FC
70	00	4D	49	44	52	41	20	53	65	72	69	65	73	0A	01	C6
80	02	03	2D	70	57	90	1F	20	21	22	05	14	04	13	3C	3D
90	3E	11	12	02	03	15	16	06	07	29	2F	01	23	09	1F	04
A0	6C	03	0C	00	00	00	00	21	C0	0D	0D	16	16	3B	3D	00
B0	A0	80	80	21	40	30	20	35	00	B1	64	00	00	00	1A	00
C0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	37

MANDATORY

CEA-861 EXTENSION

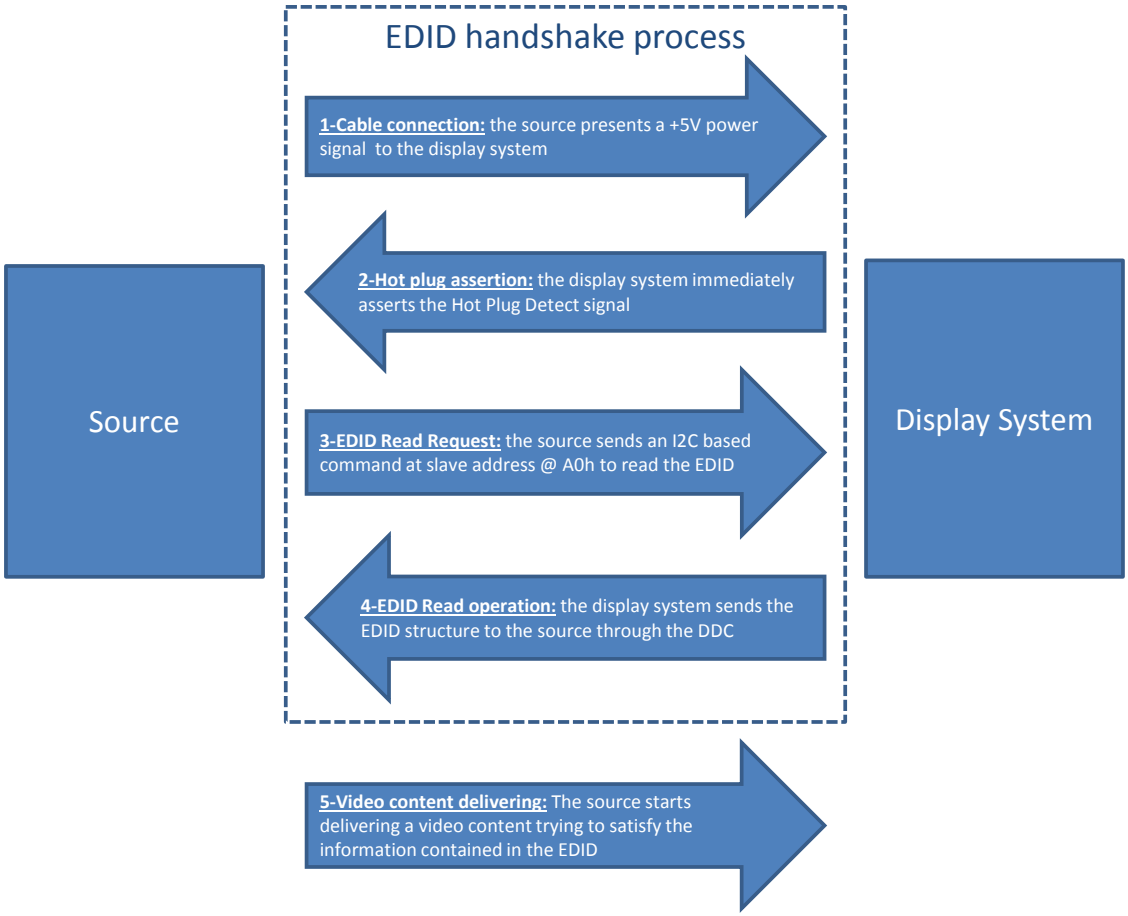
2 How is EDID Exchanged?

Usually, the EDID data is stored in the display system using a serial PROM (Programmable Read Only Memory) or a serial EEPROM (Electrically Erasable PROM).
The EDID is sent from the display system to the source using the Display Data Channel (DDC). The DDC has different versions:

- DDC1: a simple unidirectional serial link, not supported by VESA.
- DDC2: an I^2C bus based mode, not supported by VESA.
- E-DDC (Enhanced DDC): an I^2C based bidirectional based supporting to access up to 32kBytes data.
    - It was introduced at the same time as E-EDID version 1.3.
    - It is recommended for all new display designs.
    - E-DDC supports the DDC/CI (DDC Command Interface) standard protocol that allows to send command to display system receive data from sensors of the display such as an orientation sensor (portrait or landscape)
    - E-DDC Version 1.2 added support for Display Port

To transfer the EDID structure, there are 4 main signals:

- **+5V power supply** provided by the source. Used to indicate the cable connection, it also enables to read the EDID of a turned off display system as it supplies power to the EDID system.
- **Serial Clock Line** and **Serial Data Line**: lines of the I^2C bus. For DisplayPort, the I^2C bus is mapped on the auxiliary channels of the cable as there is no dedicated lines
- **Hot Plug Detect:** this signal is used by the display system to indicate that it is plugged to the source and a dialog can be initiated.

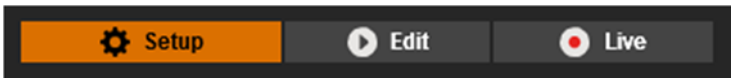


3 Managing EDID with Analog Way Switchers (Midra™ series and LiveCore™ series)

Analog Way Midra™ series and **LiveCore™ series** implement an EDID management that can be accessed through their remote control software. A dedicated section allows the operator to easily clone the output device EDID to one of the switcher input EDID, import and export EDID files from/to a computer.

3.1 Accessing the EDID management page

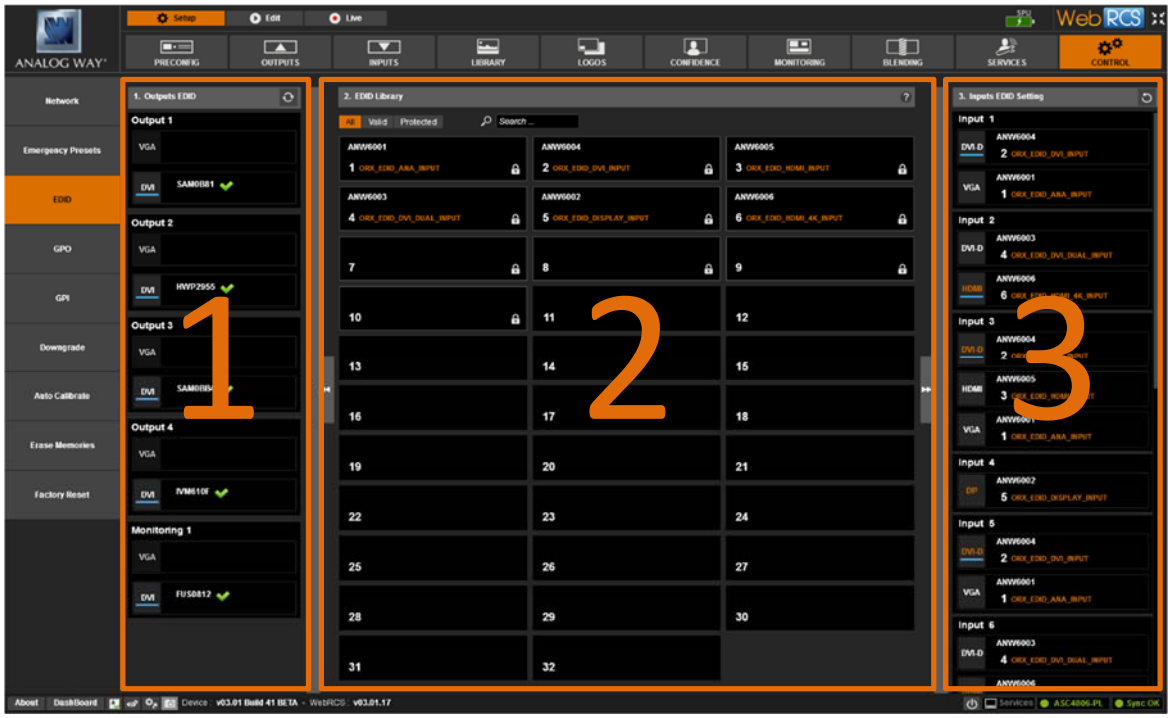
Launch the Remote Control Software of your **Analog Way** switcher (**RCS²** for **Midra™ series** and **WebRCS** for **LiveCore™ series**). Go to the Setup page.



Select the Control section

Finally choose the EDID tab on the left side

The EDID management page opens. It is divided into three distinct parts



1.Outputs EDID

This section displays the detected EDID for each output plug supporting the EDID standard.

2.EDID Library

This section contains up to 30 (**Midra™**) / 32 (**LiveCore™**) EDID files (stored in your device). The 10 first ones are protected and can't be modified. They contain **Analog Way** standard EDID for each kind of input plugs.

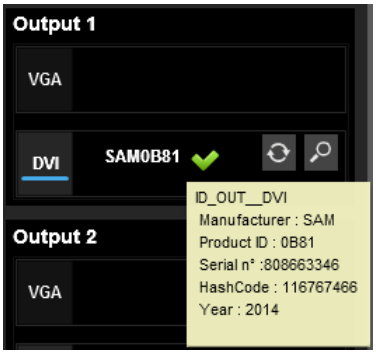
3.Input EDID settings

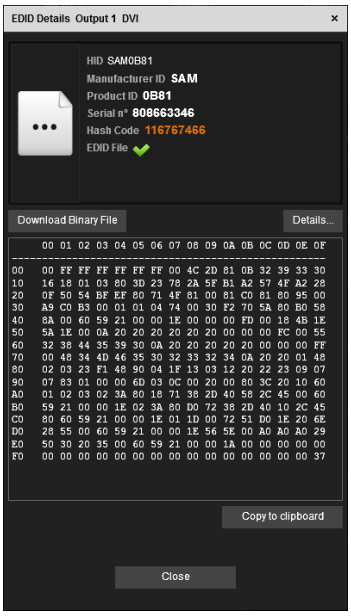
This section displays the input EDID files for each input plug supporting the EDID standard

3.2 Managing output and input EDID files

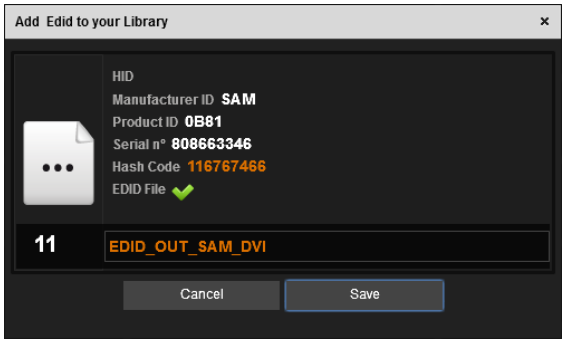
The switcher automatically reads the EDID for each plug of each output.

When the mouse rolls over an output EDID, a tool tip containing an overview of the EDID file opens. A Refresh button and a magnifying glass are also displayed. Clicking on the details opens a window showing the 256 first bytes of the EDID file. You can copy these bytes to the clipboard or download the entire EDID file to the PC.





To save an output EDID file to the EDID library, just drag and drop it to a free slot of the library. A popup-window opens to confirm your action and to allow a custom name to the file.



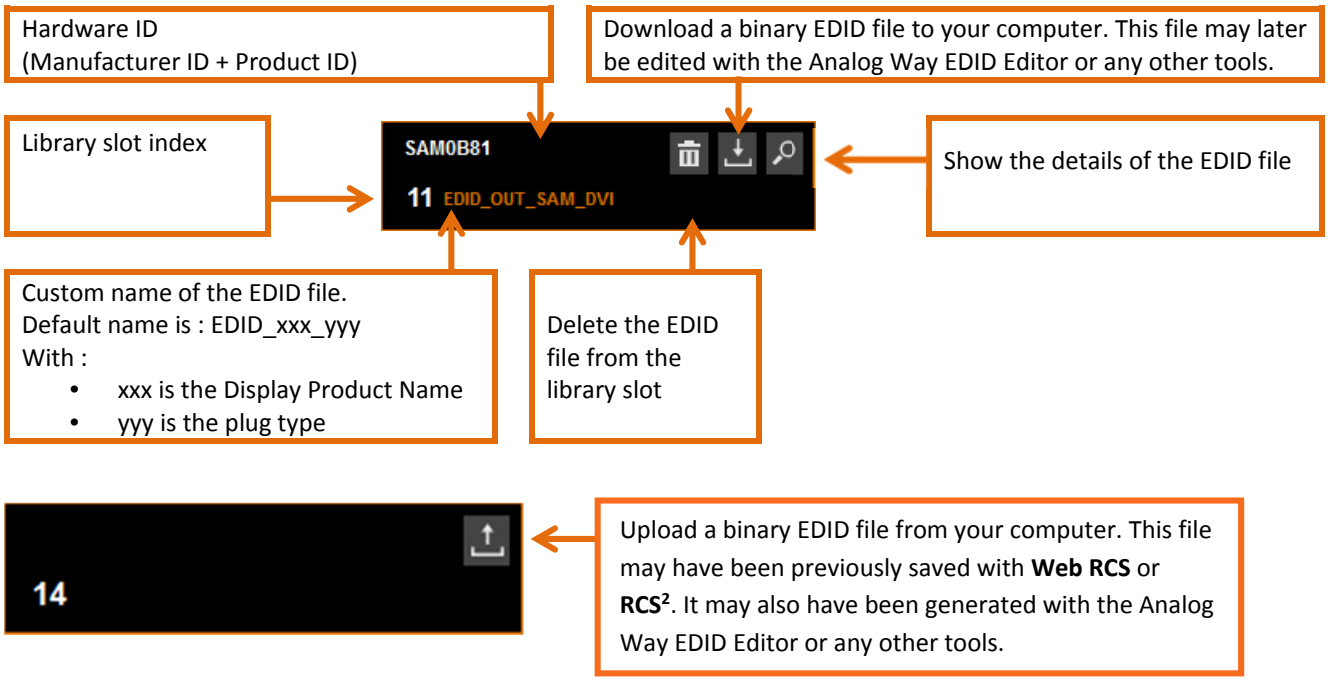
To assign an EDID file from the library to an input plug, just drag and drop it into the selected plug. Please note that you can't drag and drop an EDID file directly from an output plug to an input plug: you must always store the output EDID file into the library first.

Just like for output EDID files, input EDID files can be visualized, copied to the clipboard and downloaded to the PC. They also can be saved into the library with a simple drag and drop.

3.3 Managing the EDID library

The EDID library can be filled with EDID files coming from the input and output sections. It is also possible to upload a file from the computer (for example, an EDID file edited with **AW EDID Editor**) into the library.

The following figure describes all the actions and information of an EDID file in the library.



4 Using the AW EDID Editor

The **AW EDID Editor** is a Windows/Linux/Mac compatible software developed by **Analog Way** to help you:

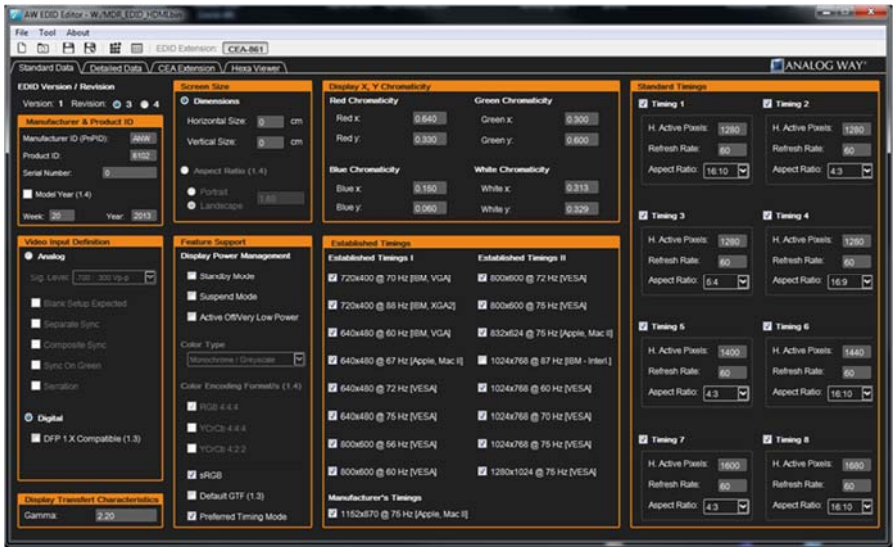
- load/create/modify/save an EDID File
- decode the EDID structure to display it in a user-friendly way

AW EDID Editor supports EDID structure versions 1.3 and 1.4 as well as CEA-861 extension block. For a better understanding, this software is divided into 4 parts.
For further details about **AW EDID Editor**, please refer to **AW EDID Editor**'s "Quick Start Guide" available on **Analog Way**'s website: http://www.analogway.com/en/products/software-and-tools/aw-edid-editor/

4.1 Standard data

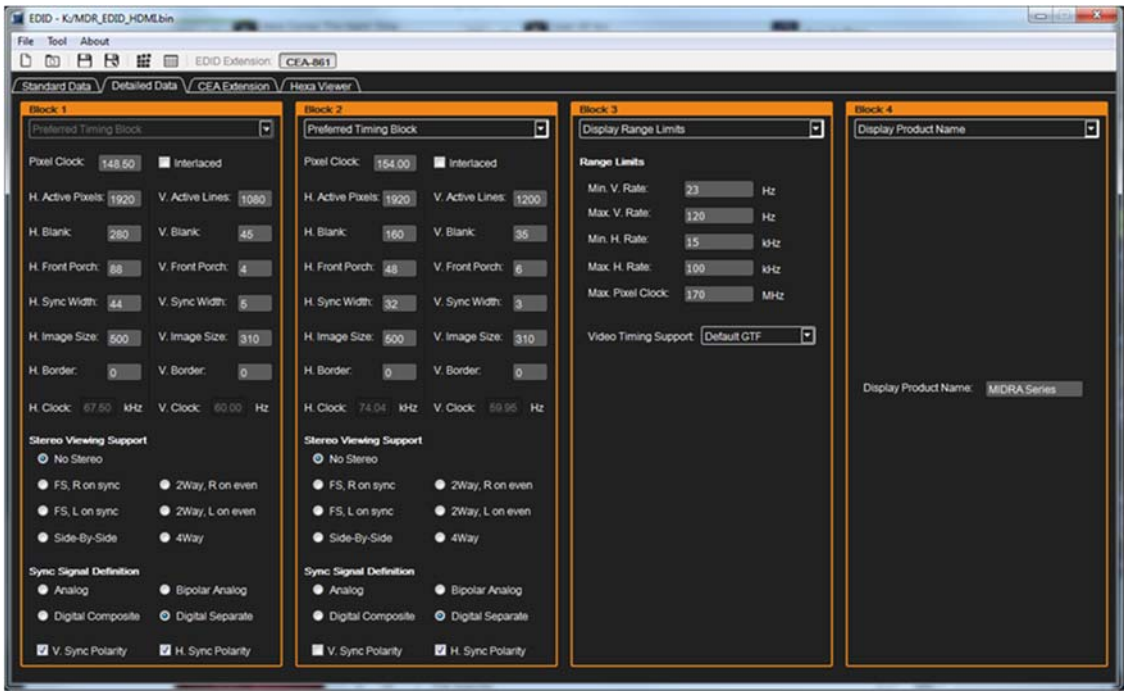
In this tab, you can have access to the following settings:

- EDID structure version
- Vendor/Product identification
- Basic Display Parameters
- Supported features
- Color Characteristics
- Established timings
- Standard Timings Identification



4.2 Detailed Data

In this tab, you can set 4 blocks. The first block type can't be changed and is a Preferred Timing Block (often known as "Preferred format"). For the other blocks, the type can be changed or declared as unused.



To help the creation of a Preferred Timing Block, a CVT format wizard is available. Simply setting the width, height and rate of a display, this wizard automatically computes all the parameters of a format according to the CVT formulas specified by VESA.

For further details about format timings, please refer to the whitepaper "Understanding and using custom output formats with **Midra™ series**" available on **Analog Way's** website

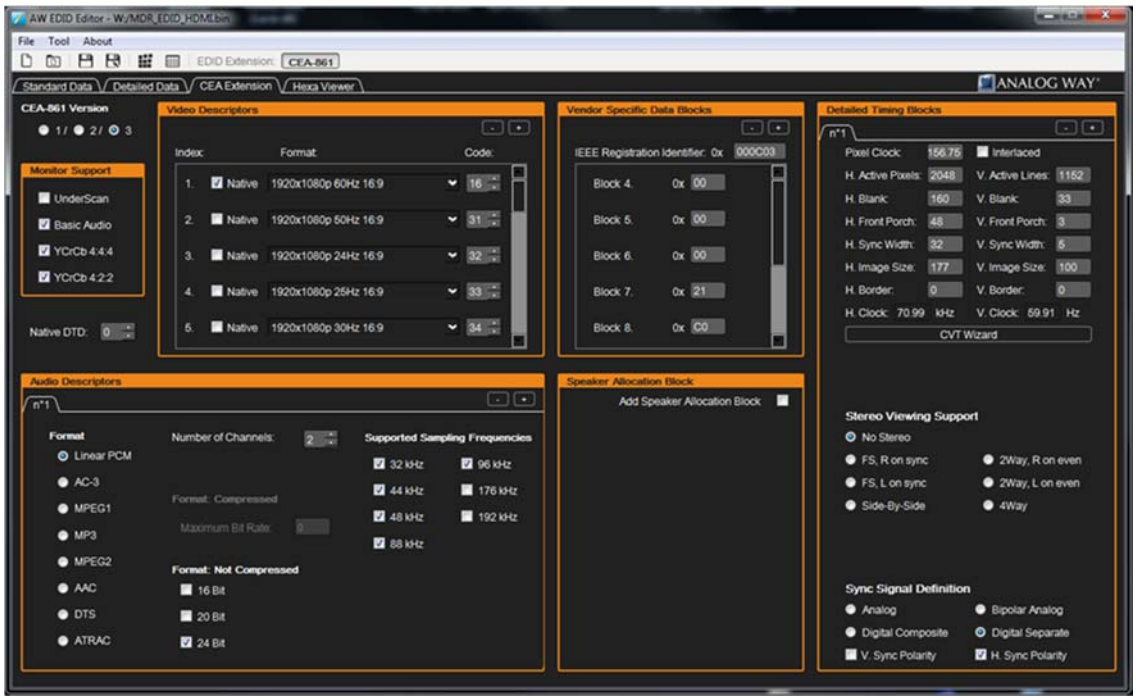
4.3 CEA Extension

Using the CEA-861 in the tool bar, it is possible to add or remove a CEA-861 extension block to the EDID.

A dedicated tab gives access to the following settings:

- CEA-861 extension version
- Global declaration of monitor capabilities
- Video descriptors
- Additional detailed timing blocks
- Audio capabilities
- Vendor specific data blocks

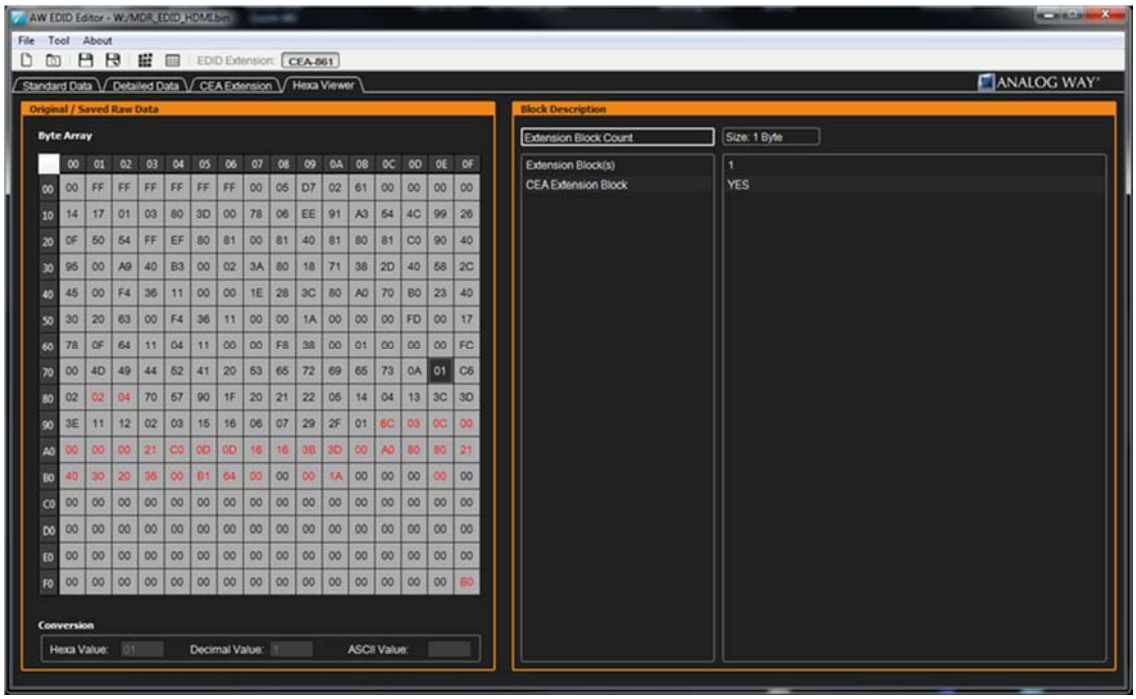
Not all settings are available depending on the selected version of the CEA-861.



4.4 Hexa Viewer

This tab displays the 256 first bytes of the EDID file. Selecting a byte in the array will highlight all the bytes of the same data group. A user-friendly description of their content is displayed in the right side area.

Bytes that were modified during the EDID edition are displayed in red.



5 Troubleshooting EDID problems

Although they were created to simplify the interoperability between sources and display systems, EDID may also be the origin of different kinds of problems: content not delivered, wrong output resolution, missing audio.

This chapter is not exhaustive regarding all troubles you could encounter, but it gives a good idea of what can be done to solve the most common problems.

5.1 Display not connected when switching the source on

TYPICAL SYMPTOMS:
Video content is not delivered. The source delivers its content at a default resolution.

EXPLANATION:
Some sources check the EDID only once when they are booting.
If the display is not connected at this moment and the source doesn't offer a default resolution, video content may not be delivered. If the source has a default resolution, it may deliver its content to a non-optimal resolution for the display.

SOLUTION:
Always connect the display to the source before switching the source on (please remember a source can read an EDID even if the display is turned off, as it supplies power to the EDID hardware)

5.2 Signal attenuation

TYPICAL SYMPTOMS:
Video content is not delivered. The source delivers its content at a default resolution.

EXPLANATION:
Due to the losses in the cable, the level of an electric signal is always attenuated between the source and sink. The longer the cable is, the more important the losses. If the level is too low:

- Hot Plug Detect signal may not be detected.
- Clock and data lines may not be detected

As the EDID handshake fails, video may not be delivered or may be delivered at a default resolution that is not non-optimal for the display.

SOLUTION:
Keep cables as short as possible and respect manufacturer recommendations.

5.3 Switchers with EDID Management

TYPICAL SYMPTOMS:
Switching sources may not be fast and seamless. The source delivers its content at a default resolution.

EXPLANATION:
Many AV devices integrate an EDID management. There are two kinds of EDID management:

- **Basic**: usually implemented on low coast switchers, the display EDID is simply passed by the switcher to the source. Each times the switcher changes the input, the EDID handshake has to be achieved again. As this takes time, the switching takes a long time. Moreover, depending on the implementation, the content delivery can start with artefacts such as glitches, scratches…
- **Advanced**: the switcher inputs are equipped with their own EDID memory. This is the solution chosen by **Analog Way** to offer a fast and reliable seamless switching. Depending on the available features, these EDID memories can be loaded with custom EDID, or simply have their preferred format modified. Therefore, a source can read a consistent EDID and deliver its content whether it is selected on the output or not.

Please note that the input EDID must be configured properly, otherwise the source resolution may not be optimal for the display:

- Switchers with scaling capabilities may have to stretch the input content more than necessary causing a blurred or fuzzy image.
- Switchers without scaling capabilities will deliver a source that will be cropped or centered by the display (assuming that the display output aspect ratio is 1:1)

SOLUTIONS:

- Do not use low cost switchers with basic EDID management,
- For advanced EDID management, set the preferred format properly or clone the display EDID to the input memory.

5.4 Missing Audio

TYPICAL SYMPTOMS:

The source does not deliver audio content on HDMI and DisplayPort.

EXPLANATION:

If the input EDID does not contain a CEA-861 extension or doesn't indicate that audio is supported, the source will not deliver audio content.

SOLUTIONS:

- First check that your source is properly configured to deliver audio. For example, **Midra™ Series** support a stereo LPCM format.
- Check if your input EDID contains the CEA861 extension with appropriate audio settings.

Conclusion

EDID can really simplify your life: it is just important to understand how it works and what the rules to respect are. It will help you design your system architecture in an efficient way that will save time and money.