

# Understanding EDID: An Introduction to AW EDID Editor

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**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<sup>™</sup> series



# 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<sup>2</sup>C bus based mode, not supported by VESA.
  - E-DDC (Enhanced DDC): an I<sup>2</sup>C based bidirectional based supporting to access up to 32kBytes data.
    - It was introduced at the same time as E-EDID version 1.3.
    - o 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)
    - o 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<sup>2</sup>C bus. For DisplayPort, the I<sup>2</sup>C 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.



#### Managing EDID with Analog Way Switchers (Midra<sup>™</sup> series and LiveCore<sup>™</sup> series) 3

Analog Way Midra<sup>™</sup> series and LiveCore<sup>™</sup> 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 (RCS<sup>2</sup> for Midra<sup>™</sup> series and WebRCS for LiveCore<sup>™</sup> series). Go to the Setup page.



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

NV I	🗘 Setup 💿 Edit	📸 Web RCS 🛪			
ANALOG WAY	PRECONING OUTPUTS				
Network	1. Outputs EDID 🔿	2. EDID Library		2	3. Inputs EDID Setting O
Emergency Presets	VGA	ANW6001 1 ORK EDD ANA INPUT	ANYY0004 2 ORX EDD DVI INPUT	ARWEES	DM.D 2 GRC_EDID_DV_INPUT
EDID	<u>DV1</u> SAM0881 🛷				VGA 1 ORX_EDD_AMA_IMPUT
GPO	VGA				MNW6003 MLD 4 ORX_E00_0VL_DOAL_NPUT
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Downgrade	VGA	10 8		12	Input 3 ANW6064 2 rdv
Auto Calibrate	DM SANDER	13 R			HOME ANYFORS
Erase Memories	Output 4			18	
Factory Reset	DVA NAMETOR 🛩	19	20	21	ANW6002 5 OKCLOR_DISPLAY_INPUT
	Monitoring 1	22	23	24	Input 8
	VGA	25	26	27	
		28	29	30	Input 6 ANW6003
		31	32		4 OKC_EDG_SV1_DUAL_INPUT

#### **1.Outputs EDID**

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

2.EDID Library

**3.Input EDID settings** 

This section contains up to 30 (Midra<sup>™</sup>) / 32 (LiveCore<sup>™</sup>) 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.

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

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# 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.



EDID Details Output 1 DVI ×																
HID SAM0881 Manufacturer ID SAM Product ID 0881 Sorial nº 80865346 Hash Code 118767466 EDID File 💉																
Dov	vnio	ad E	linar	y Fi											Det	ails
	00				04	05	06		80	09	0A	0B	0C	0D	0E	OF
00 10 20 30 40 50 60 70 80 90 A0 B0 C0 D0 E0 F0	00 16 0F A9 8A 5A 32 00 02 07 01 59 80 28 50 00	FF 18 50 00 1E 38 48 03 83 02 21 60 55 30 00	FF 01 54 83 60 44 23 01 03 00 59 00 20 00	FF 03 BF 00 59 0A 35 4D F1 00 02 00 21 60 35 00	FF 80 EF 01 20 39 46 48 00 3A 1E 00 59 00 00	FF 3D 00 20 30 30 6D 80 02 00 21 60 00	FF 23 71 04 00 04 30 04 03 18 3A 1E 00 59 00	00 78 4F 74 20 20 32 1F 0C 71 80 01 00 21 00	4C 2A 81 00 20 20 33 13 00 38 D0 1D 1E 00 00	2D 5F 00 20 20 32 03 2D 72 00 56 00 00	81 B1 F2 00 20 34 12 00 40 38 72 5E 1A 00	0B A2 C0 70 20 20 80 58 20 58 20 51 00 00	32 57 81 5A 00 20 20 22 3C 20 20 20 20 20 20 20 20 00 00	39 4F 80 20 20 23 20 45 10 1E A0 00 00	33 A2 95 60 00 01 09 10 00 20 20 A0 00	30 30 58 1E 55 FF 48 07 60 45 60 45 60 37
												Co	py ti	o cli	pbo	ard
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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.

Add Edid to ye	Add Edid to your Library								
	HID Manufacturer ID SAM Product ID 0B81 Serial nº 808663346 Hash Code 116767486 EDID File 💉								
11	EDID_OUT_SAM_DVI								
	Cancel	Save							

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.

# WHITE PAPER

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: <u>http://www.analogway.com/en/products/software-and-tools/aw-edid-editor/</u>

## 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.

EDID - KJ/MDR_EDID_HDMLbin	ter land for the land		
File Tool About	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		
	sion. CEA-861		
Standard Data CEA External	sion V Hexa Viewer		
Block 1	Block 2	Block 3	Block 4
Preferred Timing Block	Preferred Timing Block	Display Range Limits	Display Product Name
Pixel Clock: 148.50 Interlaced	Pixel Clock: 154.00 Interlaced	Range Limits	
H Active Pixels INDIAL V Active Lines	H Active Pixels (1998) V Active Lines: (1998)	Min. V. Rate: 23 Hz	
Contraction of Contra		Max V. Rate: 120 Hz	
H. Blank: 280 V. Blank:	H. Blank: 160 V. Blank: 35	Min. H. Rate: 15 kHz	
H. Front Porch: 68 V. Front Porch:	H. Front Porch: 48 V. Front Porch: 6	Max H. Rate: 100 kHz	
H. Sync Width: 44 V. Sync Width:	H. Sync Width: 32 V. Sync Width: 3	Max. Pixel Clock: 170 MHz	
H. Image Size: 500 V. Image Size:	0 H. Image Size: 600 V. Image Size: 310	Video Timing Support Default GTF	
H. Border: 0 V. Border.	H. Border: 0 V. Border: 0		Directory Brock of Marries - Landau Brocker
H. Clock: 67.50 kHz V. Clock: 60.00	Hz H. Clock: 74.04 KHz V. Clock: 59.95 Hz		Display Product Name MIDHA Serves
Stereo Viewing Support	Stereo Viewing Support		
No Stereo	No Stereo		
FS, R on sync 2Way, R on er	n 🗣 FS, R on sync 🗣 2Way, R on even		
FS, L on sync Ø 2Way, L on ev	n 🗣 FS, Lon sync 🗣 2Way, Lon even		
Side-By-Side 4Way	Side-By-Side 4Way		
Sync Signal Definition	Sync Signal Definition		
Analog Bipolar Analog	Analog Bipolar Analog		
Digital Composite O Digital Separa	Digital Composite      Digital Separate		
🛛 V. Sync Polarity 🛛 H. Sync Polari	V. Sync Polarity II H. Sync Polarity		



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<sup>™</sup> 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.

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AW EDED Editor + W/MD	R_EDID_HDMLbin						
File Tool About							
	EDID Edension: CEA-861						
Standard Data // Detailed	d Data CEA Extension Hexa Viewe	R				ANALOG	WAY'
CEA-861 Version	Video Descriptors		Vendor Specific Data Blocks	Detailed Ta	ning Blocks		
● 1/ ● 2/ ◎ 3				· · · / _ · · · ·			$\overline{}$
and the second	Index Format	Code:	IEEE Registration Identifier. Ox 000	2003 Pixel Ci	ook: 156.75	Interlaced	
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VCrCb 4.4.4	3 Notive 1920v10806.24	147 16 Q PAL 14	Birth 6 Dr 00	H. Sync	Width: 32	V. Sync Width:	6
VCrCh422				H. Imag	e Size: 177	V. Image Size:	100
	4. 🔲 Native 1920x1080p 259	Hz 16.9 💙 🛐 🗮	Block 7. Ox 21	H. Bord	er: 0	V. Border:	0
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Audio Descriptors	Number of Channels: 2	Supported Sampling Frequencies	Speaker Allocation Block Add Speaker Allocation Bloc	tk ■ Stereo @ No 5 ● F5,1	CV1 Viewing Supp Stereo R on sync	Wizard kort 9 2Way, R on	even
Audio Descriptors	Number of Channels: 2	Supported Sampling Frequencies           32 kHz         96 kHz           44 kHz         176 kHz	Speaker Allocation Block Add Speaker Allocation Bloc	x ■ Stereo ⊙ No € FS, 0 FS, 0 FS,	CVT Viewing Sups Stereo R on sync L on sync	wizard kort 9 2Way, Ron 9 2Way, Lon	even
Audio Descriptors fr1 Format © Linear PCM AC-3 MPEG1	Number of Channels.	Supported Sampling Frequencies     32 1642     4 1642     4 1642     12 166 1642	Speaker Allocation Block Add Speaker Allocation Bloc	x Stereo 0 No 6 FS, 6 FS, 8 Side	CVT Viewing Sups Stereo R on sync L on sync -By-Side	wort 2Way, R on 2Way, L on 4Way	even
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Autio Descriptors / m1 Format O Linear PCM AC-3 MPEG1 MPEG2 ACC	Number of Channels:	Supported Sampling Prequencies     2 32 642     2 4642     4 642     4 642     176 642     192 844     192 844	Speaker Allocation Block Add Speaker Allocation Bloc	ck Stereo O No FS, FS, Store	CV7 Viewing Supp Stereo R on sync L on sync Hay-Side	nort 2Way, Ron 2Way, Lon 4Way	even
Audio Descriptors	Number of Channels:	Supported Sampling Projuencies 2 32 64z 2 96 64z 2 44 64z 176 64z 2 48 64z 192 64z 2 88 64z	Speaker Allocation Block Add Speaker Allocation Bloc	ck Stereo O No 3 O FS, O FS, Side	CVT Viewing Supp Stereo R on sync L on sync I-By-Side Rigmal Definitio	nor1 • 2Way, R on • 2Way, L on • 4Way n • Bipolar Analo	even even
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### 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.

AW EDID Editor - W/MOR_EDID_HOMESin									
Fie Tool About									
/ Standard Data \/ Detailed Data \/ CEA Extension \/ Hexa Viewer \	ANALOG WAT								
Original / Saved Raw Data	Elock Description								
Byte Array	Extension Block Count Size: 1 Byte								
00 01 02 03 04 05 06 07 08 09 0A 08 0C 00 0E OF	Extension Block(s) 1								
00 00 FF FF FF FF FF FF 00 06 D7 02 61 00 00 00 00	CEA Extension Blook TES								
10 14 17 01 03 80 3D 00 78 06 EE 91 A3 54 4C 99 26									
20 OF 50 54 FF EF 80 81 00 81 40 81 80 81 CO 90 40									
30 95 00 A9 40 B3 00 02 3A 80 18 71 38 2D 40 58 2C									
45 00 F4 36 11 00 00 1E 28 3C 80 A0 70 80 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 FC									
70 00 4D 49 44 52 41 20 53 65 72 69 65 73 0A 01 C6									
50 02 02 04 70 57 90 1F 20 21 22 05 14 04 13 3C 3D									
30         3E         11         12         02         03         15         16         06         07         29         2F         01         6C         08         0C         00									
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# 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 nonoptimal 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...
- <u>Advanced</u>: 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:

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- 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<sup>™</sup> 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.