



Interpretation of HDMI EDID Data Using the WFM5250 HDMI/SDI Waveform Monitor for HDMI Signals

When dealing with an end-to-end video system, we are increasingly confronted with the fact that end of the chain uses the HDMI (High Definition Multimedia Interface), (e.g., a Camera, Set Top Box or DVD player). This standard incorporates into its structure an encryption system which can severely limit the possibilities for analysis if the measuring device is not HDCP (High Bandwidth Digital Content Protection) compliant. Developed and adopted by an industrial consortium led by Intel, this content protection algorithm prohibits displaying images on non-complaint HDCP displays. It is based on an accurate identification of the source and the display, leading to a single encryption key that will only benefit the two devices. There is an exchange of data between the source and destination, and is structured into the EDID (Extended Display Identification Data) packets. This EDID data can be analyzed with the Auxiliary Data Status of the WFM5250 Waveform Monitor.

The following describes how it works and how to interpret the data.

Principle of the HDCP Pairing Procedure

- Upon connection, the source sends an identification code to the receiver.
- To demonstrate eligibility, the receiver must respond within 100ms with its code
- With these two identifiers, the source and the receiver calculate internally a unique key called a session key (unique and secret 56-bit key)
- The media is encrypted with this key that only the connected receiver can decode. A synchronization sequence is then exchanged every 128 frames.

				3	Auxiliary Data Status							Page 3 of 3								
Row	Column	Velue	Description	EDID) Tra	nsmi	itted	on	HDM	II IN:										
0x0	0x0 - 0x7	00 FF FF FF FF FF FF 00	Fixed Header										0-0	0-0	A	A	A	A	A	A
0x0	0x8 - 0x9	XX XX	Manufacturer ID	1				UX3	5 UX4	1 0x5				0x9	Uxa	UXB	Uxc		Uxe	
0x0	0xa - 0xb	XX XX	Manufacturer Product Code	0x0	00	ff	ff	ff	ff	ff	ff	00	50	ab	07	11	01	00	00	00
0x0	0xc - 0xf	XX XX XX XX	Serial Number	Sx1	33	16	01	03	80	0c	09	78	0a	le	ac	98	59	56	85	28
0x1	0x0	XX	Week of Manufacture	0x2	29	52	57	20	00	00	d1	c0	01	01	01	01	01	01	01	01
0x1	0x1	XX	Year of Manufacture	0x3	01	01	01	01	01	01	02	3a	80	18	71	38	2d	40	58	2c
0x1	0x2	01	EDID Version	0x4	45	00	dd	0c	11	00	00	le	01	1d	80	18	71	le	16	20
0x1	0x3	03	EDID Version	0x5	58	2c	25	00	81	40	00	00	00	9e	00	00	00	fe	00	54
0x1	0x4 - 0x8	XX XX XX XX XX XX	Display Parameters	0x6		41	2d	35	32	35	30	ň.	20	20	20	20	00	00	ň	fa
0x1	0x9 - 0xf	XX XX XX XX XX XX XX XX	Chromaticity Coordinates	0x0	00	17	3d	0.1	2e	11	00	0a	20	20	20	20	20	20	01	lf
0x2	0x0 - 0x2	XX XX XX	Chromaticity Coordinates						2e	11		on	20	20	20			2		
0x2	0x3 - 0x5	XX XX XX	Established timing bitmap	0x8		03	26	4	40	90	05	02	04	01	ш	14	13	11	06	15
0x2	0x6 - 0xf	XXXX	Standard timing information	0x9		12	23	Of	04	01	83	41	00	00	6Ь	03	C.	00	10	00
0x3	0x0 - 0x5	XXXX	Standard timing information	0xa	80	2d	20	00	02	14	01	14	00	72	00	u 0	le	00	6e	28
0x3	0x6 - 0xf	XXXX	Descriptor 1	0xb	00	00	81	49	00	00	00	18	d6	20	80	a0	00	e0	2d	00
0x4	0x0 - 0x7	XXXX	Descriptor 1	0xc	10	60 ,	200	00	81	60	00	00	08	18	8c	0a	d0	90	00	40
0x4	0x8 - 0xf	XXXX	Descriptor 2	0xd	31	00 ^L	- Ос	40	00	-00	81	60	00	00	00	18	00	00	00	00
0x5	0x0 - 0x9	XXXX	Descriptor 2	0xe	00	00	00	UU	00	00	00	00	00	00	00	00	00	00	00	00
0x5	0xa - 0xf	XXXX	Descriptor 3	0.55	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	4e
0x6	0x0 - 0xb	XXXX	Descriptor 3																	
0x6	0xc - 0xf	XXXX	Descripto	Arro	w Le	ft. U	ю –	Prev	ious	Dag	e. Ri	ght.	Dow	n - l	Next	page	е.			
0x7	0x0 - 0xd	AAXX	Descriptor 4				_			1										_
0x7	0xe	XX	Number of Extensions		A	t ria	ht. tł	ne E	DID	data	a de	scrip	tion	s. Al	oove	. the	e dis	play	/	
0x7	0xf	XX	Checksum		screen for the waveform monitor.															

The 0x7/0xe byte indicates the number of 128-byte blocks that follow in the so called 'Extended' data corresponding to the V2 standard. Find here all of the bytes that follow in the list.

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EDID Data

Data identifying a source or display is stored in a block of 256 bytes encoded in hexadecimal (V2.0). The data always begins with an easy to recognize header (in red below). Followed by various data such as resolution and standard of the media, brand, type, serial number, date of manufacture, supported resolution, the color space, the timing etc. Careful analysis of EDID data often helps to identify the nature of the pairing defects. That is why the waveform monitor displays three separate pages: A page summarizing the main parameters decoded in the clear, raw EDID received from the receiver, and those sent by the source (see Figure 1 for example – page 3 of 3).

Video Session	Auxiliary Data Status Page 1 of 3
Input: HDMI Input 2A Signal: Locked Effective: Auto 1080i 59.94 - YCbCr 422 12b - HDMI Disabled Colorimetry: 709 Input HDCP: Disabled Colorspace: YCbCr Output HDCP: Not Connected Color Depth: 8-bit/channel Y Stuck Bits: TMDS Clock: 74.179688 MHz C Stuck Bits: HDMI/DVI: HDMI AP CRC: 4EBEh 99B1h Pixel Rep. Rate: 1X Field Length Err: OK Quantiz. Range: Default Line Length Err: OK Katistics Status Err Secs Err Fields X Err Fields RGB Gamut Error OK 0 0 0.0000 % Cmpst Gamut Error OK 0 0 0.0000 %	Source Prod Desc: Aspect Ratio: 16:9 ACP Packet: Missing ISRC Packet: Missing Gamut Packet: Missing Vendor Specific Info: Missing AVI Info: Fresent Source Prod Desc Info: Missing Audio Info: Present MPEG Source Info: Missing
Black Events: 0 Frozen Events: 2 Changed since reset: Yes Run Time: 0 d, 00:02:45 Running Press "SEL" to reset. Any "arrow key" stops/starts. Auxiliary Data Status Page 2 of 3	Arrow Left, Up – Previous page, Right, Down – Next page.
EDID Received on HDMI OUT: 0x0 0x1 0x2 0x3 0x4 0x5 0x6 0x7 0x8 0x9 0xa 0xb 0xc 0xd 0xd	EDID Transmitted on HDMI IN: 0x0 0x1 0x2 0x3 0x4 0x5 0x6 0x7 0x8 0x9 0xa 0xb 0xc 0xd 0xe 0xf 0x0 00 ff </td

Figure 1. Video Session and Aux Data Status of HDMI input.



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- 1. Select the STATUS button on the waveform monitor for one of the tiles and push and hold this button to display the menu select the Aux Data Display under the Display Type menu.
 - a. There are three pages within this display and pressing the Left or Right arrow keys will cycle through the menus as shown in Figure 2.
- 2. Pressing the Help button while in this Aux Data Status display can show a brief summary of the EDID Syntax as shown in Figure 1.
 - a. The user can also download this EDID information via the web interface of the instrument.

Note

- The EDID information is stored within the Sink (Input) device and provided to the Source (Output) when the connection is made.
- The EDID information is then used by the source to configure the appropriate video and audio signals to provide to the Sink.
- When the HDMI loop through output is connected from the WFM5250 the EDID information can be obtained from the connected device.

