EDID: A Guide to Identifying and Resolving Common Issues

Table of Contents

Abstract

HDMI, DVI, and DisplayPort require successful two-way EDID exchange between a display and a source to establish a connection between them. This in turn enables the flow of digital AV content from the source to the display. Problems with EDID communication are major causes of failure in digital video systems, with no image display as the typical symptom. This paper will provide a clear explanation of EDID, and identify EDID-related issues commonly encountered in the field, with suggested guidelines for successfully resolving them. With a better understanding of these issues, effective EDID strategies can be applied toward future system designs to ensure reliable and consistent system operation.

white paper

The professional AV industry's transition from analog to digital video technologies continues with the rapid adoption of HDMI, DVI, and DisplayPort. Though largely successful, this transition brings with it many challenges in delivering a solidly robust, trouble-free video system to the end user. Such challenges may be associated with the integrity of digital video signals as they travel along cables and pass through equipment, and the reliability of the cable connections as well as terminations. They may also be related to the two-way communication used in HDMI, DVI, and DisplayPort.

This two-way communication first encompasses EDID exchange, with HDCP authentication to follow if the content to be displayed is HDCP-encrypted. Successful completion of both is prerequisite to enabling the flow of digital AV content from source to display. Problems with EDID or HDCP are major causes of system failure leading to this very common symptom: a blank or blue screen with a message that reads "No Signal Present" or something similar. Issues with HDCP handshaking are well-known in the field. EDID also has a long history in AV and is widely familiar to integrators. However, it is also difficult to fully understand, and perhaps more importantly, to effectively troubleshoot when things go wrong in a digital video setup.

This paper aims to bring the AV professional to a comfortable understanding of EDID, starting with a clear explanation of EDID. This will be followed by identification of EDID-related issues commonly encountered in the field, with suggested guidelines for successfully resolving them. This information can then be used to help develop and apply sound EDID strategies to ensure reliable and consistent operation within any AV system.

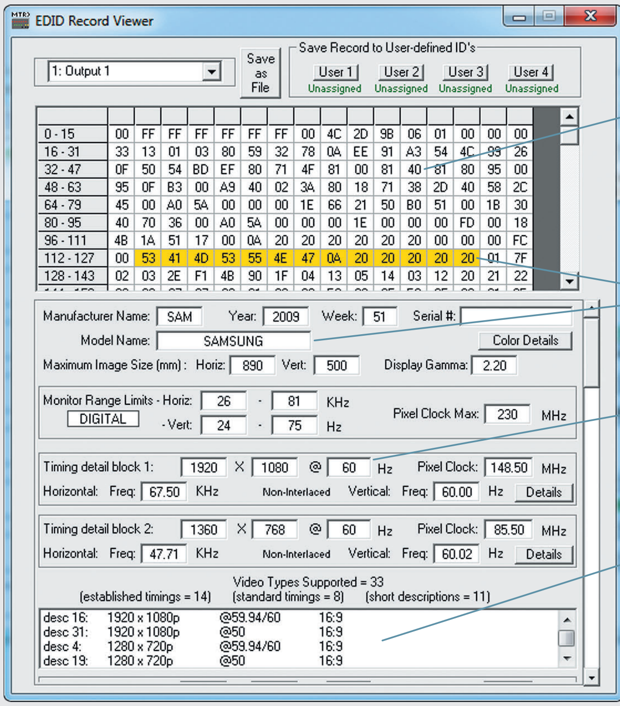
What is EDID?

EDID - Extended Display Identification Data consists of 128-byte data structures stored in a video display device – also referred to as a sink. The EDID specifies a sink's characteristics and must contain a primary data block, also known as VESA block 0. Block 0 lists the display's preferred resolution and refresh rate, other resolutions and refresh rates that will be accepted, and color characteristics. The preferred resolution is usually, but not always, the same as the display's native resolution. EDID also contains a wide range of ancillary information including the vendor, model, serial number, date of manufacture, physical image dimensions, display transfer characteristics – gamma, and color characteristics – RGB primaries and white point. For more information about what's in an EDID, refer to the sidebar.

In addition to a sink, EDID may also be stored in repeater devices situated in between a source and a sink. Switchers, DAs, and signal processing equipment are common examples of repeaters.

What's in an EDID?

Here are some of the essential details contained within an EDID. The Extron control software for matrix switchers was used to display the information.

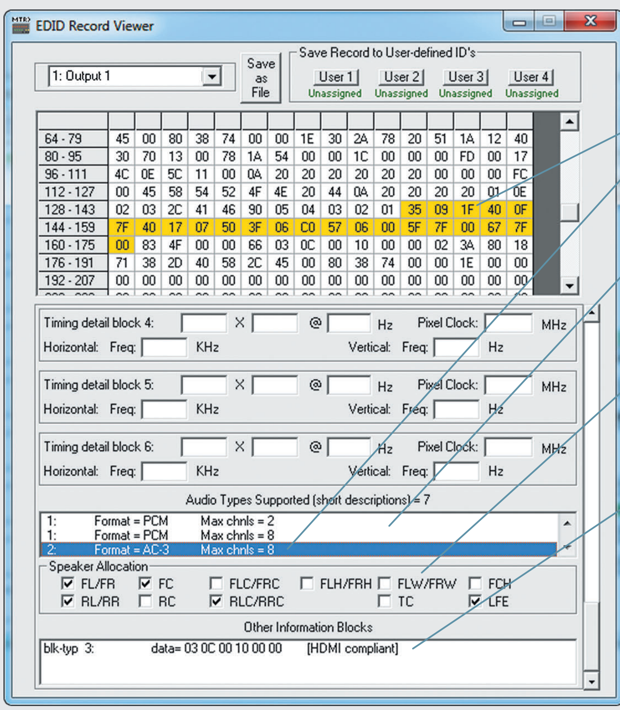


Original hex-encoded data for the EDID. The software translates the data into readable information.

Model name of the display

Preferred or native resolution and refresh rate

Full list of timings supported by the display



Supported audio format

List of audio formats supported by the sink or repeater

Speaker allocation for a specific audio format

Additional information, such as compatible 3D video formats or color bit depths

Consumer televisions or monitors with HDMI ports require EDID with additional 128-byte extension blocks, standardized as CEA-861 by the Consumer Electronics Association, to define parameters for compatible DTV/HDTV and audio formats when connected to a consumer device such as an audio/video receiver, Blu-ray Disc player, mobile device, or a PC. The CEA-861 block data also specifies, whenever appropriate, 3D video formats, color bit depths for Deep Color, color space compatibility including xvYCC, and parameters for lip sync.

When a source device connects to a sink, the EDID is sent over to the source, which then reads the information and uses it to produce a video output properly formatted for the display. For example, a PC receives EDID from a sink indicating WUXGA native resolution via the sink's DVI port, and responds accordingly by sending video to the sink at WUXGA. EDID is intended to enable a simple plug-and-play connection while automatically optimizing video compatibility between source and sink.

EDID exchange is standardized by VESA - Video Electronics Standards Organization. It was first introduced in 1994 for analog VGA. At that time, the proliferation of CRT data display models with various preferred resolutions prompted a desire to simplify connection from a PC, by automatically communicating attributes of the display to the graphics card. As a result of its wide implementation for VGA, EDID has been incorporated into the HDMI, DVI, and DisplayPort standards.

EDID Communication Protocol, Step by Step

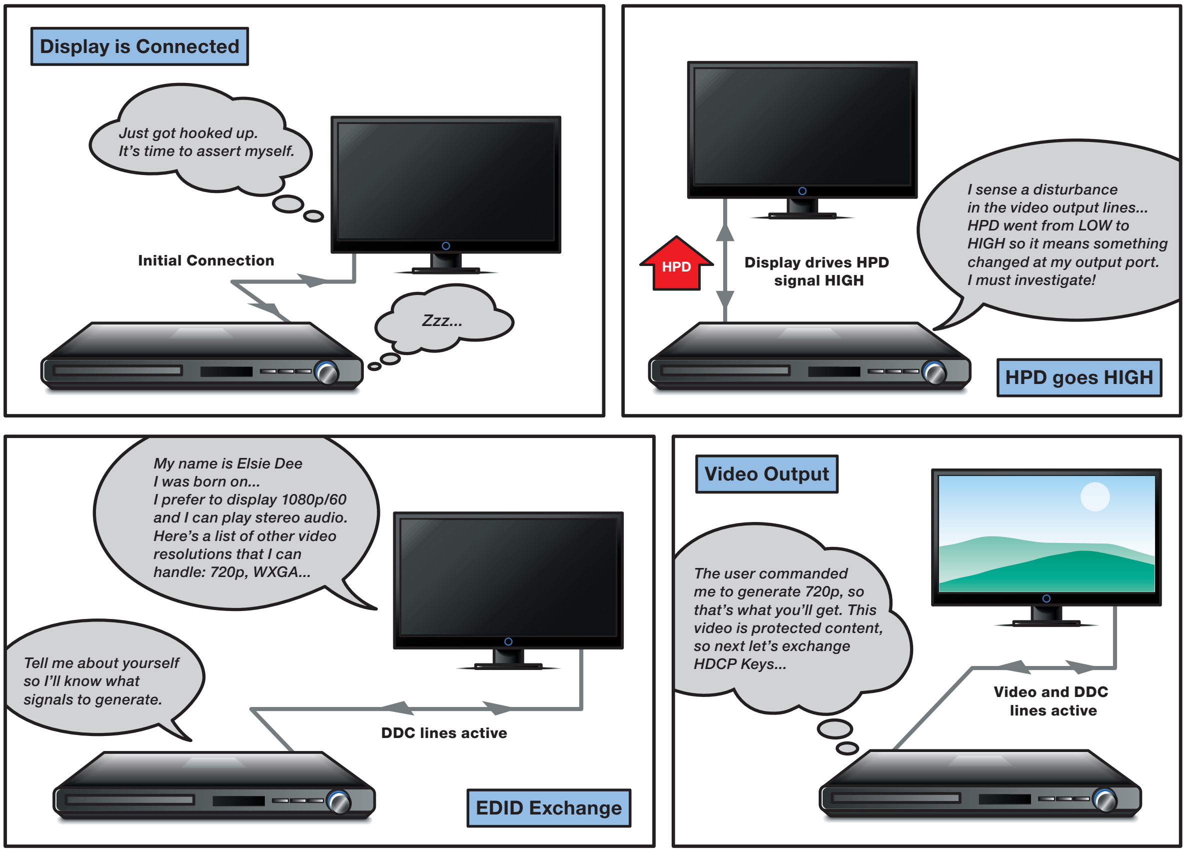
The protocol for establishing the exchange of EDID is standardized by VESA as the DDC - Display Data Channel, which is based on I^2C, a standard serial bus protocol for two-way communication in many types of electronic devices. The DDC specifies three pins on the HDMI or DVI connectors for signal transmission and data exchange, including the SDA - serial data line and SCL - serial clock line for I^2C, and a +5 volt supply from the source.[1] Signals passing through the DDC are separate from the TMDS lines that carry video and audio.

1. **Initial source connection –** A source device is connected to the sink and is powered up. Per the DDC specification, the source supplies +5 volts to the sink. This powers the sink's EDID circuitry so that EDID exchange can take place without the need to fully power the display.

2. **Acknowledgement of source connection and handshaking –** Once the sink's EDID circuitry is powered up, it signals confirmation of the connection by driving the HPD - Hot Plug Detect signal from "low" to "high." The HPD pin is separate from the DDC and its +5 volt supply line.

[1] DisplayPort supports DDC but does not utilize the I^2C bus for transmitting DDC signals or EDID between devices. Instead, it translates the I^2C bus into a designated auxiliary channel at the source and sink connections.

EDID EXCHANGE



3. **Request for EDID from the sink –** When the source has received an HPD "high" signal, it then sends a command requesting the sink's EDID via the DDC.

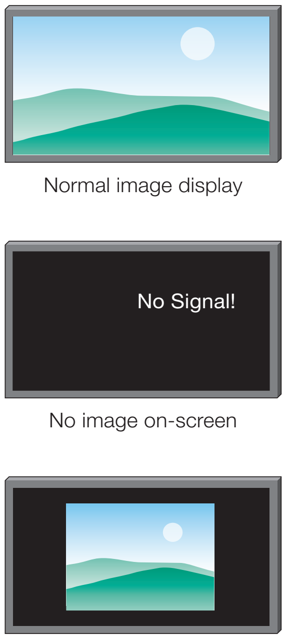
4. **Transmission of EDID to the source –** The sink receives the command and responds by sending its EDID to the source through the DDC.

5. **Source video output based on EDID –** The source reads the data within the EDID and responds accordingly by sending its video output to the sink at the preferred resolution, refresh rate, and color space. The preferred resolution may be overridden if the user selects an alternate output resolution that complies with the supported video timings in the EDID.

6. **HDMI sinks and sources such as consumer televisions and Blu-ray Disc players –** For HDMI sink devices, the EDID usually contains one or more extension data blocks providing compatible timings relevant to DTV, as well as supported audio formats, speaker allocation, and if present, lip sync delay. The source detects the presence of these extension blocks via a flag in the primary EDID block, and then requests them from the sink.

The HPD and EDID handshake process is illustrated above. It is important to mention here that HDMI and DVI specifications require successful EDID communication before

Figure 1



Normal image display

No image on-screen

Image does not fill the screen

Common symptoms of an EDID-related problem

a source will output its video. EDID communication, in turn, is dependent on successful HPD handshaking.

Additionally, for HDCP-encrypted content, EDID communication must be completed first before HDCP authentication can occur. Exchange of information for HDCP occurs over the same DDC lines for EDID exchange.

EDID Communication Issues

Problems related to EDID communication are very common in the field. They may occur as a result of DDC or HPD signal degradation due to cable losses, poor terminations, or EMI/RFI interference. They may also originate in the sink, source, or sometimes a repeater such as a switcher, and be related to how HPD or EDID are being handled or managed within the system. The symptoms often are common: no image is shown on-screen, or the image is present but appears distorted, fuzzy, or does not fill the screen – see Figure 1. This can make it particularly difficult for AV integrators to isolate the problem. The balance of this paper identifies the most prominent field issues related to EDID, with suggestions for successfully overcoming them.

Common Field-Related EDID Issues

Signal Integrity Problems in the DDC or HPD Lines

Typical system scenarios. (1) A source is connected to a sink over a long HDMI or DVI cable connection. **(2)** A source is connected far away from a sink over a twisted pair extender.

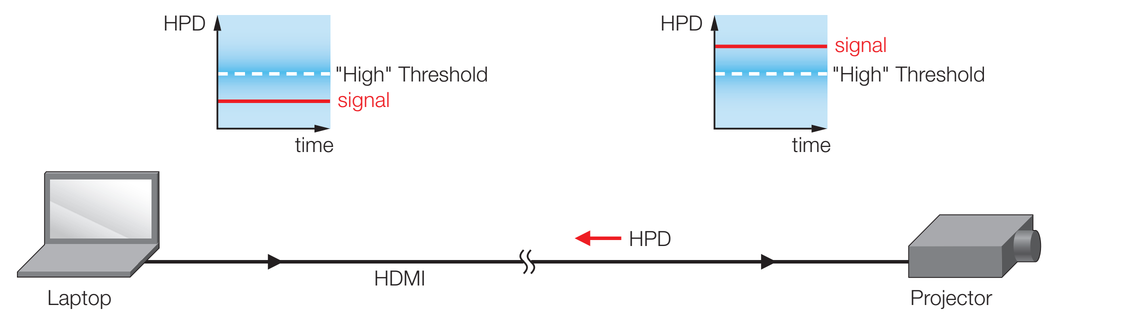
Common symptom. No image seen at all. Or if the source is a PC, the image seems to be at a low resolution and appears fuzzy, stretched, or does not fill the screen.

Explanation. Integrators working with HDMI and DVI in the field are very well-aware of the dramatic effects on image quality that result from a loss of signal integrity in the TMDS video lines. Signal degradation can occur as a result of transmission over long cables, poor connections, the use of barrel connectors to extend cables, cascading multiple devices in the signal path, and other factors.

Similarly, signal integrity problems can affect the DDC and HPD lines and affect image display reliability. Signals passing through DDC and HPD essentially follow standard TTL binary logic. According to the specifications for HDMI and DVI, a “low” signal is detected if it falls within the range of 0 to 0.8 volts. A “high” signal is detected if it is sensed within the range of 2.0 to 5.3 volts.

Long cables can cause logic signals to drift lower, possibly causing an intended high signal to be misinterpreted at the receiving end. Figure 2 illustrates the effect of HPD signal loss over a long HDMI cable. The signal from the sink has lost enough voltage that when it reaches the source, the signal is detected below the range defining high

Figure 2

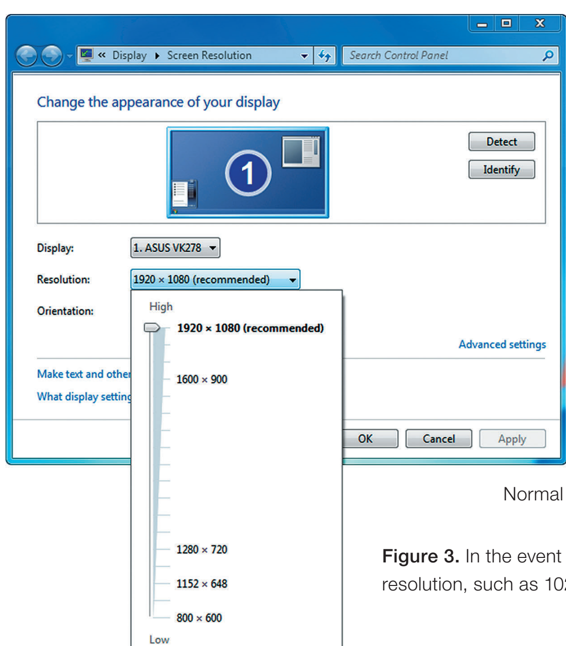


Long cables can result in HPD signal loss, causing an intended high signal to be misread by the source.

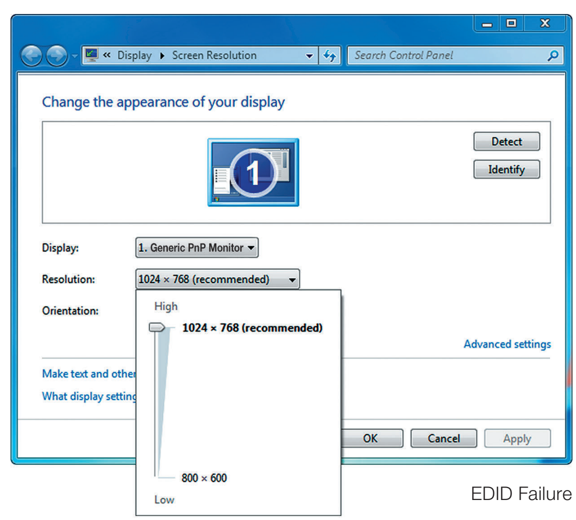
HPD. As a result, the source fails to request the EDID from the sink and the handshake process terminates. Similar problems can occur with signal extenders and twisted pair cables that are too long.

Even if the DDC or HPD lines have been affected, the TMDS video lines may still be intact since they are handled differently. Many sources fail to output video if the handshake fails, but PCs typically will send an output at a default low resolution, such as 1024×768, to ensure the user can still work with the PC.[2] In this scenario, just a few selectable low resolutions are available when manually configuring the output from the PC. See Figure 3.

Recommended solutions. To help prevent DDC and HPD signal degradation, employ the same practices recommended for good digital video signal integrity by keeping cables as short as possible, ensuring that connections are solid and robust, and simplifying the signal path by minimizing discontinuities in the chain. If using signal



Normal



EDID Failure

Figure 3. In the event of an EDID communication failure, a PC usually will send out a default resolution, such as 1024×768, and provide very few options for adjusting the output.

[2] *Although a source usually requires EDID exchange to output its content, a sink device can display incoming signals without EDID communication.*

extenders over twisted pair cable, cable lengths should be kept within manufacturer guidelines.

A signal test generator can be used to test the integrity of the TMDS video lines – see the sidebar for more information. If the TMDS lines are found to be good, an EDID management device, such as the Extron EDID 101D, can provide a quick and effective solution when system modifications are impractical or inconvenient. Typically, the device is connected at the source output over a short cable. The EDID 101D automatically manages EDID communication with the source, so that the device essentially simulates the function of a sink. The source then outputs its content to the EDID 101D, which passes the signals through to the display.

Extron technologies for EDID management are EDID Minder® and EDID Emulation. They enable EDID communication with the source using pre-stored EDID tables, available at various resolutions with or without audio that can be selected by the user to match the display's native or preferred resolution. EDID Minder builds on EDID Emulation by allowing the EDID management-equipped device to initiate a handshake with the display to receive its EDID, which can then be stored and subsequently communicated to the source. This can reduce some uncertainty associated with determining the best resolution for the display.

EDID management devices improve system reliability by keeping the EDID handshake closer to the sources, eliminating the uncertainties associated with sending HPD and DDC signals over extended cable lengths or through successive devices in the signal path. It is generally recommended that EDID be delivered from as close to the source as possible or practical.

Other considerations. Signal degradation effects caused by EMI/RFI interference, ground loops, and more can cause voltages to drift upward, potentially leading to misdetection of low logic signals. When extending HDMI or DVI signals over CAT 5-type cables grouped with other cables, or in close proximity with power sources, shielded twisted pair cables and connectors are recommended for protection against EMI/RFI.

EDID Management Not Configured

Typical system scenario. An AV device with EDID management is installed right out of the box and put into operation.

Common symptom. There's no problem getting image display on-screen. But the image seems to be at the wrong resolution for the display, looking slightly fuzzy, possibly distorted, or not filling up the screen.

Explanation. Many types of AV products, including those from Extron, incorporate EDID management. Examples include switchers, matrix switchers, DAs, video signal

Essential Troubleshooting Tools for EDID-Related Field Issues

Having a number of tools on hand can save a lot of time and effort, and expedite the process of troubleshooting digital video-related problems in the field, including those related to EDID. One of the most effective tools is a Quantum Data 780 test generator and HDMI analyzer. However, many other tools can also be effective without requiring significant capital outlay.

- **Viewing and confirming EDID**. Free software, including Extron EDID Manager® and Monitor Asset Manager from EnTech, are available for viewing the contents of an EDID. Monitor Asset Manager should be used when using a PC running Windows 7. Examining an EDID is usually the best way to determine a display's preferred and compatible resolutions, as well as audio formats and other attributes.

- **Video test generator.** A video test generator such as the Extron VTG 400DVI can output test patterns through the TMDS lines without requiring EDID handshake with the sink. It can also show the native resolution of an attached sink device by reading its EDID, making it handy for quick validation. Extron video processors similarly have built-in test pattern generators, so having one on hand can be very helpful whenever troubleshooting is needed.

- **EDID management device.** The Extron EDID 101D and similar products are small and compact, and can be used to help quickly debug field issues related to integrity of the DDC or HPD lines, or some other problem related to EDID.

- **HDMI or DVI line tester.** Affordable line testers are available that can provide a quick integrity check of the TMDS, DDC, HPD, and +5 volt supply lines.

- **Network cable tester.** Testers for network cables can be very useful in installations with twisted pair extenders. They can be used to check for problems related to terminations, shielding, and signal integrity, and to determine whether there may be significant crosstalk. The quality of connector terminations plays an important role in the performance of systems with twisted pair signal transmission.

processors, and long distance HDMI or DVI extenders. Having EDID management in these products can improve system reliability by keeping the EDID handshake closer to the sources, eliminating the uncertainties associated with sending HPD and DDC signals over extended cable lengths or through successive devices in the signal path.

These devices likely have factory default settings for EDID management. Extron AV products are shipped from the factory with a default pre-stored EDID setting to 720p or 1024×768, depending on the model. The 720p resolution is widely compatible with today's televisions and monitors, while the 1024×768 resolution is generally compatible with a wide variety of desktop monitors.

These default settings usually ensure reliable image display, but the image may not be optimal. For example, if a system includes a source capable of 1080p output, and a sink at 1080p native resolution, the default 720p EDID will force the source to output at 720p for the display. The image, upscaled to 1080p, then doesn't appear to be as sharp as it should be. Aspect ratio issues can also occur in addition to resolution mismatch, such as in a system with a 1440×900 monitor and a PC. A default EDID at 1024×768 will force a lower resolution output to the sink, which will then distort it by stretching it to fill the screen, or display the image within a black frame.

Recommended solution. Set up the EDID management feature to capture the EDID from the sink and then communicate it to the source. Alternatively, set the EDID management to communicate pre-stored EDID at the preferred or native resolution of the sink.

Other considerations. Problems can occur if the pre-stored or captured EDID is at a resolution that a source, such as a PC or its graphics card, does not recognize or accept. In this case, nothing may appear at all on the display. Or a PC will send out an image at a default low resolution, often 1024×768, and just a few selectable low resolutions are available when trying to configure the output. Again, properly setting up EDID management will resolve the issue.

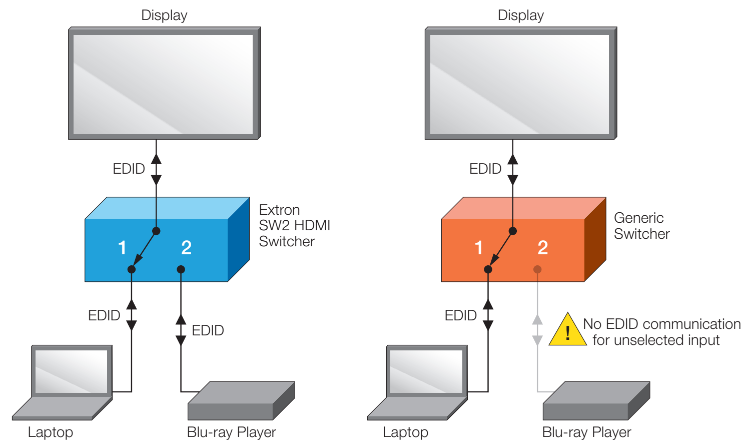
Be aware that Blu-ray Disc players usually will only output HDTV resolutions. If connected to EDID management that is set to a computer resolution, the player most likely will send a low resolution output at 480p that is universally compatible with sinks.

Slow or Unreliable Source Switching

Typical system scenarios. (1) A basic or low-cost HDMI or DVI switcher is used in an AV system. **(2)** A system design includes multiple HDMI or DVI sources connected directly to the inputs of a display.

Common symptom. Switching between sources is slow. For some displays, the built-in switching may even be unreliable with some source devices.

Figure 4



An Extron SW HDMI Series switcher actively maintains continuous EDID communication with all connected input sources, resulting in consistent and reliable operation. Generic switchers simply pass DDC information from only the selected input directly to the output. This necessitates reinitiating EDID communication between the source and display upon each switch, which can contribute to unreliable operation, switching lag, and visible glitches of the displayed image.

Explanation. Basic HDMI or DVI switchers handle transitions between sources by simply disconnecting the signal lines including TMDS video, DDC, and HPD. When the lines are reestablished following an input selection, the EDID negotiation process has to be reinitiated between the display and the newly selected source device. This renegotiation of EDID can result in some switching lag. This latency may be prolonged if the new source presents a different resolution or color space to the sink.

Switching lag can be especially noticeable when switching between a display's built-in HDMI or DVI inputs. Additionally, a display may handle a new input selection by switching only the TMDS or DDC lines from the previous source, but doing nothing with the HPD line. This can be a problem, because some sources wait for the HPD line to change state before sending video. In such cases, switching between inputs on a display can result in no viewable picture until the system is power-cycled.

Recommended solution. Avoid using a display's integrated switching whenever possible. Instead, use a switcher with EDID management, such as the Extron DVI Plus and HDMI Series switchers. They speed up switching by exchanging EDID with each connected source. The HPD and DDC lines are never disconnected, so the sources continuously output video regardless of the input currently selected on the switcher. See Figure 4.

By default, the DVI Plus and HDMI Series automatically capture the EDID from the display device when it is connected to the switcher output and powered on. Then this EDID is stored for each of the inputs and communicated to the sources. No EDID management setup is required, which simplifies installation.

Other considerations. EDID management in a switcher usually ensures consistent signal resolution and color space format between sources, further contributing to quick source switching.

Images Look Great on Some Displays but Not on Others

Typical system scenario. A matrix switcher with EDID management is used so that several displays can reliably display content from an HD source. The displays are LCD flat panels and a combination of smaller 720p and larger 1080p models.

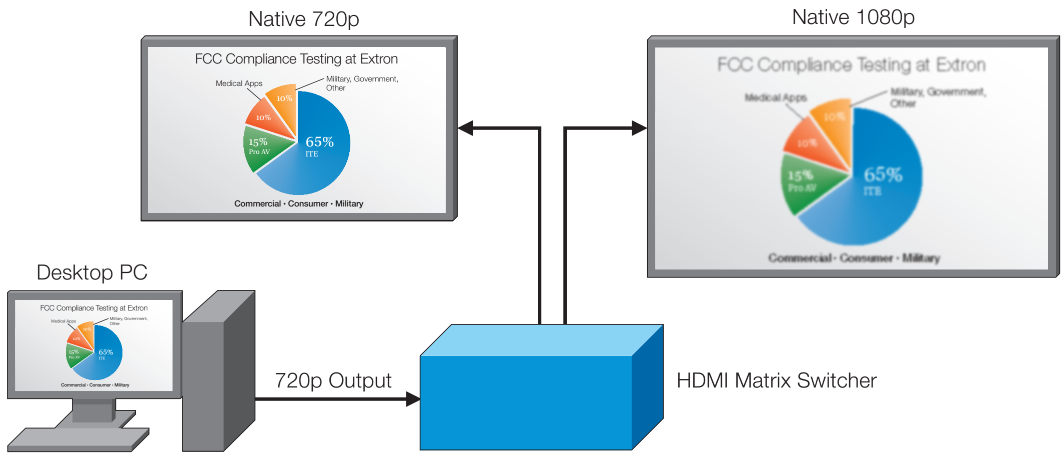
Common symptom. The picture looks very good on the 720p screens, but not sharp enough on the 1080p panels.

Explanation. Matrix switchers with EDID management are similar to switchers in that EDID is communicated to each source connected to an input. EDID management in a matrix switcher can be very effective in managing resolution compatibility between sources and various displays.

A common practice, when using EDID management in a matrix switcher, is to determine the native resolutions of the displays to be tied to an input source, and then determine the highest common resolution between them. Pre-stored or display-captured EDID based on this resolution is then communicated to the source, so that the output will be compatible with all displays. Figure 5 illustrates EDID management setup for an Extron XTP CrossPoint® matrix switcher.

Figure 5. The Extron XTP Configurator software for XTP Systems includes a user-friendly GUI for managing EDID throughout the system.

Figure 6



Graphics formatted for 720p are likely to appear fuzzy when scaled up on a native 1080p display.

For example, a 1080p television and a 720p display are to be fed from a PC via a matrix switcher. The highest common resolution is 720p, so the EDID management would be set to this resolution. Although an image will be reliably shown on both displays, graphics will look sharp on the 720p display but may appear somewhat fuzzy on the 1080p TV. See Figure 6. Additional issues can arise when mixing and matching displays of various aspect ratios.

Recommended solution. Complaints and service calls can be avoided by taking an important step during the needs assessment phase of system design. During this time, discuss with the end user the application requirements for displaying sources on multiple displays. Determine what sources will be used, their content resolutions, and what the native resolutions will be for the displays. Ask about the end user's expectations for image quality, and whether some compromises will be acceptable if a source is to feed a mix of display resolutions and aspect ratios.

The importance of image quality may depend on the nature of the content. Video and photos are more likely to be acceptable than graphics, if they need to be scaled up or down in resolution. Whenever possible, high resolution graphics for digital signage and other applications should be presented pixel-for-pixel to ensure that details are sharp and clear.

Other considerations. When combining televisions with PCs and desktop monitors, be aware that many TVs may only accept a very limited range of computer resolutions. In these situations, 720p may be the best common resolution.

If an end user is using a mix of smaller 720p and larger 1080p flat-panel displays, and insists on the best image quality for 1080p, 720p-type televisions may accept

Additional EDID-Related Pitfalls and Issues

In addition to the common field-related EDID issues discussed in the article, there are several other situations and instances that can be related to EDID.

- **HDMI and DVI inputs.** Many sinks designed for commercial applications have separate HDMI and DVI inputs, which may contain different EDID content between them. The EDID for the DVI input likely will not have CEA-861 extension blocks, so an HDMI source connected into this input may not output HDMI audio. Additionally, the EDID for the DVI input may specify a computer resolution in its preferred timing, while the EDID for the HDMI input specifies an HDTV rate.
- **Cascading devices with EDID management.** In some systems there will be more than one device in the chain with EDID management capability. Generally, it is best to manage EDID as close to the source as possible, so EDID management should be limited to the device connected directly to the source, and disengaged for devices further downstream.
- **EDID from the sink required.** In some applications, the original EDID from the sink must be used when applying EDID management. A particular example is 3D video from Blu-ray Disc. The EDID within a 3D-capable sink will specify the 3D video formats supported, which need to be conveyed to the Blu-ray Disc player. EDID management can be used to capture this EDID from the sink and then communicate it to the player.
- **Corrupt EDID in display.** This is not very common, but may happen with legacy displays. Corrupt EDID is not likely to be an issue with newer HDMI-equipped sinks. These devices conform to the CEA-861 standard, which requires that the EDID be write-protected in the display to prevent accidental corruption.
- **Customizing an EDID.** There may be circumstances in which neither the EDID in the sink or the emulated EDID will be ideal. For example, a source needs to send an HDMI output to a display at a specific resolution, and also send out audio. Emulated EDID can be provided by the EDID management but with no provision for audio. The solution would then be to customize the EDID, which can be done using a software application. But doing so requires sufficient knowledge of the EDID data structures and syntax.

1080p input, making them ideal in many system designs if they are to present the same images with 1080p displays. Smaller flat-panel displays increasingly feature 1080p native panels, which will soon make this a moot issue.

Color Space Switching or Compatibility Issues

Typical system scenario. A source is connected to a sink through a DVI switcher. The source is sending RGB color space video to the sink. A user then selects a new source that outputs component color space video to the sink.

Common symptoms. The screen momentarily flashes magenta, the image is permanently tinted in magenta and green, or there is no image at all.

Explanation. The DVI specification supports RGB color space only and does not mention component color space. HDMI expands on the DVI spec to include optional support for component color space, so a display's HDMI input will usually accept it. When suddenly receiving a different color space into an HDMI input, some displays smoothly handle the transition with no glitches. But others may exhibit a brief visual artifact. This can occur when a display, receiving RGB color space through its input, suddenly senses a component color space from a newly switched source. The screen may momentarily flash magenta as the display adjusts to the new color space.

In switching systems combining sources that output RGB and component color space, problems may occur if there are monitors with DVI inputs.[3] If a component color space video signal is switched to a display's DVI input, the result may be no image display, or a picture tinted with magenta and green.

Recommended solution. Though not directly related to EDID, EDID management can avoid these potential color space issues by communicating EDID to all input sources that only specify RGB compatibility. The HDMI specification requires that sources and sinks, at minimum, be compatible with RGB color space.

Other considerations. If EDID management does not resolve color space issues, then it may be necessary to check the color space settings on the sources and sinks. Changing the color space format to "auto" on the source, sink, or both often resolves the problem.

Source Compatibility Problems

Typical system scenario. A PC had been configured to a specific output resolution. It is then connected to a new display, either manually or through a switcher.

Common symptoms. The image does not look right – fuzzy, stretched, or partially filling the screen. There may even be no image at all.

[3] While this is generally the case for computer monitors with DVI inputs, many PCs, graphics cards, and displays have DVI ports that are actually HDMI compliant.

Explanation. After connecting to the new sink, the PC failed to follow its EDID, and retained its previous resolution setting that doesn't match the sink's native or preferred resolution. If the sink is incompatible with the PC's output resolution, an error message may be displayed.

Recommended solution. Go into the display settings or open the program for the graphics card. Select the native resolution for the display. Make sure the new resolution setting will be retained if the PC is to be switched with other sources. If the issue persists, connect an EDID 101D or other EDID management device to the PC output, or use a switcher with an EDID management feature.

Other considerations. A somewhat similar situation may occur when a laptop is newly connected to an external display. The laptop may switch over to a specific presentation display mode, known as "Duplicate" in Windows 7, in which the desktop is duplicated on the laptop's internal screen and the display. The video output is identical to both displays, so the resolution chosen by Windows 7 must be mutually compatible. This resolution may not be optimal for either or both displays, unless they share the same native resolution.

For example, if the laptop's internal screen resolution is 1440×900 and the external projector is 1920×1200 native, 1440×900 will be sent to both. This may even happen without the internal screen being active. If the best possible image is desired for the external display, this issue usually can be resolved easily in Windows 7 by pressing the Windows logo key, and tapping "P" to cycle through the available display modes to "Projector only," or "Extend" if you intend to use the external display to extend your desktop.

Some presenters like to use the laptop's internal screen as a confidence monitor. If the laptop screen resolution equals or exceeds the native of the presentation display, this should not be a problem. But the presentation image may be less than desirable if the laptop is connected to a higher resolution projector or flat-panel monitor.

HDMI Audio Issues

Typical system scenario. A source, such as a PC or Blu-ray Disc player, is connected to a sink over HDMI. The intention is to watch video and listen to audio through the speakers in the sink.

Common symptom. The audio is missing.

Explanation. HDMI provides the convenience of sending audio together with the video on a single cable, which can simplify integration in applications where audio presentation is needed. For some systems, HDMI audio will be carried through to a flat-panel display and output through its built-in speakers, while in other installations, an intermediary

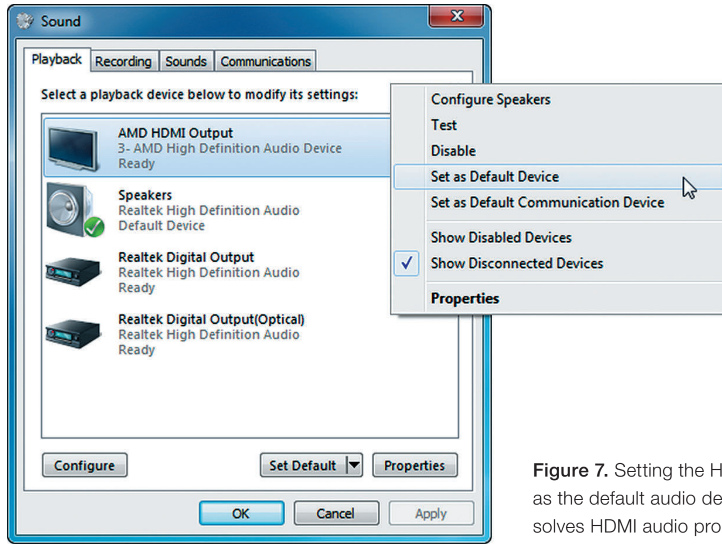


Figure 7. Setting the HDMI output as the default audio device usually solves HDMI audio problems.

device will extract the audio for playback over a sound reinforcement system. Consumer AV receivers commonly extract HDMI audio to provide surround sound. The Extron HAE 100 HDMI Audio De-Embedder is an example of a product ideal for commercial AV systems.

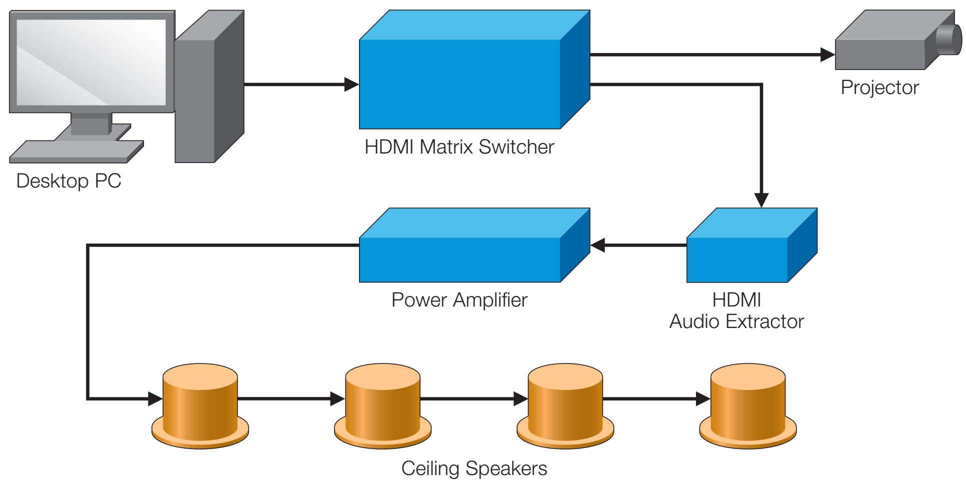
An HDMI sink sends one or more EDID extension blocks to an HDMI source, which includes information establishing the sink's compatible audio formats, including PCM or the multi-channel audio formats from Dolby and DTS. The sink must specify the channel count and speaker allocation. The source outputs audio compatible with the sink as specified in the EDID. Usually the format most relevant to commercial AV systems is two-channel or 2.0 PCM.

There are many instances in which a source may not send out audio over HDMI as expected. A PC may be overriding the EDID and defaulting to a mode with its analog audio output active and the HDMI audio turned off. Or a Blu-ray Disc player may have been manually set to output Dolby Digital 5.1, regardless of the EDID, which the sink does not accept. In this case, "crackling" artifacts may be audible through the sink's speakers.

A less common situation, leading to no HDMI audio, is failure to transmit the EDID extension blocks to a PC. This is caused by the PC not following HDMI/DDC specifications when requesting EDID from the sink.

Recommended solution. For a Blu-ray Disc player, select two-channel PCM output in the configuration menus. For a PC, be sure the driver for the graphics card or integrated graphics is up to date, and then go into the sound settings to activate HDMI audio output. See Figure 7. Ensure that settings will be retained if the system requires switching with other sources. If the issue persists, connect an EDID management device to the source output, or use a switcher with EDID management.

Figure 8



In systems requiring HDMI and sound reinforcement, it is best to keep the video signal path to the display as simple as possible. In the application shown here, this is accomplished by dedicating a matrix switcher output for the display, and another for the audio system.

Other considerations. Some projectors do not specify audio output in their EDID, even over their HDMI ports, so there may be no HDMI audio output from the source. This is also likely the case for flat-panel displays with no speakers. The lack of audio in the EDID will be a problem if there is a product in between that is intended to extract the HDMI audio for output to a sound reinforcement system. The Extron HAE 100, switchers, and matrix switchers with EDID management can resolve this issue by sending EDID directly to the source device that specifies audio output as well as video at the projector's preferred resolution. Pre-stored EDID is available that includes two-channel PCM or the multi-channel audio formats via the EDID extension block.

In addition to EDID management with support for audio formats, the HAE 100 extracts embedded HDMI audio, while passing the HDMI signals on to the display. If possible, the HAE 100 should be connected to a separate switcher output, as illustrated in Figure 8, to help simplify the digital video signal path to the display.

Develop an EDID Strategy

Every AV integrator has engineering standards in place to provide guidelines for system design. An EDID strategy section should be incorporated within these standards to address EDID management. A well thought-out, documented EDID strategy applied in the early design stages can greatly reduce the potential for on-site issues during installation and commissioning.

The following are key points to consider when designing a system:

Identify destination resolution requirements. The native or preferred display resolution will determine the EDID setting. For systems that incorporate multiple display devices, EDID for the highest common resolution should be selected.

Identify audio application needs. Two-channel audio is used for most sound reinforcement applications. If there is a need to support surround sound, select pre-stored EDID that includes multi-channel audio formats. If the pre-stored EDID tables do not support a specific format that is needed, such as multi-channel high resolution audio, it will be necessary to capture EDID from the surround sound processor.

Identify special EDID requirements. Support for 3D video necessitates use of EDID from a 3D-compatible display device. Many professional displays do not support audio, so EDID management with audio support will be necessary if sound system playback is required.

Identify where EDID is being provided to each source device. A system design may include several AV system components that manage EDID. To ensure the most consistent and reliable system operation, always apply EDID management from the device nearest the source, and turn off EDID management in all other devices.

Design systems with EDID management to every source. The system design should include AV devices that provide active EDID management to every source device. This will ensure robust system operation and reliable video output from the sources, especially in systems with switching and distribution.

Determine whether multiple EDID settings should be used. In most AV systems, a common EDID setting can be used for all sources. However, a specific EDID may be required for some source devices. For example, a system with 1080p sources and displays may include a videoconference codec that only supports 720p output, or the system needs a specific surround sound format from a Blu-ray Disc player.

Extron Electronics, headquartered in Anaheim, CA, is a leading manufacturer of professional AV system integration products. Extron products are used to integrate video and audio into presentation systems in a wide variety of locations, including classrooms and auditoriums in schools and colleges, corporate boardrooms, houses of worship, command-and-control centers, sports stadiums, airports, broadcast studios, restaurants, malls, and museums.

www.extron.com

Worldwide Sales Offices

Anaheim • Raleigh • Silicon Valley • Dallas • Chicago • New York • Washington, DC • Toronto • Mexico City • Paris • London • Frankfurt
Amersfoort • Moscow • Dubai • Johannesburg • New Delhi • Bangalore • Singapore • Seoul • Shanghai • Beijing • Tokyo

UNITED STATES	EUROPE	ASIA	MIDDLE EAST
+800.633.9876 Inside USA/Canada	+800.3987.6673 Inside Europe	+800.7339.8766 Inside Asia	+971.4.2991800
+1.714.491.1500	+31.33.453.4040	+65.6383.4400	

Extron®