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S O L U T I O N S

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PRODUCT TRAINING



# WHY EVERY INTEGRATOR NEEDS A HDMI TEST KIT IN THEIR TOOLBOX

1. Troubleshoot HDMI distributed systems
2. Manage EDID (Extended Display Identify Data) settings synchronization (EDID causes 80% of HDMI failures)
3. Validate HDCP 2.2 compliance
4. Provide 18Gbps Reference
5. Avoid additional truck rolls
6. Peace of mind

**HDMI**<sup>TM</sup>  
HIGH-DEFINITION MULTIMEDIA INTERFACE

**HDCP**<sup>TM</sup>  
HIGH-BANDWIDTH DIGITAL CONTENT PROTECTION

 **HDR**

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# WHY DO ON-SITE TROUBLESHOOTING WITH THE FOX & HOUND?

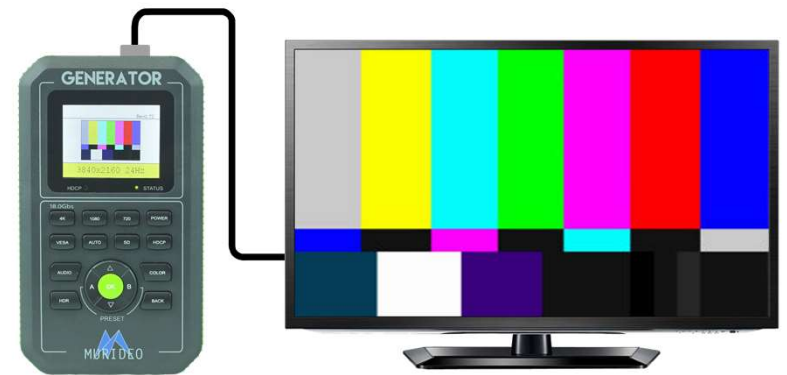
- Pin-point the problem component
- No need to “pluck and chuck”
- Save money: time, replacement parts and cabling.
- Identify system shortcomings
- Verify compatibility of system components
- HDCP compliance throughout a system



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# MAIN FEATURES INTEGRATORS WANT

- Cable Test
- Display Setup and Testing Patterns
- 2160P60 4:4:4/4:2:2/4:2:0 8-16 bit
- HDCP Testing – 1.4 and 2.2
- HDR Testing – HDR-10, HLG, Dolby Vision
- EDID Tools
- Portable & Battery Operated



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# 5 STEP TROUBLESHOOTING PROCESS

1. Start at the Source and inject desired signal through path (HDCP, Desired Resolution, etc.)
2. Verify picture on Sink/Display
3. Move generator to next device in chain
4. Repeat
5. Once you have passed the problem component, you will see the desired image.
6. Change the settings on the problem component or replace, Reinject the signal to verify.





## THE LINE OF INNOVATION: DOES YOUR SUPPLIER CROSS IT?

TYPE	RESOLUTION	FRAME RATE (FPS)	COLOR COMPRESSION	DEEP COLOR BIT DEPTH	HDR	WIDE COLOR GAMUT (BT2020)	HDMI VERSION	DATA RATE	MURIDEO	AUHD SERIES	444 SERIES	UHD SERIES
HD	1920x1080	24	4:2:2	8 BIT	NO	NO	1.4	2.23 Gbps	YES	YES	YES	YES
HD	1920x1080	60	4:2:2	8 BIT	NO	NO	1.4	4.45 Gbps	YES	YES	YES	YES
HD	1920x1080	60	4:4:4	16 BIT	NO	NO	1.4	5.91 Gbps	YES	YES	YES	YES
UHD	3840x2160	24	4:2:0	8 BIT	NO	NO	1.4	8.91 Gbps	YES	YES	YES	YES
UHD	3840x2160	24	4:4:4	8 BIT	NO	NO	1.4	8.91 Gbps	YES	YES	YES	YES
4K	4096x2160	24	4:4:4	8 BIT	NO	NO	1.4	8.91 Gbps	YES	YES	YES	YES
UHD OR 4K	3840x2160	60	4:2:0	8 BIT	NO	NO	1.4/2.0	8.91 Gbps	YES	YES	YES	YES
LINE OF INNOVATION												
UHD OR 4K	3840x2160	24	4:2:0	10 BIT	YES	YES	2.0(A/B)	8.91 Gbps	YES	YES	YES	YES
UHD OR 4K	3840x2160	24	4:2:2	12 BIT	YES	YES	2.0(A/B)	11.14 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	24	4:4:4	10 BIT	YES	YES	2.0(A/B)	11.14 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	24	4:4:4	12 BIT	YES	YES	2.0(A/B)	13.37 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	60	4:2:0	10 BIT	YES	YES	2.0(A/B)	13.37 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	60	4:2:0	12 BIT	YES	YES	2.0(A/B)	13.37 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	60	4:2:2	12 BIT	YES	YES	2.0(A/B)	17.82 Gbps	YES	YES	YES	NO
UHD OR 4K	3840x2160	60	4:4:4	8 BIT	YES	YES	2.0(A/B)	17.82 Gbps	YES	YES	YES	NO

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# TROUBLESHOOTING: Cable Testing

1. First step is to connect one end of the HDMI cable to the Generator, and the other end to the Analyzer.
2. Send any signal and make sure that you can see the video preview on the Analyzer.
3. Now Press the “Cable Test Button” on the Analyzer.
4. WAIT! Don’t press any more buttons, if you press any other buttons that will affect the cable test and you could get incorrect readings.



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# TROUBLESHOOTING: Cable Testing (cont.)

1. As the readings go through they will show up on the analyzer automatically, you can view them on the main screen.
2. Results are pass or fail – specifically:
  - 5V – OK – This indicates 5V is present
  - 18G – Pass / Error / No Signal – Pass = pass, Error = sees signal, but cannot pass all data. No Signal and Error are considered defective cables.
  - Same as above for all other lower resolutions
  - DDC – OK The Display Data Channel, or DDC, is a collection of protocols for digital communication between a computer display and a graphics adapter that enable the display to communicate its supported display modes to the adapter and that enable the computer host to adjust monitor parameters, such as brightness and contrast.
  - HPD – OK - HPD (Hot Plug Detection) allows the source to detect a display plugged in real time and indication should be OK if functioning properly



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# TROUBLESHOOTING: Timing & Scaling Issues

The first thing to do before installing an Audio/Video distribution system is to check compatibility of all the products to be utilized. Be sure that everything in your system works together.

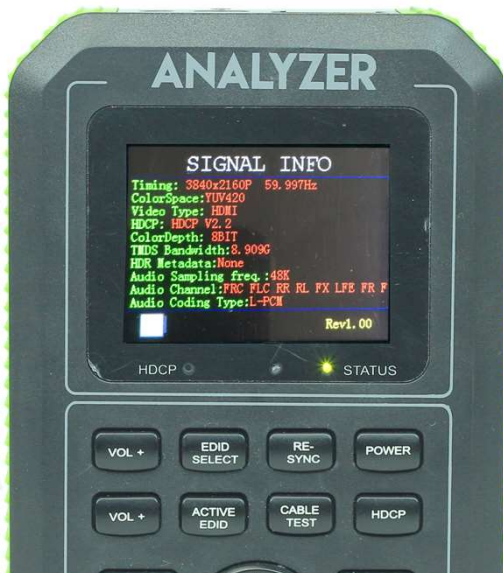
1. Use the GENERATOR in place of your Source, select resolution, color sampling and bit-depth that matches maximum compatibility of the Source.
2. Substitute the ANALYZER for the TV. Press INFO to validate the proper signal is passing through the system.



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# TROUBLESHOOTING: Timing & Scaling Issues (cont.)

3. What are the differences in what you are generating compared to what you are analyzing, None?  
Great, your done it works.
4. If there is a difference showing on the analyzer, work backwards from the sink using your analyzer, checking the signal after each repeater product to find where the change originated.



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## Basic Troubleshooting Setup



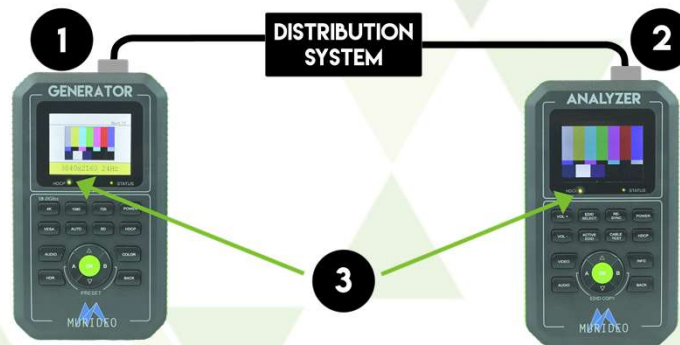
# TROUBLESHOOTING: HDCP Issues

The second aspect of pre-testing an A/V Distribution system is to check for HDCP compatibility throughout.

1. Use the GENERATOR in place of your Source, choose any test pattern and the highest resolution your distribution system can handle. Then press '**HDCP**' on the GENERATOR and select 2.2.

2. Substitute your ANALYZER in place of your TV, select either 'AUTO' or HDCP 2.2 emulation.

**TIP: Use A/B on the Generator to store your favorite timings**



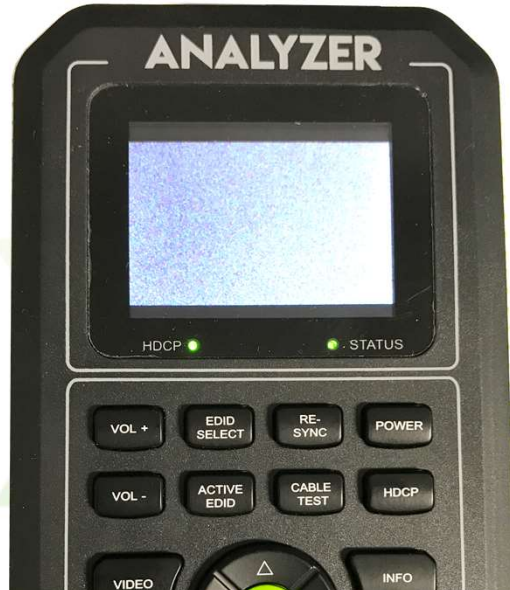
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# TROUBLESHOOTING: HDCP Issues (cont.)

3(a). If you see the test pattern and the HDCP light is lit, you are all set

3(b). If you get noise, or no HDCP light, work backwards from the Sink/TV with your Analyzer checking the signal after each repeater product to find the where HDCP was lost.



Noise on the Analyzer screen indicates HDCP incompatibilities.

**Note: You can also turn off HDCP completely for testing connectivity.**

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# TROUBLESHOOTING: Source Devices

1. Connect a trusted HDMI cable (or the cable received with your Fox & Hound Kit) from the output of the Source to the ANALYZER input.
2.
  - a) Press INFO to see timing data as the Source
  - b) Press VIDEO to see line video from the Source



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# TROUBLESHOOTING: Source Devices (cont.)

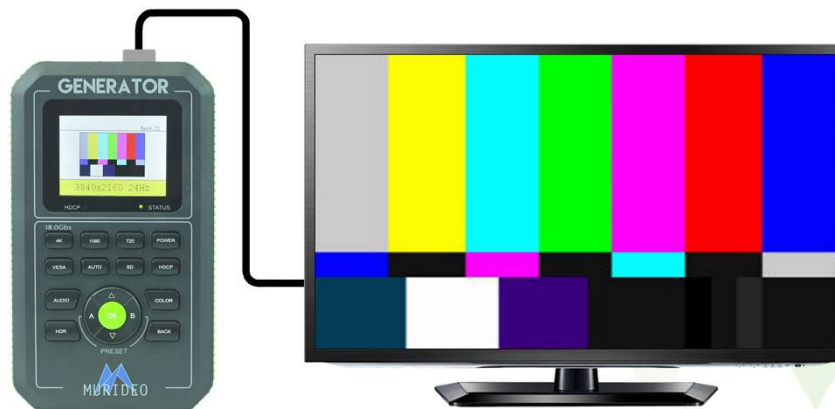
3. Read the data and make sure it matches what you want the source to output. Check for 4K, Color Space, Bandwidth & HDR.
4. If everything reads correctly, you know your source is configured properly. If not, you will need to get into the source's menu and make sure that it is sending an optimized signal. If your source isn't optimized, there is no way for the rest of your system to distribute a truly higher resolution.



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# TROUBLESHOOTING: Sink Devices (Displays, Projectors)

1. Take a trusted HDMI cable (or the cable received with your Fox & Hound Kit) from the input of the Sink to the output of your GENERATOR.
2. Select any test pattern from the GENERATOR using the up down arrows. Then choose the resolution you want to distribute by selecting either '**4K**', '**1080**', '**720**' or '**VESA**', then click '**OK**'.

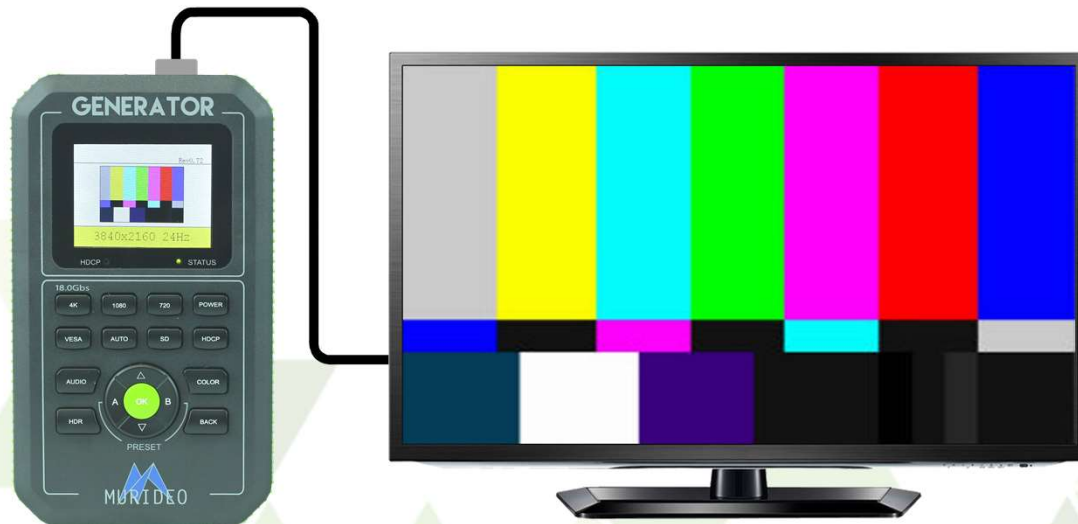


**TIP: Press and hold '4K' for 5 seconds to test for maximum bit depth and color sampling.**

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# TROUBLESHOOTING: Sink Devices (Displays, Projectors) (cont.)

3. Press COLOR on the Generator to set Chroma Sub-Sampling and Bit Depth
  - Note: For a maximized UHD player use 3840x2160 24 fps **4:4:4 12 Bit**
4. The test pattern should appear on the display, if it does not, start decreasing bandwidth until you get a picture on screen. Once you are able to obtain a picture, this is the maximum resolution available for the display.



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# TROUBLESHOOTING: Repeaters

1. For this test you need two trusted HDMI cables. Plug one end of the first cable into the GENERATOR, and the other into the repeater's input. Use the other cable to connect the repeater's output into your ANALYZER.
2. With the GENERATOR, choose any test pattern, and select the highest resolution, timing, and bandwidth you want to pass through the repeater.



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# TROUBLESHOOTING: Repeaters (cont.)

3. Select '**OK**' on the ANALYZER to read what is being output. It should be the exact same thing that the GENERATOR was inputting. If not, use that repeater's internal options to make sure your signal is being optimized. If you can't optimize the repeater to pass the resolution, timing, and bandwidth you want you will need to swap products or "dumb-down" your entire system to meet it's capabilities.



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# TROUBLESHOOTING: Extenders

1. For this test you need two trusted HDMI cables and a trusted CAT 5e/6/6a/7 cable. Plug one end of the first HDMI cable into the GENERATOR, and the other into the Extender transmitter's input. Use the other HDMI cable to connect to Extender receiver's output and then into your ANALYZER. Connect the Transmitter and Receiver with the trusted CAT cable.
2. With the GENERATOR, choose any test pattern, then select the highest resolution, timing, and bandwidth you want to pass through the extender. For *most* HDBaseT and HD over IP extenders, the max bandwidth is 10.2 Gbps.



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# TROUBLESHOOTING: Extenders (cont.)

3. Select '**INFO**' on the ANALYZER to read what is being output. It should be the exact same thing that the GENERATOR was sending. If not, your extenders are changing the signal, and in most cases if there is something wrong you will get NO PICTURE. At this point you will need to swap products or “dumb-down” your entire system to meet the extender set’s capabilities.



Note: Toggle HDR on and off to determine the extender capability to pass HDR-10/10+. Don't forget to check standard HDR FORMATS (See HDR Troubleshooting)

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# TROUBLESHOOTING: HDR

1. HDR Testing is very straightforward, and contrary to popular belief, the format and bandwidth are the most important. HDR Metadata is only a info-frame carried on the AVI data system. However – We recommend enabling HDR Metadata on the Generator to be 100% sure – This will force the display to activate HDR Mode and show metadata passthrough
2. It is recommended to check the following formats to verify HDR Pass through:
  1. 4K 60 4:4:4 8BIT – Verify full 18Gbps throughput (Most important) – 18Gbps
  2. 4K 60 4:2:2 12BIT – Verify full bandwidth with difficult compressions (Roku, Kaleidescape, Apple TV) 18Gbps
  3. 4K24 or 30 4:4:4 12BIT – Verify Film HDR Content (Blu-Ray, etc.) 14 Gbps
    - NOTE: It is highly recommended to check these through the system with the Analyzer to verify it is coming with its full integrity – A lot of repeaters (Matrices, extenders etc.) destroy these formats and leave a terrible image. This will also help you choose the correct infrastructure when selecting HDR connectivity.



# TROUBLESHOOTING: HDR (cont.)

- If your system can handle all of the above satisfactorily, you have a robust, stable, high bandwidth signal that will work great.
- 4K 30 4:2:0 10 BIT HDR (9 Gbps) is a MYTH – YES, it is encoded on the disc and used in post-production, but almost no sink device supports it – in lower frame rates 4:4:4 is required for it to work! DO NOT BE TRICKED BY THIS!
- You must also check HDCP 2.2, many source devices will not “give up” HDR if HDCP 2.2 is not present.
- HDR IS YOUR FRIEND! Do not be afraid of this infrastructure – you WILL create repeat business if you can do this properly. Recent advancements in HDMI Cables, HDBaseT and Fiber Optics all make high bandwidth video a reality, however there is a lot of “funny business” happening in marketing, ultimately YOU are responsible so it is in your best interest to test, test, and test again.



# EDID Tools

1. EDID was almost a non-issue as recently at 2 years ago. Now EDID is more important than ever before. For proper 4K and HDR video, you MUST manage EDIDs.
2. What is EDID? ---- EDID is simply a communication from a Sink (TV, Projector, repeater, matrix etc...) to a Source device. Its sole purpose in life is to tell the source what a given display is capable of – the information includes brand, max resolution, preferred resolution and compatible resolutions. EDID is ONE WAY from a display to a source, this means:
  - A source can only read EDID
  - The Display sends The EDID to the source
  - If you were to verbalize an EDID communication from a TV to a Blue ray, it would look like this ---- “Hello, I am a (NAME BRAND) TV, and I would prefer you send me 1080P, But I can handle 4K. Even though I can do 4K I cannot do HDR. Additionally I am not good with PC formats, I was not designed for them.” ---- Then the source device says “Hello! I understand! We are on the same team, I promise not to send you something you cannot handle.”
  - What is the “Gotcha”? The Source can only read the EDID from the next device in the chain, so if it is not connected directly to the TV it may have an EDID asking for a higher bandwidth or resolution than the display can handle. Additionally, what if you use a canned EDID and it is not good for all the displays?



**Note: The A and B buttons can hold separate EDIDs**

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# EDID Tools

3. Common reason you NEED to pay attention to EDID:

Sink devices all use lower bandwidth EDIDs to ensure a picture on the screen

Repeaters often “spoof” EDID to force a source to give something it is compatible for and not necessarily what YOU want.

4. This is simple to test – Simply place the GENERATOR into AUTO EDID and check what the generator sets itself too

5. The analyzer can read and Emulate EDIDs so you can see precisely how a source will react to a given EDID as well!

6. PRO TIP: Use AVProConnect with the most Robust EDID Management.



# Common Problems in a Distributed A/V System

- **No Video?**

- Use the “Troubleshooting A/V Systems” section to run your system through the process and find out where the issue is coming from.

- **No 4K?**

- Individually check that each product can handle the same types of 4K; 4K 18Gpbs is drastically different than 4K 10.2Gpbs. Manage your EDID's on each repeater and sink to make sure you have your system optimized for the 4K signal you are trying to distribute.

- **Incompatible Video?**

- Are you getting a signal to the sink but it's telling you that the signal is incompatible? Test the maximum capability of the Sink and make sure you are not feeding it something it can't handle. If you know the Sink should be able to handle the signal, strip the EDID from it to make sure the rest of your setup is ready for that same EDID.

# Common Problems in a Distributed A/V System

- **Discolored Video?**

- First check that the Sink's settings are set up to show the correct color. Color space mismatch is the most common issue. Remember you get a live video preview on the ANALYZER so you can visibly see what is being output at each spot you test.

- **Source Problems?**

- You can check if your Source has problems by plugging the ANALYZER directly into your source. You can find out what is actually being output compared to what it should output. You will be surprised that they are not always the same, and when you have a problem with your Source, nothing can be done with your distribution system to fix it, except decreasing the capabilities.



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