Using SDI with the Enova® DGX & DVX

How to successfully deploy SDI formats within the Enova DGX & DVX architecture through the use of SDI to HDMI conversion devices

Although the Enova DGX & DVX products support a variety of formats, occasionally a signal format is not natively supported within the Enova DGX/DVX architecture. By following this document, integrators can use the Enova DGX or DVX platforms as an easy, cost effective and robust solution for handling SDI formatted signals. This document discusses several types of SDI signal formats, how and when they might be encountered, and how these signals can be converted to traverse the Enova signal switching architecture.
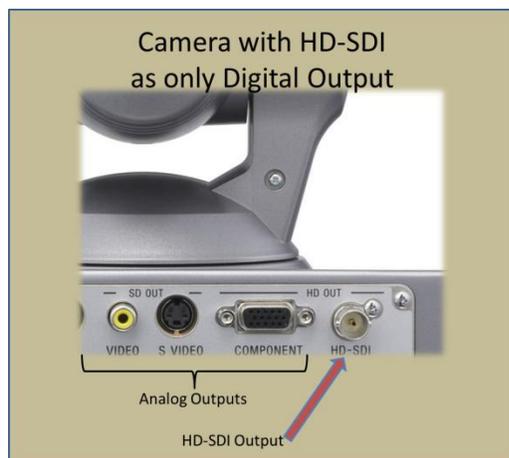
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COMMON TRANSPORT AND SWITCHING LAYER

Within a matrix switching architecture where sources and destinations can be varied, utilization of a common transport and switching layer is critical. Once a common layer is achieved the ability to send any input to any or all outputs is possible. Without this common layer, inputs of a certain signal style would only be able to be sent to outputs of that same signal style. This common layer is achieved as source devices enter a distribution and switching ecosystem when they are converted to a single, homogenous signal style. In some cases, consideration would need to be given to the video resolution as well as format, however, within the Enova ecosystem, because SmartScale is available on every output, individual resolution incompatibilities are resolved prior to exiting the DGX/DVX ecosystem.

Within DXLink transmitters, conversion from analog to digital occurs as signals are brought into the system architecture. This allows for composite, component, S-Video and RGBHV to be automatically converted. DisplayPort signals with DP++ capabilities are able to convert their format to a compatible TMDS signal format so the when these devices are connected to the Enova DGX/DVX, these signals achieve the common signal transport and switching layer automatically (through the use of appropriate passive cable adaptors). DVI and HDMI are both able to be brought into the Enova DGX/DVX ecosystem and handled appropriately since HDMI is a superset of the DVI standard. Signals within the Enova DGX/DVX architecture are passed as HDMI formats.

Camera with HD-SDI and HDMI outputs

HDMI/DVI Output

HD-SDI Output

EXTERNAL CONVERSION OPTION

Ideally, source devices can be brought into the Enova DGX/DVX architecture as one of these directly compatible signal formats. This allows for the source device to provide a signal style into the

Camera with HD-SDI as only Digital Output

SD OUT   HD OUT
VIDEO S VIDEO COMPONENT HD-SDI

Analog Outputs

HD-SDI Output

switching and transport layer without the need for additional signal or format conversion. In many cases, devices such as VTC cameras will offer both variants of video outputs. (See image)

In some scenarios, when deciding on a video usage scheme, consideration will be given to analog outputs versus that of digital and what the expected performance of each might be. In the case of the video conferencing camera in the image to the left, the only digital output provided is in an HD-SDI format. While component video is provided as an HD

output (and S-Video and composite are provided for standard definition variants), an integrator may prefer a digital output option. In this case, they would be relegated to using the HD-SDI output. To bring this signal into the Enova DGX/DVX architecture, a signal conversion would be needed. Ideally, this conversion would provide a clean, formatted signal within the HDMI or DVI format range. By providing a signal converted format, other inputs are still able to be brought into the Enova DGX/DVX architecture within the HDMI or DVI native formats.

SERIAL DIGITAL INTERFACE OVERVIEW

As a general overview, SDI is a serialized transport format originally published in 1993 for standard definition video formats. Fundamentally, it is a single-ended electrical standard which utilizes coaxial cable as the transport layer. Several SMPTE standards call out for very specific video resolutions and distances and have changed and expanded since the original inception. Today, several versions of SDI exist, allowing for video resolutions up to 1920x1080 at 60 Hz. (see table)

Common Name	SMPTE Standard	Data Rate(s)	Common Resolution Description
SD-SDI	SMPTE 259m	143 Mbps 177 Mbps 270 Mbps 360 Mbps	NTSC PAL
HD-SDI	SMPTE 292m	1.48 Gbps	720p 1080i
Dual Link SDI	SMPTE 372m	2.97 Gbps	1080p
3G-SDI	SMPTE 424m	2.97 Gbps	1080P

CONVERSION DEVICE BEST PRACTICE

While the ability to simply convert an SDI format to a DVI or HDMI signal style exists, it can often times lead to inferior performance or scenarios where signals will not be recognized by switching or transport layers. Conversion devices which account for these differences will almost always provide better results. By ensuring the output HDMI or DVI signal is properly formatted to enter that architecture, it allows all subsequent touch points within the system to more effectively handle and deal with the newly formatted signal.

SDI RESOLUTION OPTION

Depending on the SDI to HDMI/DVI conversion device being used, integrated scaling may or may not be included. If this is included within the solution offer, it is recommended that the system be tried with this scaling functionality off to begin with. If needed, the output resolution may be set to a resolution matching the original source equipment providing the SDI output. For consideration, AMX recommends the use of progressive signals whenever possible

for signals entering the Enova architecture, if a scaling option is provided to output a progressive format, (e.g. 720p, 1080p) that would be preferred.

If scaling is not provided within the conversion device, allowing every output of the Enova architecture to scale the image will provide a highly functional and easy to implement solution. Output scaling with SmartScale allows the SDI to HDMI/DVI conversion device to provide a single, consistent format without the need to consider what resolutions are needed as would be the case with non-SmartScale distribution solutions. Simply put, common format (HDMI/DVI) does not mean a requirement for a greatest common resolution.

RECOMMENDED HD-SDI TO HDMI CONVERSION DEVICES

AMX has recently completed comprehensive testing of third party equipment which can assist in supporting SDI, HD-SDI and 3G HD-SDI formats. Through the use of these conversion devices, an HD-SDI/3G HD-SDI signal can be easily converted to an HDMI format which can then be accepted into the Enova ecosystem.

While several devices were tested, these two devices were most effective in converting HD-SDI signals to an HDMI format to send into the Enova system and would be recommended for this application.

- **Monoprice: 3G SDI to HDMI Convertor - Product ID: 10318**

Review of the Monoprice device in conjunction with the Enova system: The Monoprice 3G SDI to HDMI Converter is easily recommended and has been tested to be compatible with our Enova line of products. It accurately reproduced every input resolution tested (listed below) in a 1:1 fashion, required no interaction other than plugging in power and source, worked with imbedded audio, and sustained stable video timing over extended periods of time.

- **TVOne SDI to HDMI Scaler with Audio – Product PN: 1T-VS-647**

Review of the TVOne 1T-VS-647. The TVOne SDI to HDMI convertor is also recommended for someone looking for a unit with more control or one that outputs resolutions other than that of the original source while maintaining a consistent video format into the Enova DGX. While the unit under test did fail the digital video analyzer timing test for a single resolution at 1080i50, the picture looked good visually so it is within tolerable levels.

Test process:

- Setup each SDI Converter: Direct from Leader → through converter → to test digital video test analyzer for timing analysis
- Source Video formats tested from test source including embedded audio
    - 1080i/60
    - 1080i/50
    - 1080p/24

- o 720p/60
- o 720p/50
- o 525i/59.94
- o 625i/50
- Verify stable and accurate video and audio timings on the output of the digital video test analyzer

CONCLUSION

SDI formats can occasionally be found as video outputs of various source devices within A/V system deployments. These signals often times need to be included as part of a larger digital media switching and distance transport solution such as the Enova DGX or DVX platforms. Thanks to recent testing by AMX, inexpensive SDI to HDMI conversion devices can be used to reliably and easily and include these signal formats within this award winning audio and video distribution solution.

TAKE ACTION

To learn more about the award winning Enova DGX and DVX, please view the resources below.

The **LEARN** page (http://amx.com/automate/learn.aspx) on amx.com includes a wealth of general resources on the AV industry, as well as Product Guides covering most major AMX products. In particular, you might be interested in the following:

- Enova DGX Product Guide. Provides an overview of Enova DGX digital media switchers. http://www.amx.com/assets/productGuides/AMX_Enova_DGX_Family_Product_Guide.pdf

- Enova DVX Product Guide. Provides an overview of Enova DVX all-in-one presentation switchers. http://www.amx.com/assets/productGuides/AMX_Enova_DVX_Family_Product_Guide.pdf

- Enova Spotlight. Provides an overview of the entire Enova solution including links to individual component pages. http://amx.com/enova/

- Enova DGX Configuration Tool. Allows you to easily build and configure an Enova DGX System. Preview the module layout of your DGX system and print out the components list when you are ready to order. http://www.amx.com/enova/dgx_config_tool/

You can always **CONTACT A SOLUTIONS ADVISOR**, who will be glad to guide you through the process of identifying, specifying and purchasing your ideal Enova DGX/DVX solution. The "Contact an Advisor" link is at the top of every page of the AMX website. Options to connect include chat, phone and email.