

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio



- 4K60 4:4:4 video over standard Gigabit Ethernet
- HDR10 video support
- Real-time video performance over the network
- Pixel Perfect Processing technology
- Enterprise-grade security including 802.1X, Active Directory® credential management, TLS, and AES-128
- HDCP 2.2 compliant
- Configurable as an encoder or decoder
- Two auto-switching HDMI® inputs
- One HDMI output with 4K60 4:4:4 scaler
- Video wall processing
- Dynamic text overlay capability
- Adaptive bit rate
- Analog audio embedding or de-embedding
- 7.1 surround sound audio
- Dante® or AES67 audio embedding or de-embedding
- Breakaway audio
- USB 2.0 and KVM signal extension and routing
- Copper and fiber Ethernet connectivity
- CEC device control
- Easy setup via built-in web pages
- Compatibility with a Crestron® 3-Series® or later control system
- Streamlined management using DM NVX Director™ virtual switching appliances
- Crestron XiO Cloud® service support
- Designed for installation into a DMF-CI-8 chassis

Crestron® DM NVX® technology transports ultra high-definition 4K60 4:4:4 video over standard Gigabit Ethernet with no perceptible latency or loss of quality. Using standard network switches and CAT5e UTP wiring, a DM NVX system delivers a high-performance virtual matrix routing solution that is economically advantageous and infinitely scalable for any enterprise or campus-wide 4K content distribution application. Professional onboard scaling, High Dynamic Range support (HDR10), and HDCP 2.2 compliance ensure the ultimate in picture quality and compatibility for all of today's varied media sources.<sup>1,2</sup>

The DM-NVX-352C is an AV over IP encoder/decoder card that occupies one slot of a DMF-CI-8 card chassis. The card is designed to function as either a transmitter or receiver in a high-density rack-mount installation. Capable of handling a network AV installation of any size, the DM-NVX-352C includes features such as secure web-based control and management, auto-switching HDMI® inputs, a scaling HDMI output, video wall processing, an analog audio input or output, native Dante® or AES67 transmit and receive capability, USB 2.0 and KVM integration, and support for copper and fiber Ethernet connectivity.<sup>2,3</sup>

#### Real-Time 4K60 Video Distribution

Engineered for demanding conference room and classroom applications, DM NVX technology ensures real-time, full-motion 4K60 video performance for the presentation of multimedia, videoconferencing, and live camera images. Interactive functions such as gameplay and the use of a mouse are fluid and natural.

A DM NVX system is engineered for stability and reliability. Line-synchronized outputs ensure perfect synchronization of content across multiple displays for applications such as digital signage and video walls. Variable Multicast TTL (Time To Live) enables traversing multiple network routers for optimal flexibility.

#### Pixel Perfect Processing Technology

A DM NVX system incorporates Pixel Perfect Processing technology, which provides flawless video transport in all applications. Depending on the operating mode, the DM-NVX-352C can encode or decode a video signal to achieve imperceptible end-to-end latency of less than 1 frame. The image quality of the source is maintained across a 1-Gigabit network at any resolution up to 4K60 4:4:4.

#### Enterprise-Grade Security

Using advanced security features and protocols such as 802.1X authentication, Active Directory® credential management, AES-128 content encryption, PKI authentication, TLS, SSH, and HTTPS, a DM NVX system delivers a true enterprise-grade network AV solution engineered to fulfill demanding IT policies.

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

### Encoder or Decoder Functionality

The DM-NVX-352C is configurable to operate as either a network AV encoder or decoder:

- As an encoder, the DM-NVX-352C allows the HDMI signal of the output of a switcher, computer, [AirMedia®](#) gateway, or other media source to be transmitted over the network to one or many decoders.<sup>1</sup>
- As a decoder, the DM-NVX-352C receives the signal from a DM NVX encoder and feeds it to the input of a switcher or display device via the HDMI output. The decoder can quickly and easily switch between multiple encoders on the network alongside locally connected HDMI sources.<sup>1</sup>

The DM-NVX-352C provides a versatile, cost-effective solution for applications that require encoder and decoder operating modes in a single card. The operating mode can be reconfigured dynamically in less than 1 minute via a control system or web browser or via the [DMF-CI-8](#) front panel.

### Auto-Switching HDMI® Inputs

The DM-NVX-352C includes two HDMI inputs. Switching between the two inputs can be performed automatically using auto-switching mode, programmatically via a control system, manually via the [DMF-CI-8](#) front panel, or through a computer using a web browser.<sup>1</sup>

### HDMI Output with 4K60 4:4:4 Scaler

When the DM-NVX-352C is configured as a decoder, the HDMI output feeds the decoded signal to the HDMI input of a local display device, switcher, or other equipment. The built-in scaler ensures an optimal image, scaling the encoded source resolution up or down to match the native resolution of the display device. When the DM-NVX-352C is configured as an encoder, the HDMI output can be used to feed a local display, confidence monitor, or audio system.<sup>1, 4</sup>

### Video Wall Processing

A video wall composed of up to 64 individual displays can be configured using multiple DM NVX endpoints. Each endpoint provides fully adjustable zoom capability and bezel compensation to accommodate a range of video wall configurations and display types. One DM NVX endpoint is required per display, supporting configurations of up to eight wide by eight high.

### Text Overlay

The ability to display dynamic or fixed text on screen provides a means to label the video source or to display special instructions, schedules, announcements, alerts, and other messaging.

### Adaptive Bit Rate

In DM NVX encoder mode, adaptive bit rate can be enabled or disabled using the web interface or a control system. Adaptive bit rate enables the encoder to automatically set the bit rate required for the input resolution of the stream; for example, the adaptive bit rate for a common resolution such as 1920x1080p@60Hz (1080p60) is automatically set to 400 Mbps. Adaptive bit rate makes better use of the available bandwidth.

### Analog Audio Embedding or De-embedding

A balanced stereo analog audio port is included, which can be configured as either an input or output. As an input, the port allows a stereo audio source to be connected and combined with the video signal from either HDMI input or the incoming network video stream. As an output, the port can provide a stereo line-level signal to feed a local sound system or analog audio switcher. The output volume is adjustable via a control system or web browser.<sup>5</sup>

### 7.1 Surround Sound Audio

DM NVX technology supports the lossless transport of 7.1 surround sound audio signals, including Dolby® TrueHD, Dolby Atmos®, DTS HD®, DTS:X®, and uncompressed linear PCM. In decoder mode, the DM-NVX-352C can receive both multichannel and 2-channel downmix signals from a [DM-NVX-351](#) or [DM-NVX-351C](#) encoder, allowing either signal to be selected at the HDMI output while the 2-channel signal is automatically routed to the analog output.

### Dante® or AES67 Audio Embedding and De-embedding

Dante and AES67 support allows the selected audio source to be transmitted as a 2-channel Dante or AES67 source while another Dante or AES67 2-channel audio stream is received from a Crestron DSP or other third-party device and combined with the video signal.

In DM NVX encoder mode, the Dante or AES67 received audio stream can be output via the local HDMI output, primary AV stream, secondary audio stream, and analog audio output. In DM NVX decoder mode, the Dante or AES67 received audio stream can be combined with the video and then output via the HDMI output and analog audio output.

**NOTE:** An AES67 stream that is received by a DM NVX endpoint cannot be transmitted from that endpoint.

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

**Breakaway Audio**

A DM NVX decoder can select and combine separate video and audio signals from two different inputs—even two different encoders.<sup>6</sup>

**Copper and Fiber Ethernet Connectivity**

The DM-NVX-352C includes one RJ-45 1000BASE-T LAN port (Ethernet port 1) and one SFP port (Ethernet port 2). The SFP port enables connection to a fiber-optic network with the use of the appropriate Crestron [SFP-1G](#) Series transceiver module (sold separately). A selection of modules is offered to accommodate various multimode and single-mode fiber types.<sup>3</sup>

Ethernet port 1 or 2 can be used to transport video over a Gigabit Ethernet network. Ethernet port 1 can also be used to provide a network connection for an [AirMedia](#) gateway, display device, or other local device. In addition, the port can be used to daisy-chain multiple endpoints feeding a single-source video wall or individual displays that show the same video image.<sup>2</sup>

A DM NVX system can be deployed on an existing corporate or campus network or on a dedicated network. For information about network requirements and guidelines, refer to the [DM NVX AV-over-IP System Design Guide](#), Doc. 7977.

**USB 2.0 and KVM Integration**

DM NVX technology supports the extension of USB signals, which can be switched and routed alongside the AV signal or separately via a control system. USB 2.0 HOST and DEVICE ports are provided on the DM-NVX-352C, allowing a USB mouse, keyboard, or other peripheral device to be connected to a remote endpoint and routed to a computer or other host at the local endpoint. In addition to KVM switch functionality, various types of USB peripherals are supported, including whiteboards, touch screens, game controllers, cameras, mobile devices, headsets, and flash drives.<sup>7</sup>

USB 2.0 data transport can be configured for Layer 2 or Layer 3. Layer 2 supports USB signal extension in point-to-point and multipoint applications. USB signals can be routed from the HOST port of up to seven remote DM NVX endpoints to the DEVICE port of a single local DM NVX endpoint. Layer 2 also supports Crestron USB over Ethernet Extender Modules ([USB-EXT-DM-LOCAL](#) or [USB-EXT-DM-REMOTE](#)), which can be used in locations that do not include DM NVX endpoints. USB signals can be routed between DM NVX and USB-EXT-DM devices under the management of a control system.<sup>8</sup>

USB 2.0 Layer 3 data transport supports USB signal extension in DM NVX point-to-point applications across VLANs. USB-EXT-DM devices do not support Layer 3.

**CEC Device Control**

The DM-NVX-352C provides a gateway for controlling devices via CEC (Consumer Electronics Control) over the HDMI connections. Under the management of a control system, the DM-NVX-352C can control display devices and other equipment via CEC, potentially eliminating the need for any dedicated serial cables or IR emitters.

CEC over the HDMI output can also enable the display device to be turned on or off automatically without the use of a control system.

**Web-Based Setup**

Setup of the DM-NVX-352C is accomplished by using a web browser. Full control and monitoring of the card is enabled through integration with a control system or with a DM NVX Director™ virtual switching appliance.

**Streamlined Management Using DM NVX Director Virtual Switching Appliances**

For applications that are small to moderate in size, a network of DM NVX endpoints can be configured and controlled with the use of a control system. For larger enterprise and campus-wide signal routing applications, adding a DM NVX Director virtual switching appliance (DM-NVX-DIR-80, DM-NVX-DIR-160, or DM-NVX-DIR-ENT) enhances and streamlines the entire configuration and control process. A DM NVX Director appliance provides a central point of management and enables the creation of multiple virtual matrix switchers through one easy-to-use web-based portal.

**Crestron XiO Cloud® Service Support**

The DM-NVX-352C is compatible with the Crestron XiO Cloud service, which is a platform for remotely provisioning, monitoring, and managing Crestron devices across an enterprise or an entire client base. The service enables installers and IT managers to deploy and manage thousands of devices in the amount of time it previously took to manage a single device. For more information, visit [www.crestron.com/xiocloud](http://www.crestron.com/xiocloud).

**High-Density, Card-Based Solution**

The DM-NVX-352C is designed for installation into a [DMF-CI-8](#) card chassis, providing a scalable high-density solution for applications requiring multiple encoders and decoders in one equipment rack.

*For additional design tools and reference documents, refer to the DM NVX web page at <https://www.crestron.com/nvx>.*

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

## Specifications

## Encoding/Decoding

**Video Codec:** Pixel Perfect Processing

**Video Resolutions:** Up to 4096x2160@60Hz (DCI 4K60), 4:4:4 color sampling, HDR10 and Deep Color support

**Audio Formats:** Primary multichannel (up to 8-channel LPCM or encoded HBR 7.1 surround sound), secondary 2-channel LPCM<sup>9</sup>

**Bit Rates:** 200 to 950 Mbps<sup>10</sup>

**Streaming Protocols:** RTP, SDP

**Container:** MPEG-2 transport stream (.ts)

**Session Initiation:** Multicast via secure RTSP

**Copy Protection:** HDCP 2.2, AES-128, PKI

## Video

**Input Signal Types:** HDMI with HDR10, Deep Color, and 4K60 4:4:4 support<sup>1, 11</sup> (Dual-Mode DisplayPort™ interface and DVI compatible<sup>12</sup>)

**Output Signal Types:** HDMI with HDR10, Deep Color, and 4K60 4:4:4 support<sup>1</sup> (DVI compatible<sup>12</sup>)

**Switcher:** 3x1 in decoder mode (HDMI 1, HDMI 2, Stream), 2x1 in encoder mode, manual or auto-switching, breakaway audio<sup>6</sup>, Crestron QuickSwitch HD™ technology

**Scaler:** 4K60 4:4:4 video scaler with motion-adaptive deinterlacing, intelligent frame rate conversion, Deep Color support, HDR10 support, widescreen format selection (zoom, stretch, maintain aspect ratio, or 1:1), video wall processing up to 8 wide x 8 high, static or dynamic text overlay

**Copy Protection:** HDCP 2.2

**Maximum Resolutions:** Common resolutions are shown in the table below. Custom resolutions are supported at pixel clock rates up to 600 MHz.

Scan Type	Resolution	Frame Rate	Color Sampling	Color Depth
Progressive	4096x2160 DCI 4K and 3840x2160 4K UHD	24 Hz	4:4:4	36 bit
		30 Hz	4:4:4	36 bit
		60 Hz	4:2:2	36 bit
		60 Hz	4:4:4	24 bit
	2560x1600 WQXGA	60 Hz	4:4:4	36 bit
	1920x1080 HD 1080p	60 Hz	4:4:4	36 bit
Interlaced (Input Only)	1920x1080 HD 1080i	30 Hz	4:4:4	36 bit

## Audio

**Input Signal Types:** HDMI (Dual-Mode DisplayPort interface compatible<sup>12</sup>), analog stereo<sup>5</sup>

**Output Signal Types:** HDMI, analog stereo<sup>5</sup>

**Digital Formats:** Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby TrueHD, Dolby Atmos, DTS®, DTS ES, DTS 96/24, DTS HD High Res, DTS HD Master Audio, DTS:X, LPCM up to 8 channels

**Analog Formats:** Stereo 2-channel

**Analog-To-Digital Conversion:** 24-bit 48 kHz

**Digital-To-Analog Conversion:** 24-bit 48 kHz

**Dante or AES67:** 24-bit 48 kHz

**Analog Performance:**

Frequency Response: 20 Hz to 20 kHz ±0.5 dB  
S/N Ratio: >95 dB 20 Hz to 20 kHz A-weighted  
THD+N: <0.005% @ 1 kHz  
Stereo Separation: >90 dB

**Analog Output Volume Adjustment:** -80 to +20 dB

## Communications

**Ethernet:** 100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, TCP/IP, UDP/IP, CIP, DHCP, SSL, TLS, SSH, SFTP (SSH File Transfer Protocol), IEEE 802.1X, IPv4, Active Directory authentication, variable Multicast TTL, HTTPS web browser setup and control, Crestron 3-Series or later control system integration

**USB:** USB 2.0 host or device signal extension and routing, Layer 2 or Layer 3

**HDMI:** HDCP 2.2, EDID, CEC

**DM NVX (via Ethernet):** HDCP 2.2, AES-128 AV content encryption with PKI authentication, RTP, secure RTSP, SDP, ONVIF, IGMPv2, IGMPv3, SMPTE 2022, FEC (Forward Error Correction)

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

### Connectors

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**USB DEVICE:** (1) USB Type-B connector, female;  
USB 2.0 device port;  
USB signal extender port for connection to a computer or other USB 2.0 host<sup>7</sup>

**USB HOST:** (1) USB Type-A connector, female;  
USB 2.0 host port;  
USB signal extender port for connection to a mouse, keyboard, or other USB 2.0 device;<sup>7</sup>  
Available Power: 500 mA at 5 VDC

**ETHERNET 1:** (1) 8-pin RJ-45 connector, female;  
100BASE-TX/1000BASE-T Ethernet port;<sup>2</sup>

**ETHERNET 2:** (1) SFP port;  
Accepts one Crestron SFP-1G Series transceiver module<sup>3</sup>

**HDMI OUTPUT:** (1) HDMI Type A connector, female;  
HDMI digital video/audio output<sup>1</sup> (DVI compatible<sup>12</sup>)

**HDMI INPUT 1 – 2:** (2) HDMI Type A connectors, female;  
HDMI digital video/audio inputs;<sup>1</sup>  
(DVI and Dual-Mode DisplayPort interface compatible<sup>12</sup>)

**AUDIO I/O:** (1) 5-pin 3.5 mm detachable terminal block;  
Balanced/unbalanced stereo line-level audio input or output;<sup>5</sup>  
Input Impedance: 24k Ohms balanced/unbalanced;  
Maximum Input Level: 4 Vrms balanced, 2 Vrms unbalanced;  
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;  
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced

### Controls and Indicators

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**TX:** (1) Green LED, indicates unit is in encoder (transmitter) mode

**RX:** (1) Green LED, indicates unit is in decoder (receiver) mode

**OL:** (1) Green LED, indicates an online connection to a control system via Ethernet

**Ethernet 1:** (2) LEDs, green indicates Ethernet link status, amber indicates Ethernet activity

**Ethernet 2 LNK:** (1) Green LED, indicates Ethernet link status

**Ethernet 2 ACT:** (1) Green LED, indicates Ethernet activity

**HDMI OUTPUT:** (1) Green LED, indicates video signal transmission at the HDMI output

**HDMI INPUT 1 – 2:** (2) Green LEDs, each indicates sync detection at the corresponding HDMI input

### Construction

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Plug-in card, occupies (1) card slot in a [DMF-CI-8](#) card chassis, includes metal faceplate

### Weight

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15.1 oz (427 g)

### Compliance

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UL® Listed for US and Canada, CE, IC, FCC Part 15 Class B digital device

### Models and Accessories

#### Model

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**DM-NVX-352C:** DM NVX 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

#### Available Accessories

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**DMF-CI-8:** DigitalMedia™ Card Chassis for DM NVX Encoder/Decoder Cards

**SFP-1G-SX:** SFP Transceiver Module for DM NVX Encoders/Decoders, Duplex Multimode Fiber, 850 nm

**SFP-1G-LX:** SFP Transceiver Module for DM NVX Encoders/Decoders, Duplex Single-Mode Fiber, 1310 nm

**SFP-1G-BX-U:** SFP Transceiver Module for DM NVX Encoders/Decoders, Simplex Single-Mode Fiber, 1310/1490 nm, Uplink

**SFP-1G-BX-D:** SFP Transceiver Module for DM NVX Encoders/Decoders, Simplex Single-Mode Fiber, 1490/1310 nm, Downlink

**USB-EXT-DM-LOCAL:** USB over Ethernet Extender with Routing, Host Module

**USB-EXT-DM-REMOTE:** USB over Ethernet Extender with Routing, 4-Port Device Module

**CBL-HD-6:** Crestron Certified HDMI Interface Cable, 18 Gbps, 6 ft (1.8 m)

**DM-CBL-ULTRA-PC-10:** DigitalMedia Ultra Patch Cable, 10 ft (3 m)

**DM-CONN-ULTRA-RECP-20:** DigitalMedia Ultra Keystone RJ-45 Jack, 20-Pack with Termination Tool

**DM-RPP-K24:** DigitalMedia 24-Port Keystone Patch Panel

#### Management Tools

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**DM-NVX-DIR-80:** DM NVX Director Virtual Switching Appliance for 80 Endpoints

**DM-NVX-DIR-160:** DM NVX Director Virtual Switching Appliance for 160 Endpoints

**DM-NVX-DIR-ENT:** DM NVX Director Virtual Switching Appliance for 1000 Endpoints

## DM NVX® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card with Dante® Audio

## Notes:

1. 4K60 4:4:4 performance and HDR support require the use of HDMI cables and couplers with a minimum TMDS bandwidth of 18 Gbps. If 4K60 4:2:0 or 4K30 4:4:4 performance is acceptable, cables and couplers with a minimum bandwidth of 10.2 Gbps may be used. Bandwidth loss is cumulative; therefore, performance may be reduced when inserting multiple cables and couplers inline.
2. The minimum cable required for DM NVX over 1000BASE-T Ethernet (copper) is unshielded CAT5e. All Ethernet ports on the DM-NVX-352C are for connection to an Ethernet network or device; they cannot be connected to the DM® ports of other Crestron devices.
3. The use of a fiber-optic Ethernet port requires the purchase of a Crestron [SFP-1G](#) Series transceiver module (sold separately). All Ethernet ports on the DM-NVX-352C are for connection to an Ethernet network or device; they cannot be connected to the DM ports of other Crestron devices.
4. When the DM-NVX-352C is in encoder mode, the HDMI output resolution is matched to the resolution of the encoded source.
5. The analog audio port can function as an input or output—not both. Analog audio output is only functional when the DM-NVX-352C is receiving a 2-channel stereo input signal. A 2-channel downmix signal from a multichannel surround sound source requires the use of a Crestron [DM-NVX-351](#) or [DM-NVX-351C](#).
6. Audio from one onboard HDMI input cannot be combined with video from the other onboard HDMI input. Combining audio from one encoder with video from another encoder is possible using the secondary 2-channel audio stream only. Multichannel audio from one encoder cannot be combined with video from another encoder.
7. The DM-NVX-352C can be configured to accept the connection of a USB device or a USB host—not both. Crestron DM NVX products are engineered to deliver maximum compatibility with the widest possible range of USB products. Crestron does not guarantee that all USB products are compatible with DM NVX products. Consult the [DM NVX AV-over-IP System Design Guide](#), Doc. 7977, for USB bandwidth considerations.
8. The DM-NVX-352C is not compatible with the USB HID signal extender technology found in other Crestron DM products.
9. As an encoder, the DM-NVX-352C does not transmit audio via the secondary 2-channel stream except when it is receiving a 2-channel stereo input signal via the HDMI or analog inputs.
10. The minimum bit rate for 4K60 video is 350 Mbps. A bit rate below 350 Mbps may display a black screen.
11. 3D formats are not supported.
12. HDMI connections require an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. [CBL-HD-DVI](#) interface cables are available separately.

This product may be purchased from select authorized Crestron dealers and distributors. To find a dealer or distributor, please contact the Crestron sales representative for your area. A list of sales representatives is available online at [www.crestron.com/How-To-Buy/Find-a-Representative](http://www.crestron.com/How-To-Buy/Find-a-Representative) or by calling 855-263-8754.

This product is covered under the Crestron standard limited warranty. Refer to [www.crestron.com/warranty](http://www.crestron.com/warranty) for full details.

The specific patents that cover Crestron products are listed online at [patents.crestron.com](http://patents.crestron.com).

Certain Crestron products contain open source software. For specific information, please visit [www.crestron.com/opensource](http://www.crestron.com/opensource).

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Rev 06/23/20