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

- 4K60 4:4:4 video over standard Gigabit Ethernet
- HDR10, HDR10+, and Dolby Vision® 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 2.3 compliant
- Configurable as an encoder or decoder
- One HDMI® input
- 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 with downmixing
- 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
- Interoperable 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, HDR (High Dynamic Range) support, and HDCP 2.3 compliance ensure the ultimate in picture quality and compatibility for all of today's varied media sources.[1, 2]

The DM-NVX-363C is an AV-over-IP encoder/decoder card that occupies one card slot in 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-363C includes features such as secure web-based control and management, a scaling HDMI® output, video wall processing, an analog audio input or output, surround sound audio with downmixing, native Dante® and AES67 transmit and receive capability, USB 2.0 and KVM integration, and support for copper and fiber Ethernet connectivity.[2, 3]

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 using a mouse are fluid and natural.

A DM NVX system also provides 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-363C 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.

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Encoder or Decoder Functionality

The DM-NVX-363C is configurable to operate as either a network AV encoder or decoder:

- As an encoder, the DM-NVX-363C allows the HDMI signal of the output of a switcher, computer, Crestron AirMedia® gateway, or other media source to be transmitted over the network to one or many decoders.[1]
- As a decoder, the DM-NVX-363C 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 a locally connected HDMI source.[1]

The DM-NVX-363C provides a versatile and cost-effective solution for applications that require encoder and decoder operating modes in one 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.

HDMI® Input

The DM-NVX-363C includes one HDMI input, which provides a convenient way to connect a source device to a DM NVX integrated system.

HDMI Output with 4K60 4:4:4 Scaler

When the DM-NVX-363C 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-363C is configured as an encoder, the HDMI output can be used to feed a local display, confidence monitor, or audio system.[1, 4]

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) would automatically be set to 400 Mbps. The bit rate is adjusted to make 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 the 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.[5]

7.1 Surround Sound Audio with Downmixing

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. The DM-NVX-363C can decode the incoming multichannel surround sound signal from the network or an HDMI input and then downmix that signal to stereo. The stereo downmix signal is automatically routed to the onboard analog output[5], while the HDMI output can be configured to output either stereo or multichannel signals. As an encoder, the DM-NVX-363C distributes both stereo and multichannel signals simultaneously over the network, allowing either signal to be selected at any decoder on the network.

Dante® or AES67 Audio Embedding or 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 received Dante or AES67 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 received Dante or AES67 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.

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Breakaway Audio

A DM NVX decoder can select and combine separate video and audio signals from two different inputs—even two different encoders. Combining signals from two separate encoders is limited to 2-channel stereo audio.[6]

Copper and Fiber Ethernet Connectivity

The DM-NVX-363C includes two RJ-45 1000BASE-T ports (Ethernet ports 1 and 2), one RJ-45 100BASE-TX port (Ethernet port 3), and one SFP port (Ethernet port 4). 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.[3]

Ethernet port 1, 2, or 4 can be used to transport video over a Gigabit Ethernet network. Ports 1 and 2 can also be used to provide network connections for an AirMedia gateway, display device, or other local device. In addition, the ports can be used to daisy-chain multiple endpoints feeding a single-source video wall or individual displays that show the same video image.[2]

An RJ-45 100BASE-TX port is included for connection to a dedicated audio network or for use as a convenience port.

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, at https://www.crestron.com/nvx.

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-363C, 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.[7]

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 Network devices (USB-NX2-LOCAL-1G and USB-NX2-REMOTE-1G), which can be used in locations that do not include DM NVX endpoints. USB signals can be routed between DM NVX and USB-NX2 devices under the management of a control system.

USB 2.0 Layer 3 data transport supports USB signal extension in DM NVX point-to-point applications across VLANs. USB-NX2 devices do not support Layer 3.

CEC Device Control

The DM-NVX-363C 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-363C can control the display and source devices, potentially eliminating the need for 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-363C is accomplished by using a web browser. Full control and monitoring of the device 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

Use of a DM NVX Director virtual switching appliance (DM-NVX-DIR-80, DM-NVX-DIR-160, or DM-NVX-DIR-ENT) 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-363C 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.

High-Density, Card-Based Solution

The DM-NVX-363-C 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.

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Specifications

Encoding/Decoding

Video Codec	Pixel Perfect Processing
Video Resolutions	Up to 4096x2160@60Hz (DCI 4K60); 4:4:4 color sampling; HDR10, HDR10+, Dolby Vision, and Deep Color support
Audio Formats	Primary multichannel (up to 8-channel LPCM or encoded HBR 7.1 surround sound), secondary 2-channel LPCM[8]
Bit Rates	200 to 950 Mbps[9]
Streaming Protocols	RTP, SDP
Container:	MPEG-2 transport stream (.ts)
Session Initiation	Multicast via secure RTSP
Copy Protection	HDCP 2.3, AES-128, PKI

Video

Input Signal Types	HDMI with HDR10, HDR10+, Dolby Vision, Deep Color, and 4K60 4:4:4 support[1, 10] (Dual-Mode DisplayPort™ interface and DVI compatible[11])
Output Signal Types	HDMI with HDR10, HDR10+, Dolby Vision, Deep Color, and 4K60 4:4:4 support[1] (DVI compatible[11])
Switcher	2x1 in decoder mode (HDMI, Stream), manual or auto-switching, breakaway audio,[6] Crestron QuickSwitch HD™ technology
Scaler (Decoder Mode Only)	4K60 4:4:4 video scaler with motion-adaptive deinterlacing, intelligent frame rate conversion, Deep Color support, HDR10, HDR10+, and Dolby Vision 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 2.3
Maximum Resolutions	Common resolutions are shown in the following table. 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[11]), analog stereo[5]
Output Signal Types	HDMI (multichannel pass-through), analog stereo (2-channel downmix)[5]
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 — 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 2.3, EDID, CEC

DM NVX (via Ethernet) — HDCP 2.3, AES-128 AV content encryption with PKI authentication, RTP, secure RTSP, SDP, ONVIF, IGMPv2, IGMPv3, SMPTE 2022, FEC (Forward Error Correction)

Connectors

USB DEVICE — (1) USB 2.0 Type-C™ connector, female; USB 2.0 device port; USB signal extender port for connection to a computer or other USB 2.0 host[7]

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;[7] Available Power: 500 mA at 5 VDC

USB HID — (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; Available Power: 500 mA at 5 VDC

Ethernet 1 — (1) 8-pin RJ-45 connector, female; 100BASE-TX/1000BASE-T Ethernet port[2]

Ethernet 2 — (1) 8-pin RJ-45 connector, female; 100BASE-TX/1000BASE-T Ethernet port[2]

Ethernet 3 (10/100) — (1) 8-pin RJ-45 connector, female; 100BASE-TX Ethernet port

Ethernet 4 — (1) SFP port; Accepts one Crestron SFP-1G Series transceiver module[3]

HDMI OUTPUT — (1) HDMI Type A connector, female; HDMI digital video/audio output[1] (DVI compatible[11])

HDMI INPUT — (1) HDMI Type A connector, female; HDMI digital video/audio input;[1] (DVI and Dual-Mode DisplayPort interface compatible[11])

AUDIO I/O — (1) 5-pin 3.5 mm detachable terminal block; Balanced/unbalanced stereo line-level audio input or output;[5] 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

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

NV — (1) Green LED, indicates unit is encoding (transmitting) or decoding (receiving) network video

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

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

Ethernet 1-2 — (2) LEDs per port, green indicates Ethernet link status, amber indicates Ethernet activity

Ethernet 3 — (2) LEDs, amber indicates Ethernet link status, green indicates Ethernet activity

Ethernet 4 LNK — (1) Green LED, indicates Ethernet link status

Ethernet 4 ACT — (1) Green LED, indicates Ethernet activity

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

HDMI INPUT — (1) Green LED, indicates sync detection at the HDMI input

Construction

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

Weight

15.1 oz (427 g)

Compliance

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

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Model

DM-NVX-363C
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Available Accessories

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-NX2-LOCAL-1G
USB over Ethernet Network Wall Plate with Routing, Local

USB-NX2-REMOTE-1G
USB over Ethernet Network Wall Plate with Routing, Remote

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

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

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-363C are for connection to an Ethernet network or device. The Ethernet ports cannot be connected to the DM® ports of other Crestron devices.

3. Use of the SFP port requires the purchase of a Crestron SFP-1G Series transceiver module (sold separately). All Ethernet ports on the DM-NVX-363C are for connection to an Ethernet network or device. The Ethernet ports cannot be connected to the DM ports of other Crestron devices.

4. When the DM-NVX-363C 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.

6. 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-363C 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. As an encoder, the DM-NVX-363C transmits audio via the secondary 2-channel stream when it receives a 2-channel stereo input signal via the HDMI or analog input.

9. The minimum bit rate for 4K60 video is 350 Mbps. A bit rate below 350 Mbps may display a black screen.

10. 3D formats are not supported.

11. 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.

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