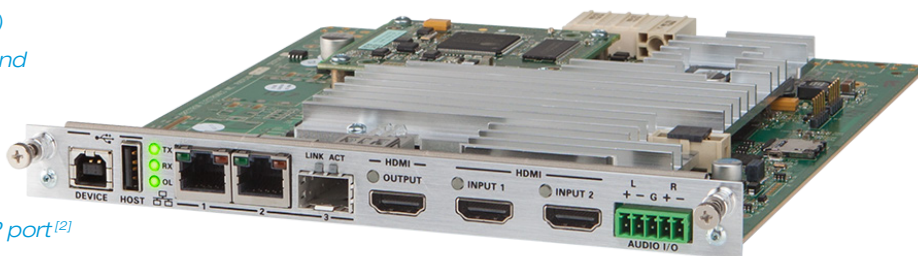


DigitalMedia™ 4K60 4:4:4 HDR Network AV Encoder/Decoder Card w/Downmixing

- > 4K60 4:4:4 video over standard Gigabit Ethernet
- > No latency penalty for real-time video performance
- > HDR (High Dynamic Range) video support (HDR10)
- > Dolby® TrueHD, Dolby Atmos®, DTS-HD®, DTS:X®, and uncompressed 7.1 linear PCM audio support
- > HDCP 2.2 compliant
- > Configurable as an encoder or decoder
- > Dual onboard RJ45 LAN ports
- > Option for a fiber optic network connection via SFP port^[2]
- > Enterprise-grade security
- > Two auto-switching HDMI® inputs and one HDMI output^[1]
- > Built-in 4K60 4:4:4 scaling
- > Onboard video wall processing
- > Analog audio port configurable as a balanced stereo input or output^[5]
- > Analog audio embedding or de-embedding
- > Stereo downmixing of surround sound audio signals
- > Simultaneous distribution of stereo and surround sound signals
- > Audio breakaway capability^[6,7]
- > Dynamic text overlay capability
- > CEC device control gateway^[8]
- > USB and KVM signal extension and routing^[4]
- > Easy setup via built-in webpages
- > Fully-controllable via a Crestron® control system
- > Installs in the DMF-CI-8 card chassis



Real-Time 4K60 Video Distribution

Engineered for demanding conference room and classroom applications, DM NVX ensures real-time, full-motion 4K60 video performance for the presentation of multimedia, videoconferencing, and live camera images. DM NVX employs high-quality JPEG 2000 encoding using a patent-pending technique that overlaps scaling and encoding latencies, achieving an ultra-low end-to-end latency of 30 ms at 60 fps, so on-screen functions such as mousing and game play are fluid and natural.

Encoder and Decoder in One

In a single card, the DM-NVX-351C is configurable to operate as either a network AV encoder or decoder.

- As an encoder, it allows the output of a switcher, computer, AirMedia® gateway, or other media source to be connected via HDMI® and then transmitted over the network.^[1]
- As a decoder, it receives the signal from a DM NVX encoder and feeds it to the input of a switcher or display device via the HDMI output. It can quickly and easily switch between multiple encoders on the network alongside locally-connected HDMI sources.^[1]
- The encoder/decoder mode can be switched on-the-fly via a control system to provide a versatile, cost-effective presentation switching solution.

2x1 HDMI® Auto-Switcher

The DM-NVX-351C includes two HDMI inputs. Switching between the two inputs can be performed automatically using auto-switching mode, programmatically via a Crestron control system, or through a computer using a web browser.^[1]

HDMI Output

When configured as a decoder, the DM-NVX-351C's HDMI output feeds the decoded signal to the input of a switcher, a local display device, or any other device with an HDMI input. Its 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 used as an encoder, the HDMI output can be used to feed a local display, confidence monitor, or audio system.^[1,3]

DigitalMedia™ NVX technology transports ultra high-definition 4K video with 60 Hz frame rates and 4:4:4 color sampling over standard Gigabit Ethernet. Support for HDR video (HDR10) and HDCP 2.2 ensures the ultimate in picture quality and compatibility for all of today's varied media sources. Using standards-based Ethernet wiring and switches, DM NVX delivers a vastly scalable, high-performance solution for enterprise-wide 4K content distribution.^[1]

The Crestron® DM-NVX-351C is a video encoder/decoder card that installs in one slot of a DMF-CI-8 card chassis. It is designed to function as either a transmitter or receiver with the ability to switch between the two modes programmatically via commands from a Crestron control system. Featuring simple web-based control and management, USB and KVM integration, and support for copper and fiber LAN connectivity, the DM-NVX-351C offers a one-stop solution for any-sized network AV installation.^[2]

The DM-NVX-351C includes all the features of the DM-NVX-350C with the addition of surround sound to stereo downmixing. Refer to the "7.1 Surround Sound Audio with Downmixing" section below for details.

DM-NVX-351C DM® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card Card w/Downmixing

USB and KVM Integration

For a complete signal management solution, DM NVX supports the extension of USB signals, which may be switched and routed alongside the AV signal or separately via the control system. USB 2.0 host and device ports are provided on each DM-NVX-351C card, allowing a USB mouse, keyboard, or other device to be connected at one DM NVX endpoint and routed to a computer or other host at any other endpoint. KVM switch functionality is a natural application for this feature, but all types of USB peripherals are supported including whiteboards, touch screens, game controllers, cameras, mobile devices, headsets, and flash drives.^[4]

USB signals can also be routed to other locations where a DM NVX endpoint does not exist using Crestron USB over Ethernet Extender Modules (USB-EXT-DM). USB signals can be freely routed between DM NVX and USB-EXT-DM units over Ethernet under the management of a Crestron control system.

7.1 Surround Sound Audio with Downmixing

DM NVX 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-351C includes the ability to decode the incoming multichannel surround sound signal, whether from the network or an HDMI input, and 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. As an encoder, the DM-NVX-351C distributes both stereo and multichannel signals simultaneously over the network, allowing either signal to be selected at any decoder on the network.

Analog Audio Embedding or De-embedding

A balanced stereo analog audio port is included, which may be configured as either an input or output. As an input, it 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, it 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]

Breakaway Audio

A DM NVX decoder may select and combine separate video and audio signals from two different inputs, even two different encoders. There are just two exceptions: A) signals may not be combined between the two onboard HDMI inputs, and B) combining signals from two separate encoders is limited to 2-channel stereo audio.^[6,7]

Text Overlay

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

Video Wall Processing

A video wall composed of up to 64 individual displays can be configured using multiple DM-NVX-351C cards. Each card provides fully-adjustable zoom capability and bezel compensation to accommodate a range of video wall configurations and display types. One DM-NVX-351C is required per display, supporting configurations of up to eight wide by up to eight high.

Copper or Fiber LAN Connectivity

The DM-NVX-351C includes two RJ45 1000Base-T LAN ports. Either port may be used as the primary LAN connection, allowing the other to be used to provide a network connection for an AirMedia gateway, display device, or other local device(s). These ports may also be used to daisy-chain multiple cards feeding a single-source video wall or individual displays all showing the same video image.

Connection to a fiber optic network is facilitated by inserting an appropriate SFP transceiver module (Crestron SFP-1G series^[2]) into the SFP port on the DM-NVX-351C. A selection of modules is offered to accommodate various multimode and single-mode fiber types.

Enterprise-Grade Security

A secure AV network ensures its own reliability by protecting the integrity of the content being delivered and the privacy of the personnel accessing it. Employing advanced security features and protocols like 802.1x authentication, Active Directory credential management, PKI certification, AES encryption, TLS, SSH, and HTTPS, DM NVX delivers a true enterprise-grade network AV solution engineered to fulfill the demanding IT policies of corporate, university, medical, military, and governmental clients. DM NVX runs on a dedicated AV network, with fully-managed access to, or isolation from, the customer's LAN or the Internet.

CEC Device Control

The DM-NVX-351C provides a gateway for controlling devices through their HDMI connections by harnessing the CEC (Consumer Electronics Control) signal embedded in HDMI. Under the management of a control system, the DM-NVX-351C enables control of display devices and other equipment via CEC, potentially eliminating the need for any dedicated serial cables or IR emitters.^[8]

Web-Based Setup

Setup of the DM-NVX-351C is accomplished using a computer web browser. Full control and monitoring of the card is enabled through integration with a Crestron control system.

High-Density, Card-Based Solution

The DM-NVX-351C installs in a DMF-CI-8 card chassis, providing a scalable high-density solution for applications requiring multiple encoders and decoders in one equipment rack.

Please refer to the DigitalMedia Resources Webpage at <http://www.crestron.com/dmresources/> for additional design tools and reference documents.

DM-NVX-351C DM® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card w/Downmixing

SPECIFICATIONS

Encoding/Decoding

Video Compression: JPEG 2000

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

Bitrates: 100 to 990 Mbps

Streaming Protocols: RTP, RTSP, SDP

Container: MPEG-2 transport stream (.ts)

Session Initiation: Multicast via RTSP

Copy Protection: HDCP 2.2

Video

Input Signal Types: HDMI w/HDR10, Deep Color, and 4K60 4:4:4 support^{[1],[9]} (Dual-Mode DisplayPort and DVI compatible^[10])

Output Signal Types: HDMI w/HDR10, Deep Color, and 4K60 4:4:4 support^[1] (DVI compatible^[10])

Switcher: 2x1 auto-switching, 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 up to 8 high, static or dynamic text overlay

Copy Protection: HDCP 2.2

Maximum Resolutions:

Scan Type	Resolution	Frame Rate	Color Sampling	Color Depth
Progressive	4096x2160 DCI 4K & 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 HD1080p	60 Hz	4:4:4	36 bit
Interlaced (Input only)	1920x1080 HD1080i	30 Hz	4:4:4	36 bit

NOTE: Common resolutions are shown; other custom resolutions are supported at pixel clock rates up to 600 MHz

Audio

Input Signal Types: HDMI (Dual-Mode DisplayPort compatible^[10]), analog stereo^[5]

Output Signal Types: HDMI (multichannel pass-through or 2-channel downmix), 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

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 Volume Adjustment: -80 to +20 dB

Communications

Ethernet: 10/100/1000 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, HTTPS web browser setup and control, Crestron control system integration

USB: USB 2.0 host or device signal extension

HDMI: HDCP 2.2, EDID, CEC

DM NVX (via Ethernet): HDCP 2.2, AES, RTP, RTSP, SDP, ONVIF, IGMPv2, IGMPv3, SMPTE 2022

NOTE: Supports management of HDCP and EDID; supports management of CEC between the connected HDMI devices and a control system

Connectors

USB DEVICE: (1) USB Type B female;

USB 2.0 device port;

USB signal extender port for connection to a computer or any other USB 2.0 host^[4]

USB HOST: (1) USB Type A female;

USB 2.0 host port;

USB signal extender port for connection of a mouse, keyboard, or any other USB 2.0 device^[4];

Available Power: 500 mA at 5 Volts DC

LAN 1 – 2: (2) 8-pin RJ45 female;

10Base-T/100Base-TX/1000Base-T Ethernet ports

LAN 3: (1) SFP port;

Accepts one Crestron SFP-1G series SFP transceiver module^[2]

HDMI OUTPUT: (1) 19-pin Type A HDMI female;

HDMI digital video/audio output (DVI compatible^[10])^[1]

HDMI INPUT 1 – 2: (2) 19-pin Type A HDMI female;

HDMI digital video/audio inputs^[1];

(DVI & Dual-Mode DisplayPort compatible^[10])

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 & Indicators

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

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

DM-NVX-351C DM® 4K60 4:4:4 HDR Network AV Encoder/Decoder Card Card w/Downmixing

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

LAN 1 – 2: (4) LEDs, green indicates Ethernet link status, amber indicates Ethernet activity

LAN 3 LNK: (1) Green LED, indicates Ethernet link status

LAN 3 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

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

Weight

15.1 oz (427 g)

MODELS & ACCESSORIES

Available Models

DM-NVX-351C: DigitalMedia™ 4K60 4:4:4 HDR Network AV Encoder/Decoder Card w/Downmixing

Available Accessories

DMF-CI-8: DigitalMedia™ Card Chassis for DM-NVX-C & DMCF

SFP-1G: SFP Transceiver Modules

USB-EXT-DM: USB over Ethernet Extender with Routing

DM-CBL-ULTRA-PC: DigitalMedia™ Ultra Patch Cables

DM-CONN-ULTRA-RECP: DigitalMedia™ Ultra Keystone RJ45 Jack

DM-CBL-ULTRA-NP: DigitalMedia™ Ultra Cable, Non-Plenum Type CMR

DM-CBL-ULTRA-P: DigitalMedia™ Ultra Cable, Plenum Type CMP

DM-CBL-ULTRA-LSZH: DigitalMedia™ Ultra Cable, Low Smoke Zero Halogen

DM-CONN: Connector for DM-CBL-ULTRA

DM-CBL-8G-NP: DigitalMedia 8G™ Cable, non-plenum

DM-CBL-8G-P: DigitalMedia 8G™ Cable, plenum

DM-8G-CONN: Connector for DM-CBL-8G

DM-8G-CRIMP: Crimping Tool for DM-8G-CONN

DM-8G-CONN-WG: Connector with Wire Guide for DM-CBL-8G

DM-8G-CRIMP-WG: Crimping Tool for DM-8G-CONN-WG

CBL Series: Crestron® Certified Interface Cables

Notes:

- 4K60 4:4:4 performance requires the use of HDMI cables with a minimum TMDS bandwidth of 18 Gbps, such as Crestron model [CBL-HD](#) (20 ft / 6.1 m max. length). If 4K60 4:2:0 or 4K30 4:4:4 performance is acceptable, cables with a minimum bandwidth of 10.2 Gbps may be used, such as Crestron models [CBL-HD-LOCK](#) or [CBL-HD](#) (any available length). Performance may also be affected if an HDMI coupler is inserted in the HDMI signal path. Crestron coupling products ([MP-WP150](#), [MP-WP152](#), [MPI-WP150](#), or [FTA-CP-HD-101](#)) and cable retractors ([CBLR2-HD](#)) all have a specified bandwidth of 10.2 Gbps, and thus do not support 4K60 4:4:4. Please be aware that bandwidth loss is cumulative, so the combination of multiple components inserted inline may reduce performance.
- To add a fiber optic LAN port requires the purchase of a Crestron [SFP-1G](#) series SFP transceiver module (sold separately). All LAN ports on the DM-NVX-351C are for connection to an Ethernet based AV network or device; they cannot be connected to the “DM” ports of other Crestron devices.
- When in encoder mode, the HDMI output resolution is matched to the resolution of the encoded source.
- The DM-NVX-351C 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. DM NVX is compatible with Crestron [USB-EXT-DM](#) products, but is not compatible with the “USB HID only” signal extender technology found in other Crestron DM products.
- The analog audio port can function as an input or output, not both.
- Audio from one onboard HDMI input may not be combined with video from the other onboard HDMI input.
- Combining audio from one encoder with video from another encoder utilizes the secondary 2-channel audio stream. Multichannel audio from one encoder cannot be combined with video from another encoder.
- Device control via CEC requires integration with a [Crestron control system](#).
- 3D video input signals are automatically converted to 2D.
- 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 an authorized Crestron dealer. To find a dealer, please contact the Crestron sales representative for your area. A list of sales representatives is available online at www.crestron.com/salesreps or by calling 800-237-2041.

The specific patents that cover Crestron products are listed online at: patents.crestron.com.

Certain Crestron products contain open source software. For specific information, please visit www.crestron.com/opensource.

Crestron, the Crestron logo, AirMedia, DigitalMedia, DigitalMedia 8G, DM, and QuickSwitch HD are either trademarks or registered trademarks of Crestron Electronics, Inc. in the United States and/or other countries. Dolby, Dolby Atmos, and Dolby Digital are either trademarks or registered trademarks of Dolby Laboratories in the United States and/or other countries. DTS, DTS-HD, and DTS:X are either trademarks or registered trademarks of DTS, Inc. in the United States and/or other countries. HDMI and the HDMI logo are either trademarks or registered trademarks of HDMI Licensing LLC in the United States and/or other countries. Other trademarks, registered trademarks, and trade names may be used in this document to refer to either the entities claiming the marks and names or their products. Crestron disclaims any proprietary interest in the marks and names of others. Crestron is not responsible for errors in typography or photography. Specifications are subject to change without notice. ©2017 Crestron Electronics, Inc.