

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

- > 4K60 4:4:4 video over standard Gigabit Ethernet
- > Real-time video performance over the network with no perceptible latency or loss of quality
- > Stable, reliable, economical, and configurable to scale for any enterprise signal routing application
- > Enterprise-grade security including 802.1X, Active Directory®, TLS, and AES
- > 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^[2]
- > Optional fiber optic network connection via SFP port^[3]
- > 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^[7]
- > Analog audio embedding or de-embedding
- > Stereo downmixing of surround sound audio signals
- > Simultaneous distribution of stereo and surround sound signals
- > Audio breakaway capability^[8]
- > Dynamic text overlay capability
- > RS-232 and IR control ports^[10]
- > CEC device control gateway^[10]
- > USB and KVM signal extension and routing^[5,6]
- > Easy setup via built-in webpages
- > Fully-controllable via a Crestron® control system
- > Enhanced centralized management using the optional DM® XiO Director
- > Compact, surface-mountable form factor
- > Quiet and cool running operation
- > Powered via local power pack, optional power injector, or approved third-party PSE^[9]
- > 100-240V universal power pack included

DigitalMedia™ NVX technology transports ultra high-definition 4K60 4:4:4 video over standard Gigabit Ethernet with no perceptible latency or loss of quality. Leveraging standard network switches and CAT5e UTP wiring, DM® NVX delivers a rock-solid, high-performance virtual matrix routing solution that is both economically advantageous and infinitely scalable for any enterprise or campus-wide 4K content distribution application. Professional onboard scaling, plus support for HDR10 and HDCP 2.2, ensures the ultimate in picture quality and compatibility for all of today's varied media sources.^[1,2]

The Crestron® DM-NVX-351 is a compact AV over IP encoder/decoder designed to function as either a transmitter or receiver. Featuring simple, secure web-based control and management, auto-switching HDMI® inputs



and output, analog audio in or out, USB and KVM integration, video wall processing, and support for copper and fiber LAN connectivity, the DM-NVX-351 offers a one-stop solution for any-sized network AV installation.^[2,3]

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

Real-Time 4K60 Video Distribution

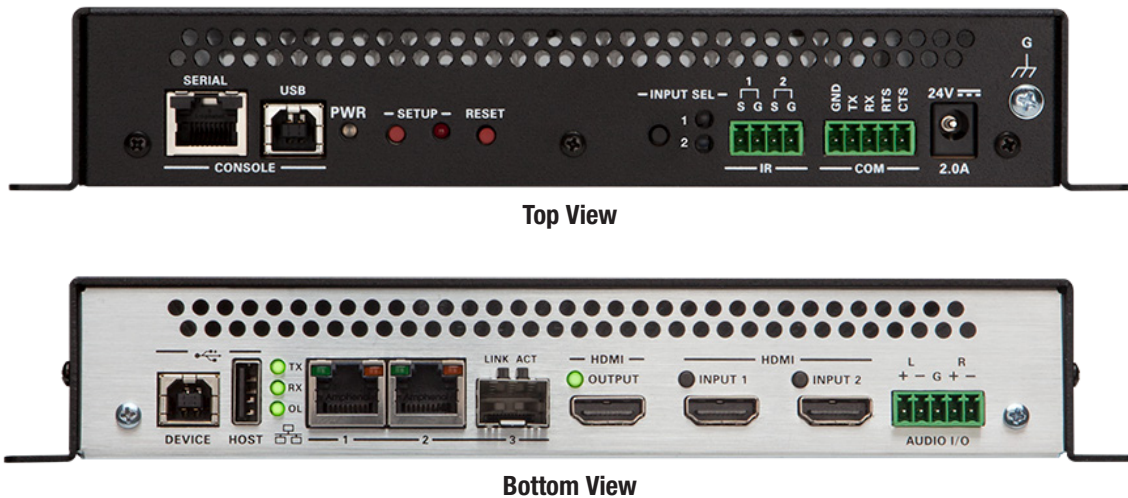
Engineered for demanding conference room and classroom applications, DM NVX ensures real-time, full-motion 4K60 video performance for the presentation of multimedia, videoconferencing, and live camera images. DM NVX employs high-quality JPEG 2000 encoding and decoding using a patent-pending technique that decodes and scales simultaneously to achieve imperceptible end-to-end latency of just 25 ms or less (1.5 frames). With DM NVX, interactive functions such as mousing and game play are fluid and natural.

DM NVX is engineered for rock-solid stability and ultimate reliability. Forward Error Correction is employed to ensure that AV data is delivered without interruption regardless of interference around the network cable. Line-synchronized outputs ensure perfect synchronization of content across multiple displays for one-to-many applications such as digital signage or video walls. Variable Multicast TTL (Time To Live) enables traversing multiple network routers for optimal flexibility.

Encoder and Decoder in One

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

- As an encoder, it allows a laptop computer, camera, or other media source to be connected via HDMI and then transmitted over the network to one or many decoders.^[1]
- As a decoder, it receives the signal from a DM NVX encoder and feeds it to a 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 reconfigured dynamically in under one minute via a control system or web browser, or using the onboard Setup button, offering a versatile, cost-effective solution for applications that require both modes in one box.

2x1 HDMI® Auto-Switcher

The DM-NVX-351 includes two HDMI inputs. Switching between the two inputs can be performed automatically using auto-switching mode, manually using the onboard input select button, programmatically via a Crestron control system, or through a computer using a web browser. When used as a decoder mounted behind a typical conference room display device, the HDMI inputs provide a convenient way to connect a Crestron AirMedia® presentation gateway, videoconferencing codec, or mini computer.^[1]

HDMI Output

When configured as a decoder, the DM-NVX-351's HDMI output feeds the decoded signal to the 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.^[1,4]

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-351 box, allowing a USB mouse, keyboard, or other device to be connected at one box and routed to a computer or other host at another box. 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.^[5]

USB signals can also be routed to other locations where a DM NVX box does not exist using Crestron USB over Ethernet Extender Modules (USB-EXT-DM-LOCAL or USB-EXT-DM-REMOTE). USB signals can be freely routed between DM NVX and USB-EXT-DM units over Ethernet under the management of a Crestron control system.^[6]

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-351 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^[7], while the HDMI output can be configured to output either stereo or multichannel. As an encoder, the DM-NVX-351 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 sound bar. The output volume is adjustable via a control system or web browser.^[7]

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.^[8]

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-351 units. Each unit provides fully-adjustable zoom capability and bezel compensation to accommodate a range of video wall configurations and display types. One DM-NVX-351 is required per display, supporting configurations of up to eight wide by up to eight high.

Copper or Fiber LAN Connectivity

The DM-NVX-351 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 the display, AirMedia gateway, or other local device(s). These ports may also be used to daisy-chain multiple units feeding a single-source video wall or individual displays all showing the same video image. Port 1 is also capable of receiving power from a Crestron power injector ([DM-PSU-ULTRA-MIDSPAN](#)) or approved third-party PSE.^[2,9]

Connection to a fiber optic network is facilitated by inserting an appropriate SFP transceiver module (Crestron [SFP-1G](#) series) into the SFP port on the DM-NVX-351. A selection of modules is offered to accommodate various multimode and single-mode fiber types.^[3]

DM NVX can be deployed on an existing corporate or campus network or a dedicated network. The optimal choice depends on a number of considerations. For complete network requirements and guidelines, please refer to the DM NVX Application Design Guide and DigitalMedia NVX Series System Design Guide, Doc. 7977

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. Every device on the network must be secure to protect against malicious intrusions from both inside and outside of the LAN. Employing advanced security features and protocols like 802.1x authentication, Active Directory® credential management, AES content encryption, PKI authentication, 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.

Device Controller

The DM-NVX-351 includes built-in RS-232 and IR control ports for control of the connected display, camera, and other devices under the management of a control system. Additional control capability is afforded by harnessing the CEC (Consumer Electronics Control) signal embedded in HDMI. Through its Ethernet connection to the control system, the DM-NVX-351 provides a gateway for controlling the display and source devices right through their HDMI connections, potentially eliminating the need for any dedicated serial cables or IR emitters.^[10]

Web-Based Setup

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

DM XiO Director Option

For small to moderate sized applications, a network of DM NVX endpoints can be configured and controlled using a Crestron control system. For larger enterprise and campus-wide signal routing applications, adding the DM XiO Director ([DM-XIO-DIR-80](#), [DM-XIO-DIR-160](#), or [DM-XIO-DIR-ENT](#)) enhances and streamlines the entire configuration and control process by providing a central point of management, and by enabling the creation of multiple virtual matrix switchers, all through one easy-to-use web-based portal.

Low-Profile Installation

The DM-NVX-351 mounts conveniently to a flat surface or rack rail, and fits easily behind a flat panel display, above a ceiling-mounted projector, beneath a tabletop, or inside a lectern, AV cart, or equipment cabinet. All connections and LED indicators are positioned on the top and bottom, offering optimal access and visibility for a clean, serviceable installation. Power is provided using the included 100-240V universal power pack, an optional power injector (Crestron [DM-PSU-ULTRA-MIDSPAN](#)), or an approved third-party PSE.^[9]

SPECIFICATIONS

Encoding/Decoding

Video Compression: JPEG 2000

Video Resolutions: Up to 4096x2160@60Hz (DCI 4K60), 4:4:4 color sampling, HDR10 & 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, AES-128, PKI

Video

Input Signal Types: HDMI w/HDR10, Deep Color, & 4K60 4:4:4 support^[1,11] (Dual-Mode DisplayPort & DVI compatible^[12])

Output Signal Types: HDMI w/HDR10, Deep Color, & 4K60 4:4:4 support^[1] (DVI compatible^[12])

Switcher: 3x1 manual or auto-switching, limited audio breakaway^[8], 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^[12]), analog stereo^[7]

Output Signal Types: HDMI (multichannel pass-through or 2-channel downmix), analog stereo (2-channel downmix)^[7]

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, Active Directory authentication, variable Multicast TTL, HTTPS web browser setup and control, Crestron control system integration

USB: USB 2.0 host or device signal extension and routing; USB 2.0 computer console (for setup)

RS-232: 2-way device control and monitoring up to 115.2k baud with hardware and software handshaking (via control system); computer console (for setup)

IR/Serial: 1-way device control via infrared up to 1.1 MHz or serial TTL/RS-232 (0-5 Volts) up to 19.2k baud (via control system)

HDMI: HDCP 2.2, EDID, CEC

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

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 connector, female;
USB 2.0 device port;
USB signal extender port for connection to a computer or any other USB 2.0 host^[5]

USB HOST: (1) USB Type A connector, female;
USB 2.0 host port;
USB signal extender port for connection of a mouse, keyboard, or any other USB 2.0 device^[5];
Available Power: 500 mA at 5 Volts DC

LAN 1: (1) 8-pin RJ45 connector, female;
10Base-T/100Base-TX/1000Base-T Ethernet port^[2];
PD (powered device) port compatible with Crestron **DM-PSU-ULTRA-MIDSPAN** or approved third-party PSE^[9]

LAN 2: (1) 8-pin RJ45 connector, female;
10Base-T/100Base-TX/1000Base-T Ethernet port^[2]

LAN 3: (1) SFP port;
Accepts one Crestron SFP-1G series SFP transceiver module^[3]

HDMI OUTPUT: (1) HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible^[12])^[1]

HDMI INPUT 1 – 2: (2) HDMI Type A connectors, female;
HDMI digital video/audio inputs^[1];
(DVI & Dual-Mode DisplayPort compatible^[12])^[1]

AUDIO I/O: (1) 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio input or output^[7];
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

CONSOLE, SERIAL: (1) 8-pin RJ45 connector, female;
RS-232 computer console port (for setup)

CONSOLE, USB: (1) USB Type B connector, female;
USB 2.0 computer console port (for setup)

IR 1 – 2: (1) 4-pin 3.5 mm detachable terminal block;
Comprises (2) IR/Serial ports^[10];
IR output up to 1.1 MHz;
1-way serial TTL/RS-232 (0-5 Volts) up to 19200 baud;
IRP2 emitter sold separately

COM: (1) 5-pin 3.5 mm detachable terminal block;
Bidirectional RS-232 port^[10];
Up to 115.2k baud, hardware and software handshaking support

24VDC 2.0A: (1) 2.1 x 5.5 mm DC power connector;
24 Volt DC power input;
PW-2420RU power pack included

G: (1) 6-32 screw;
Chassis ground lug

Controls & Indicators

TX: (1) Green LED, indicates unit is in transmitter (encoder) mode
RX: (1) Green LED, indicates unit is in receiver (decoder) mode
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
PWR: (1) Bi-color green/amber LED, indicates operating power supplied via the power pack or injector/PSE, illuminates amber while booting and green when operating
SETUP: (1) Red LED and (1) recessed pushbutton for onscreen IP address display and to change between TX and RX modes
RESET: (1) Recessed pushbutton for hardware reset
INPUT SEL: (1) Pushbutton for manual input selection and (2) bi-color green/amber LEDs to indicate the current active input and signal presence at each corresponding input

Power

Power Pack (included):

Input: 1.5 Amps maximum @ 100-240 Volts AC, 50/60 Hz
 Output: 2 Amps @ 24 Volts DC
 Model: [PW-2420RU](#)

Power over LAN: Compatible with the following PSEs:

- Crestron [DM-PSU-ULTRA-MIDSPAN](#) for 2 DM NVX endpoints;
- Microsemi® PD-9500G Family Gigabit EEPoE Midspans as follows:
 - o PD-9506G for 6 DM NVX endpoints
 - o PD-9512G for 10 DM NVX endpoints
 - o PD-9524G for 20 DM NVX endpoints

Power Consumption: 35 Watts typical

Environmental

Temperature: 32° to 104° F (0° to 40° C)
Humidity: 10% to 90% RH (non-condensing)
Heat Dissipation: 85 BTU/hr
Acoustic Noise: 33 dBA maximum

Enclosure

Chassis: Metal, black finish, integral mounting flanges, fan cooled; vented top, front, bottom, and sides
Mounting: Freestanding, surface mount, or attach to a single rack rail

Dimensions

Height: 8.61 in (219 mm)
Width: 9.27 in (236 mm)
Depth: 1.50 in (39 mm)

Weight

2.0 lb (0.91 kg)

Compliance

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

MODELS & ACCESSORIES

Available Models

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

Included Accessories

PW-2420RU: Desktop Power Pack, 24VDC, 2A, 2.1mm, Universal (Qty. 1 included)

Available Accessories

SFP-1G Series: SFP Transceiver Modules
DM-PSU-ULTRA-MIDSPAN: Power Injector
DM-CBL-ULTRA-PC Series: DigitalMedia™ Ultra Patch Cables
DM-CONN-ULTRA-RECP Series: DigitalMedia™ Ultra Keystone RJ45 Jacks
CBL Series: Crestron® Certified Interface Cables
CNSP-XX: Custom Serial Interface Cable
IRP2: IR Emitter w/Terminal Block Connector
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

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. Please be aware that bandwidth loss is cumulative, so 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 LAN ports on the DM-NVX-351 are for connection to an Ethernet network or device; they cannot be connected to the "DM" ports of other Crestron devices.
3. 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-351 are for connection to an Ethernet network or device; they cannot be connected to the "DM" ports of other Crestron devices.
4. When in encoder (TX) mode, the HDMI output resolution is matched to the resolution of the encoded source.

5. The DM-NVX-351 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 [DigitalMedia NVX Series System Design Guide, Doc. 7977](#) for USB bandwidth considerations.
6. Compatibility with Crestron USB-EXT-DM products is a future feature that will be added via a firmware update. DM NVX is not compatible with the "USB HID only" signal extender technology found in other Crestron DM products.
7. The analog audio port can function as an input or output, not both.
8. 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 is possible using the secondary 2-channel audio stream only. Multichannel audio from one encoder cannot be combined with video from another encoder.
9. Refer to the "Power" specifications for all approved powering options.
10. Device control via RS-232, IR, CEC, or Ethernet requires integration with a Crestron control system.
11. 3D video input signals are automatically converted to 2D.
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.

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