# DM NVX™ Network AV Encoders/Decoders

DM-NVX-E30
DM-NVX-D30
DM-NVX-E30C
DM-NVX-D30C
DM-NVX-D80-IOAV

Product Manual
Crestron Electronics, Inc.

# Contents

# Introduction

Crestron® DM NVX™ network AV encoders/decoders transport ultra high-definition 4K video with 60 Hz frame rates and 4:4:4 color sampling over standard Gigabit Ethernet. Support for High Dynamic Range (HDR) video and HDCP 2.2 ensures high picture quality and compatibility with a variety of media sources. Using Pixel Perfect Processing technology, a video signal is encoded and decoded to achieve imperceptible end-to-end latency of less than 1 frame.

DM-NVX-E30(C) devices consist of the DM-NVX-E30 surface-mountable endpoint and the DM-NVX-E30C card, which function as encoders (transmitters) only. DM-NVX-D30(C) devices consist of the DM-NVX-D30 surface-mountable endpoint and the DM-NVX-D30C card, which function as decoders (receivers) only. The DM-NVX-D80-IOAV also functions as a decoder only and is compatible with the Intel® OPS (Open Pluggable Specification).

Compact in design, the DM-NVX-E30 and DM-NVX-D30 are designed to mount to a flat surface such as a wall. The DM-NVX-E30C and DM-NVX-D30C are designed to occupy the DMF-CI-8 card chassis. The DM-NVX-D80-IOAV is designed for installation into the OPS slot of an OPS-supported display.

**NOTES:**

- The DM-NVX-D30, DM-NVX-D30C, and DM-NVX-D80-IOAV do not support video scaling.

- DM-NVX-E30(C) encoders, DM-NVX-D30(C) decoders, and the DM-NVX-D80-IOAV decoder are compatible with DM-NVX-350(C), DM-NVX-351(C), and DM-NVX-352(C) encoders/decoders. If DM-NVX-E30(C) encoders are used with DM-NVX-35x(C) devices, the DM-NVX-35x(C) devices must be in Receiver mode. If DM-NVX-D30(C) and DM-NVX-D80-IOAV decoders are used with DM-NVX-35x(C) devices, the DM-NVX-35x(C) devices must be in Transmitter mode.

This manual provides information about the following:

- Physical description

- Configuration and status

- HDCP 2.2 compliance

- IGMP snooping

- Troubleshooting

In addition, information about device discovery of a DM NVX device using Crestron Toolbox™ software is provided in the appendix of this manual. For installation information, refer to the DM-NVX-E30/DM-NVX-D30 Quick Start (Doc. 8211), DM-NVX-E30C/DM-NVX-D30C Quick Start (Doc. 8346), or DM-NVX-D80-IOAV Quick Start (Doc. 8526) as appropriate. For information about designing a DM NVX system, refer to the DM NVX System Design Guide (Doc. 7977). The documents are available at www.crestron.com/manuals.

# Physical Description

The following sections provide information about the connectors, controls, and indicators that are available on the DM-NVX-E30(C), DM-NVX-D30(C), and DM-NVX-D80-IOAV devices.

## DM-NVX-E30 and DM-NVX-D30

This section provides information about the front and rear panels of the DM-NVX-E30 and DM-NVX-D30.

### Front Panel, DM-NVX-E30

The following illustration shows the front panel of the DM-NVX-E30.

DM-NVX-E30 Front Panel
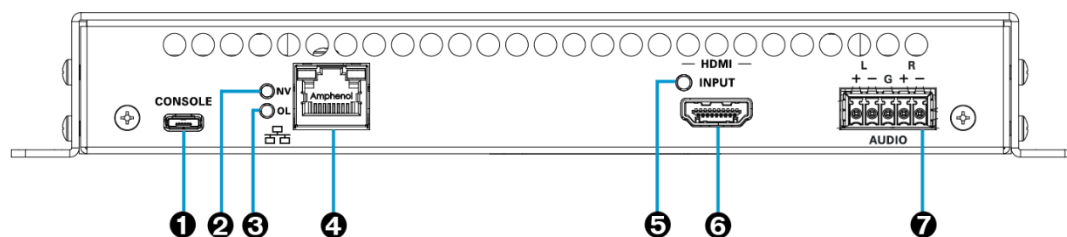


❶ **CONSOLE:** Micro USB connector, female;
USB 2.0 computer console port for setup

❷ **NV LED:** Green LED, indicates that the device is transmitting and encoding network video

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

❹ **LAN:** 8-pin RJ-45 connector, female;
100BASE-TX/1000BASE-T Ethernet port;[1]
PoE+ PD (powered device) port compatible with a PoE+ compliant Ethernet switch, a Crestron DM-PSU-ULTRA-MIDSPAN, or an approved third-party PSE;
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **HDMI INPUT LED:** Green LED, indicates sync detection at the HDMI® input

❻ **HDMI INPUT:** HDMI Type A connector, female;
HDMI digital video/audio input (DVI and Dual-Mode DisplayPort™ interface compatible)[2, 3]

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[1] The LAN port must connect to a 1000BASE-T switch in order to stream network video.
[2] The HDMI connection requires an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.
[3] Device control via CEC (Consumer Electronics Control) requires the use of a Crestron 3-Series® or later control system.

❼ **AUDIO:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio output;
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced

> **NOTE:** The analog audio output is functional only when the DM-NVX-E30 is receiving a 2-channel stereo input signal.

## Front Panel, DM-NVX-D30

The following illustration shows the front panel of the DM-NVX-D30.

**DM-NVX-D30 Front Panel**



❶ **CONSOLE:** Micro USB connector, female;
USB 2.0 computer console port for setup

❷ **NV LED:** Green LED, indicates that the device is receiving and decoding network video

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

❹ **LAN:** 8-pin RJ-45 connector, female;
100BASE-TX/1000BASE-T Ethernet port;[1]
PoE+ PD (powered device) port compatible with a PoE+ compliant Ethernet switch, a Crestron DM-PSU-ULTRA-MIDSPAN, or an approved third-party PSE;
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **HDMI OUTPUT LED:** Green LED, indicates video signal transmission at the HDMI output

❻ **HDMI OUTPUT:** HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible)[2, 3]

❼ **AUDIO:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio output;
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced

> **NOTE:** The analog audio output is functional only when the DM-NVX-D30 is receiving a 2-channel stereo input signal.

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[1] The LAN port must connect to a 1000BASE-T switch in order to stream network video.
[2] The HDMI connection requires an appropriate adapter or interface cable to accommodate a DVI signal. CBL-HD-DVI interface cables are sold separately.
[3] Device control via CEC requires the use of a Crestron 3-Series or later control system.

## Rear Panel, DM-NVX-E30 and DM-NVX-D30
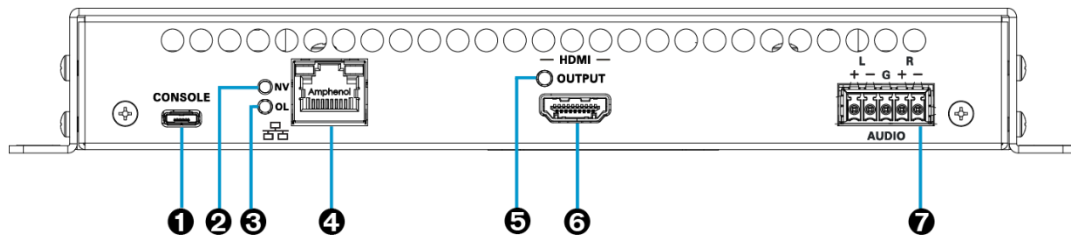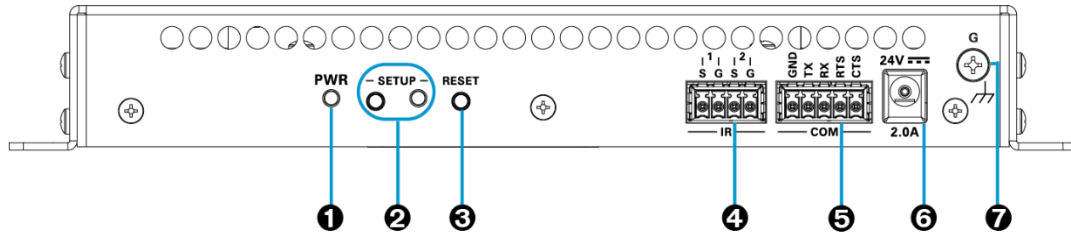
The following illustration shows the rear panel of the DM-NVX-E30 and DM-NVX-D30.

**DM-NVX-E30 and DM-NVX-D30 Rear Panel**



❶ **PWR:** Bicolor green/amber LED, indicates operating power supplied via the power pack (sold separately), PoE+ compliant Ethernet switch, or injector/PSE; Lights amber while booting and green when operating

❷ **SETUP:** Push button for on-screen display of IP address; Red LED, indicates that the **SETUP** button is pressed and times out automatically.

**NOTES:**

- If the DM-NVX-D30 decoder is connected to a DM-NVX-E30(C) or DM-NVX-35x(C) encoder, pressing the **SETUP** button on the DM-NVX-D30 for less than 10 seconds displays the decoder and encoder IP addresses. The IP addresses are shown on the display connected to the HDMI output of the decoder.

- If the DM-NVX-E30 encoder is connected to a DM-NVX-D30(C) decoder, pressing the **SETUP** button on the DM-NVX-E30 for less than 10 seconds displays the encoder and decoder IP addresses. The IP addresses are shown on the display connected to the HDMI output of the decoder.

- If the DM-NVX-E30 encoder is connected to a DM-NVX-35x(C) decoder, pressing the **SETUP** button on the DM-NVX-E30 displays the IP address of the decoder only. The IP address is shown on the display connected to the HDMI output of the decoder.

❸ **RESET:** Recessed push button for hardware reset

❹ **IR 1–2:** 4-pin 3.5 mm detachable terminal block; Comprises two IR/serial ports* IR output up to 1.1 MHz; 1-way serial TTL/RS-232 (0–5 volts) up to 19200 baud; Crestron IRP2 emitter sold separately

❺ **COM:** 5-pin 3.5 mm detachable terminal block; Bidirectional RS-232 port;* Up to 115.2k baud, hardware and software handshaking support

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* Device control via IR and RS-232 requires the use of a Crestron 3-Series or later control system.

➏ **24VDC 2.0A:** 2.1 x 5.5 mm DC power connector;
24 VDC power input;
Power pack included

➐ **Ground:** 6-32 screw, chassis ground lug

## DM-NVX-E30C

The following illustration shows the connectors, controls, and indicators that are available on the DM-NVX-E30C.

DM-NVX-E30C



➊ **CONSOLE:** Micro USB connector, female;
USB 2.0 computer console port for setup

➋ **NV LED:** Green LED, indicates that the device is transmitting and encoding network video.

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

➍ **LAN:** 100BASE-TX/1000BASE-T Ethernet port;[1]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

➎ **HDMI INPUT LED:** Green LED, indicates sync detection at the HDMI input

➏ **HDMI INPUT:** HDMI Type A connector, female;
HDMI digital video/audio input (DVI and Dual-Mode DisplayPort interface compatible)[2, 3]

➐ **AUDIO:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio output;
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced

**NOTE:** The analog audio output is functional only when the DM-NVX-E30C is receiving a 2-channel stereo input signal.

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[1] The LAN port must connect to a 1000BASE-T switch in order to stream network video.
[2] Device control via CEC requires the use of a Crestron 3-Series or later control system.
[3] The HDMI connection requires an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.

# DM-NVX-D30C

The following illustration shows the connectors, controls, and indicators that are available on the DM-NVX-D30C.

DM-NVX-D30C
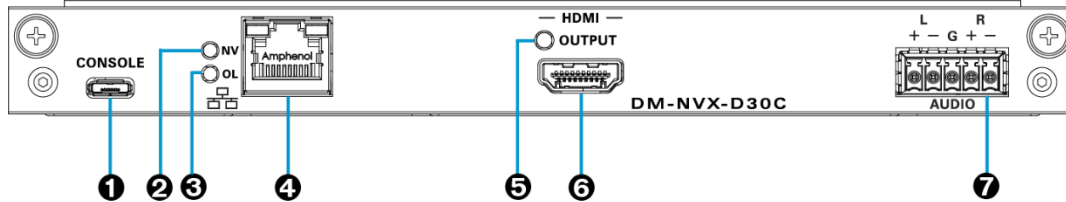


❶ **CONSOLE:** Micro USB connector, female;
USB 2.0 computer console port for setup

❷ **NV LED:** Green LED, indicates that the device is receiving and decoding network video.

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

❹ **LAN:** 100BASE-TX/1000BASE-T Ethernet port;[1]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **HDMI OUTPUT LED:** Green LED, indicates video signal transmission at the HDMI output

❻ **HDMI OUTPUT:** HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible)[2, 3]

❼ **AUDIO:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio output;
Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced

**NOTE:** The analog audio output is functional only when the DM-NVX-D30C is receiving a 2-channel stereo input signal.

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[1] The LAN port must connect to a 1000BASE-T switch in order to stream network video.
[2] Device control via CEC requires the use of a Crestron 3-Series or later control system.
[3] The HDMI connection requires an appropriate adapter or interface cable to accommodate a DVI signal. CBL-HD-DVI interface cables are sold separately.

# DM-NVX-D80-IOAV

This section provides information about the front and rear panels of the DM-NVX-D80-IOAV.

## Front Panel

The following illustration shows the front panel of the DM-NVX-D80-IOAV.

**DM-NVX-D80-IOAV Front Panel**
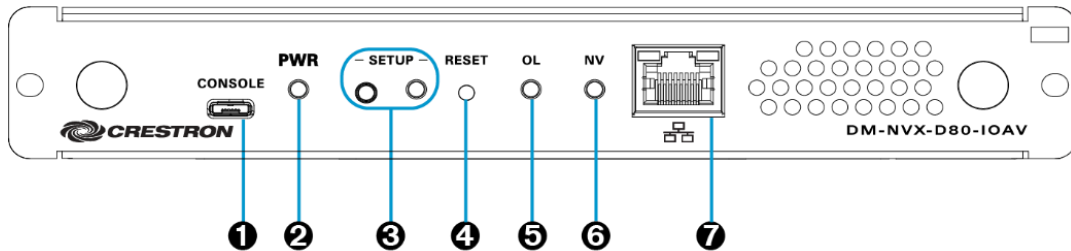


❶  **CONSOLE:** Micro USB connector, female;
   USB 2.0 computer console port for setup

❷  **PWR LED:** Bicolor green/amber LED, indicates operating power supplied via the OPS-supported display, lights amber while booting and green when operating

❸  **SETUP:** Push button for on-screen display of IP address;
   Red LED, indicates that the **SETUP** button is pressed and times out automatically.

   **NOTE:** If the DM-NVX-D80-IOAV decoder is connected to a DM-NVX-E30(C) or DM-NVX-35x(C) encoder, pressing the **SETUP** button on the DM-NVX-D80-IOAV for less than 10 seconds displays the decoder and encoder IP addresses. The IP addresses are shown on the OPS-supported display.

❹  **RESET:** Recessed push button for hardware reset

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

❻  **NV LED:** Green LED, indicates that the device is receiving and decoding network video.

❼  **LAN:** 8-pin RJ-45 connector;
   100BASE-TX/1000BASE-T Ethernet port;*
   Green LED indicates Ethernet link status;
   Amber LED indicates Ethernet activity

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* The LAN port must connect to a 1000BASE-T switch in order to stream network video.

## Rear Panel

The following illustration shows the rear panel of the DM-NVX-D80-IOAV.

**DM-NVX-D80-IOAV Rear Panel**
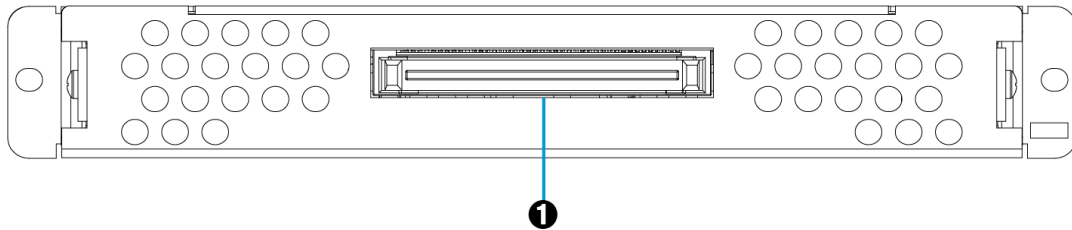


❶ **OPS:** 80-pin JAE connector;
   Connection for power, video, audio, RS-232, and USB control

# Configuration and Status

This section provides information about configuring or viewing the following items using the web interface and SIMPL Windows as applicable:

- DMF-CI-8 chassis details

- DM NVX Director™ virtual switching appliance

- Stream statistics

- Multicast TTL (Time-to-Live)

- DSCP (Differentiated Services Code Point)

- EDID (Extended Display Identification Data)

- Subscriptions

- 7.1 surround sound audio

- Analog audio output

- Crestron XiO Cloud™ service connection

- Enterprise-grade security

- Fan control

- Automatic firmware update

# DMF-CI-8 Chassis Details

NOTE: DMF-CI-8 chassis details apply to the DM-NVX-E30C and DM-NVX-D30C only.

A DM NVX card occupies a DMF-CI-8 chassis. Information about the chassis can be viewed using the web interface or SIMPL Windows.

## Using the Web Interface

View DMF-CI-8 chassis information on the Status page. The **Chassis Details** section displays the following information:

- Serial number of the chassis

- Number of the slot into which the card is installed

**Status Page – Chassis Details**
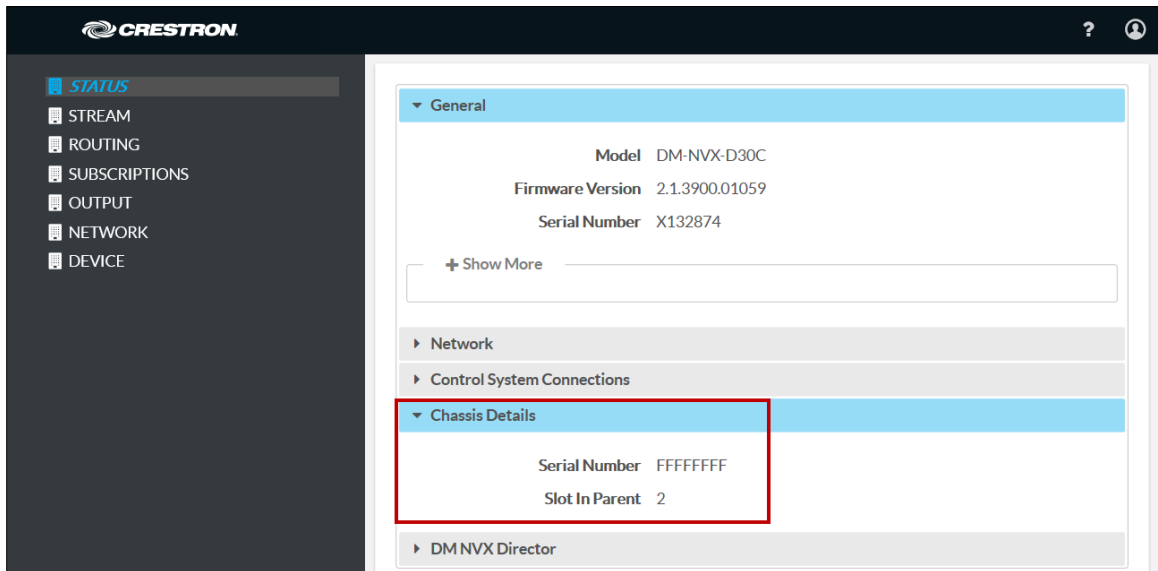


## Using SIMPL Windows

Using the top-level programming slot for the DM NVX card, program the **<ChassisSerialNumber_F>** serial output join to report the serial number of the chassis. Program the **<CardSlotInfo_F>** serial output join to report the number of the slot into which the card is installed.

# DM NVX Director Virtual Switching Appliance

If a DM NVX device is managed by a DM NVX Director™ virtual switching appliance, information about the appliance can be viewed using the web interface.

View DM NVX Director appliance information on the Status page. The **DM NVX Director** section displays the following information:

- DM NVX Director hostname

- Domain name, number, and slot number to which the DM NVX device is assigned
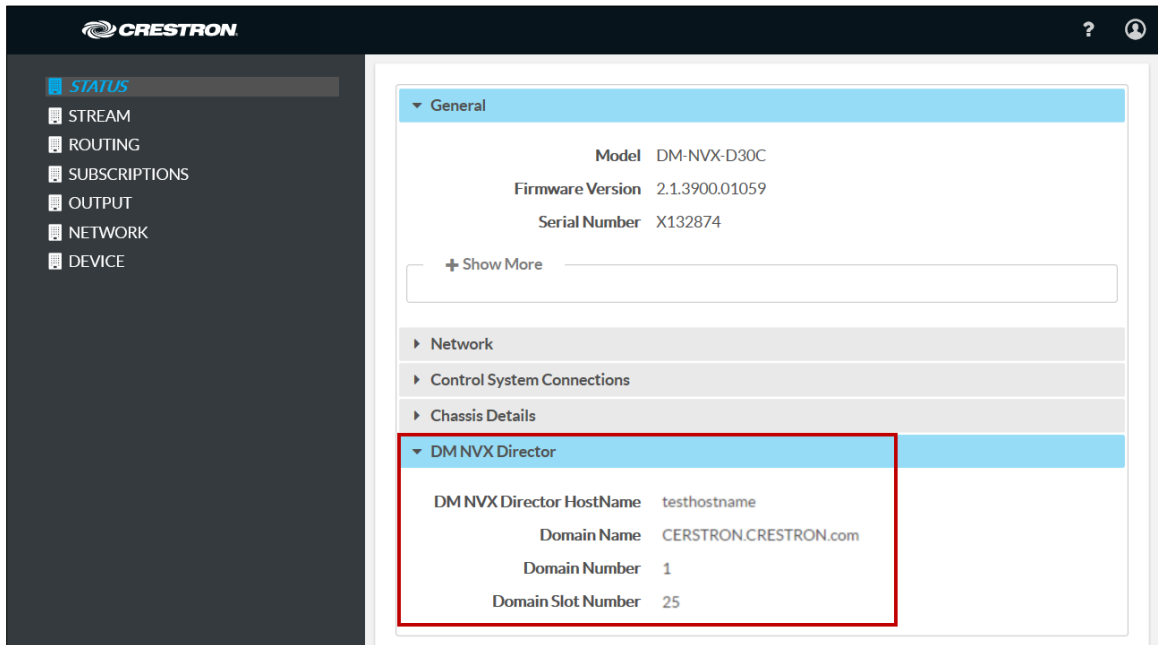
## Stream Statistics

Statistics can be displayed to indicate the number of packets received or transmitted, the number of dropped packets, and the bit rate of the received stream. To enable or disable stream statistics, use the web interface or SIMPL Windows as discussed in the following sections.

### Using the Web Interface

Configure stream statistics on the Stream page. In the **Statistics** section of the page, set **Statistics** to **Enable** or **Disable**. To reset statistics, click **Reset Statistics**.
For additional information, refer to the online help of the web interface.

**NOTE:** The bit rate of the stream appears on the Stream page of the DM-NVX-D30, DM-NVX-D30C, and DM-NVX-D80-IOAV only.

**Stream Page - Statistics Configuration**
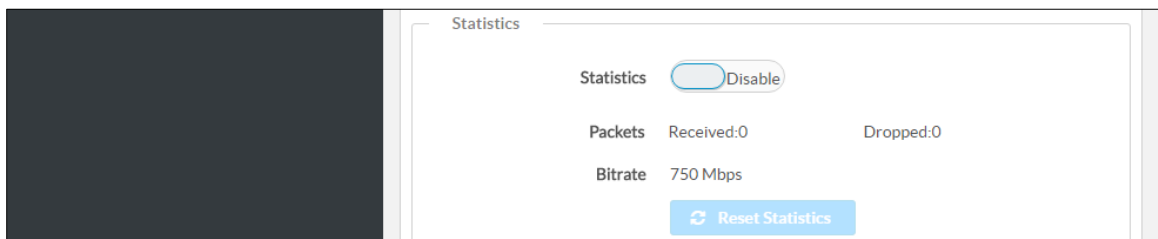
### Using SIMPL Windows

For the DM-NVX-E30 and DM-NVX-E30C, configure stream statistics in **Slot-01: Stream Transmit.** For the DM-NVX-D30, DM-NVX-D30C, and DM-NVX-D80-IOAV, configure stream statistics in **Slot-02: Stream Receive**. Trigger the **<StatisticsEnabled>** digital input join to enable the reporting of statistics. To disable statistics, trigger the **<StatisticsDisabled>** digital input join. To clear the statistics, trigger the **<ResetStatistics>** digital input join. The corresponding serial joins are updated when the digital input joins are triggered. For additional information, refer to the SIMPL Windows help file.

## Multicast TTL (Time-to-Live)

**NOTE:** Multicast TTL configuration is applicable to the DM-NVX-E30 and DM-NVX-E30C only.

Multicast TTL provides the ability to limit or extend the hop limit of a DM NVX stream that traverses routers. In IPv4 multicasting, routers have a TTL threshold assigned to each interface. Only multicast packets with a TTL greater than the threshold of the interface are forwarded.

Multicast TTL can be set to any value ranging from **1** to **255**. The default setting is **5**.

To set a multicast TTL value, use the web interface or SIMPL Windows.

### Using the Web Interface

Configure multicast TTL on the Stream page. In the **Advanced** section of the page, set a multicast TTL value:

1. Set **Auto Initiation** to **Disabled**.

2. Stop the stream by clicking **Stop**.

3. Select the **Custom TTL** checkbox.

4. Enter the desired TTL value (**1** to **255**).

5. Set **Auto Initiation** to **Enabled**. The stream automatically restarts.

**NOTE:** Deselecting the **Custom TTL** checkbox returns the TTL value to the default setting.

**Stream Page - Multicast TTL Configuration**
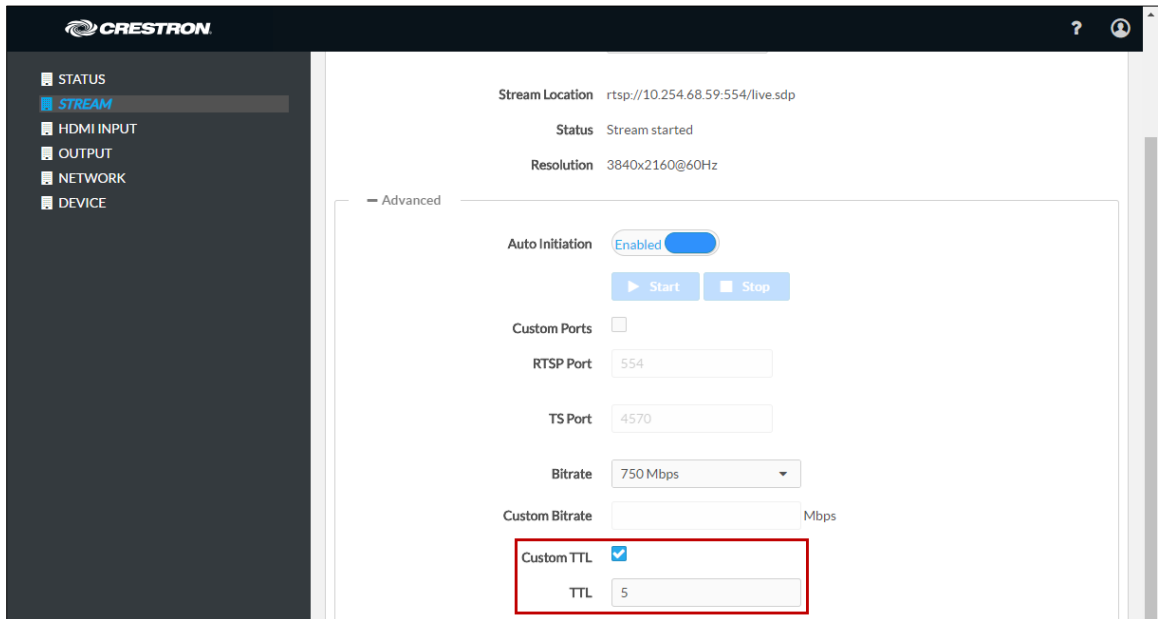


## Using SIMPL Windows

Configure multicast TTL as follows:

1. Using the top-level programming slot:

   a. Trigger the **<AutomaticInitiationDisabled>** digital input join.

   b. Trigger the **<Stop>** digital input join.

2. In **Slot-01: Stream Transmit**, set the **<MulticastTTL>** analog input join to the desired value (**1** to **255**).

3. Using the top-level programming slot, trigger the **<AutomaticInitiationEnabled>** digital input join. The stream automatically restarts.

For additional information, refer to the SIMPL Windows help file.

# DSCP (Differentiated Services Code Point)

NOTE: DSCP configuration is applicable to the DM-NVX-E30 and DM-NVX-E30C only.

To implement Quality of Service (QoS), IP networks use the DSCP value. Within an IP packet header, the DSCP defines a value from 0 to 63 that maps to a certain traffic classification. Based on IT department policies, DSCP values are used within a network to determine the treatment of packets in router queues, the routes of traffic flows, and per-hop behavior. By default, DSCP is set to **32**.

NOTE: Change the DSCP default setting of **32** only if required by IT department policies.

Configure DSCP on the Stream page. In the **Advanced** section of the page, set a DSCP value:

1. Set **Auto Initiation** to **Disabled**.

2. Stop the stream by clicking **Stop**.

3. Select the **Custom DSCP** checkbox.

4. Enter the desired DSCP value (**0** to **63**).

5. Set **Auto Initiation** to **Enabled**. The stream automatically restarts.

NOTE: Deselecting the DSCP checkbox returns the DSCP value to the default setting.

**Stream Page - DSCP Configuration**
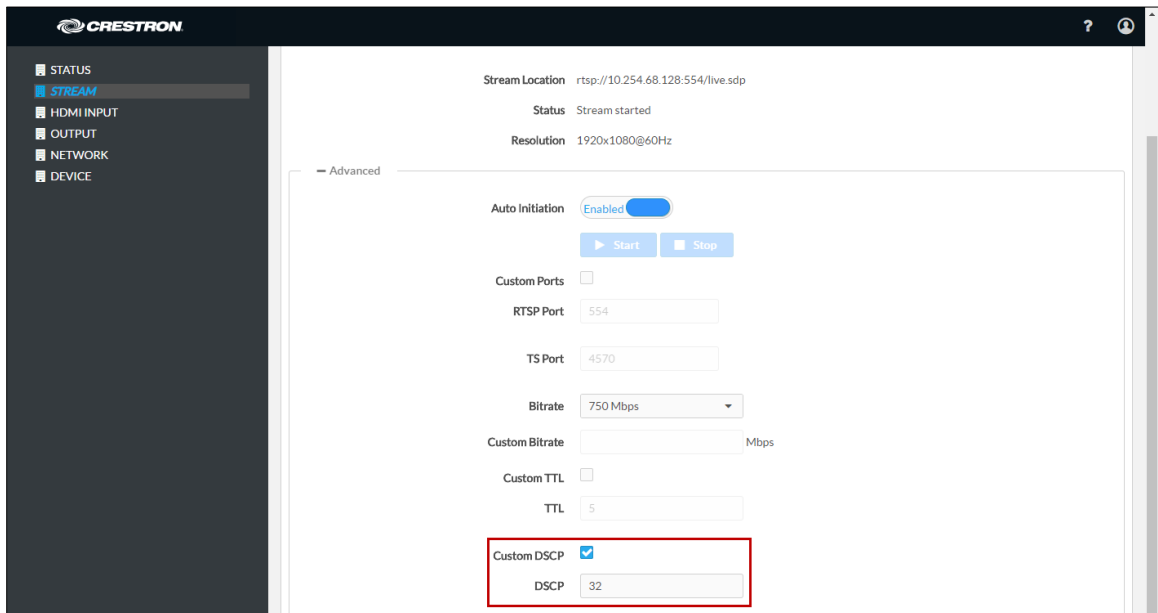
# EDID (Extended Display Identification Data)

> **NOTE:** EDID configuration is applicable to the DM-NVX-E30 and DM-NVX-E30C only.

EDID configuration allows management of the EDID that is to be sent to the upstream device connected to the HDMI input of the DM NVX device. If an EDID other than the default EDID is desired, use the web interface to configure the EDID.

Configure EDID on the HDMI INPUT page. In the **EDID** section of the page, select the desired EDID. For additional information, refer to the online help of the web interface.

**HDMI INPUT Page - EDID Configuration**

# Subscriptions

**NOTE:** Subscription configuration is applicable to the DM-NVX-D30, DM-NVX-D30C, and DM-NVX-D80-IOAV only.

Subscription of a DM NVX encoder to a DM NVX decoder sets up Real Time Streaming Protocol (RTSP) negotiation between the DM NVX decoder and the DM NVX encoder. When a stream is routed, the DM NVX decoder performs the Internet Group Management Protocol (IGMP) join, which causes the decoder to join the multicast group of the encoder. A maximum of 64 encoders can be subscribed to a single decoder.

To configure subscriptions, use the web interface or SIMPL Windows as discussed in the following sections.

## Using the Web Interface

Configure subscriptions on the Subscriptions and Routing pages:

1. On the Subscriptions page, do either of the following:

   - In the **Subscribed Streams** section, manually add each encoder that is to be subscribed to the decoder or load one or more existing subscription lists (*.xml). The default filename of the subscription list is subscription.xml.

     **NOTE:** Subscribed transmitters can be reordered in the list. To do so, click the encoder that is to be reordered in the list, and then click the up arrow ( ) or the down arrow ( ) until the encoder appears in the desired location in the list.

   - In the **Available Streams** section of the page, click **Subscribe Checked** or **Subscribe** for the encoders that are to be subscribed to the decoder.

   Subscriptions Page

2. In the **DM NVX Routing** section of the Routing page, select the desired encoder to be routed to the decoder.

**Routing Page**
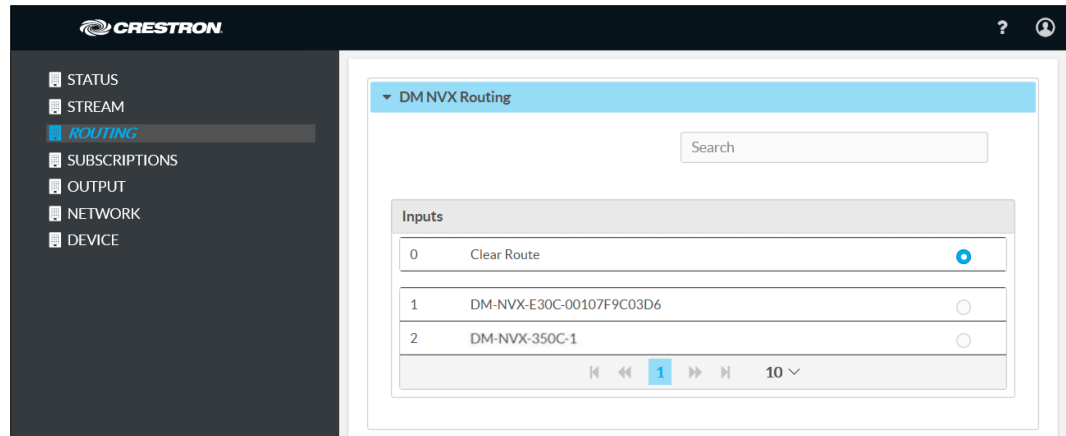


For additional information, refer to the online help of the web interface.

## Using SIMPL Windows

**NOTE:** Selection of the encoders for subscription or selection of subscription lists can be performed using the web interface only.

Manually select a subscribed encoder for routing in **Slot-1000: XIO Routing**. Set the **<VideoOut>** analog input join to the desired encoder. For additional information, refer to the SIMPL Windows help file.

# 7.1 Surround Sound Audio

DM NVX devices support the lossless transport of 7.1 surround sound audio, which includes Dolby® TrueHD, Dolby Atmos®, DTS HD®, DTS:X® and uncompressed linear PCM audio formats.

**NOTE:** The DM-NVX-D30, DM-NVX-D30C, and DM-NVX-D80-IOAV cannot accept downmixed audio from a DM-NVX-351 or DM-NVX-351C transmitter.

To configure 7.1 surround sound audio, set the desired EDID (refer to "EDID" on page 14).

# Analog Audio Output

> **NOTE:** Analog audio output configuration is applicable to the DM-NVX-E30(C) and DM-NVX-D30(C) only.

The analog audio output can provide a stereo line-level signal to feed a local sound system or sound bar. The output volume is adjustable via the web interface or SIMPL Windows.

## Using the Web Interface

Configure the volume of the analog audio output on the Output page. Set **Analog Audio Volume** to the desired volume.

**Output Page - Analog Settings Configuration**
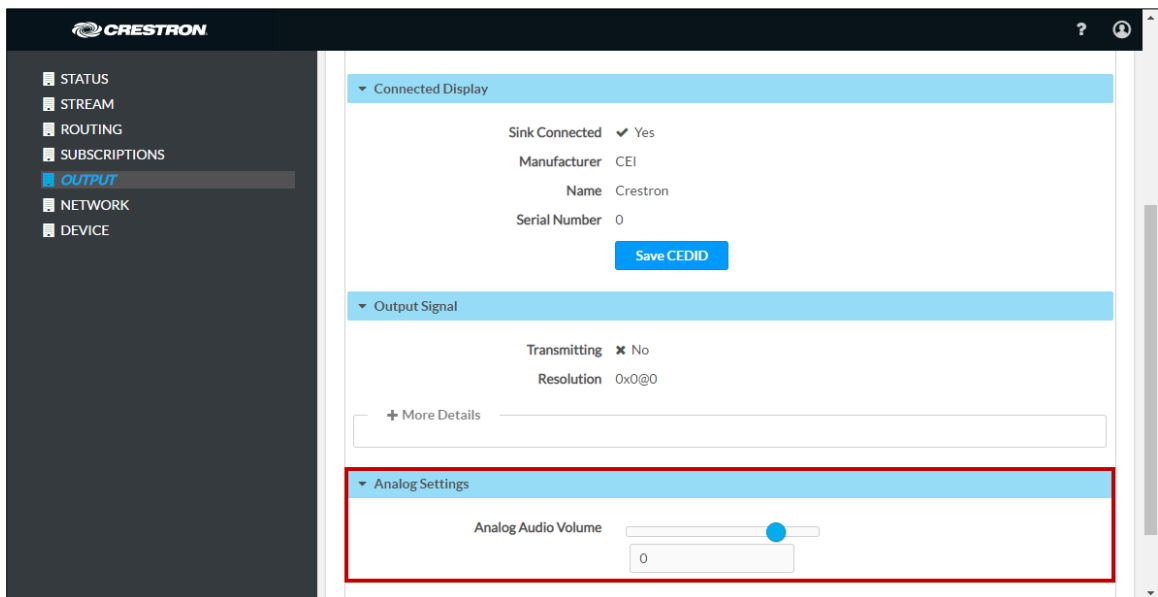


For additional information, refer to the online help of the web interface.

## Using SIMPL Windows

Using the top-level programming slot for the DM NVX device, set the **<AnalogAudioOutputVolume>** analog input join to the desired volume. For additional information, refer to the SIMPL Windows help file.

# USB 2.0 Routing

**NOTE:** USB routing is applicable to the DM-NVX-D80-IOAV only. The OPS port of the DM-NVX-D80-IOAV provides the connection for USB control.

The DM-NVX-D80-IOAV supports the extension of USB 2.0 signals. The OPS port of the DM-NVX-D80-IOAV includes USB 2.0 host port functionality, enabling the DM-NVX-D80-IOAV to function as a remote extender. The OPS port receives a USB signal from a KVM (keyboard, video, and mouse) device or other type of USB peripheral device. The USB signal is transported over the network to the USB 2.0 device port of a DM NVX device, which functions as the local extender and sends the USB signal to a USB host device (for example, a computer).

**NOTE:** In addition to KVM switch functionality, supported peripheral devices include touch screens, whiteboards, game controllers, cameras, mobile devices, headsets, and flash drives. 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 System Design Guide, Doc. 7977, for USB bandwidth considerations.

For OPS-supported displays with touch screen capability, the OPS port of the DM-NVX-D80-IOAV routes USB signals from the touch screen to a computer. For OPS-supported displays equipped with USB ports that connect to USB peripheral devices, the OPS port of the DM-NVX-D80-IOAV routes signals from the USB peripheral devices to host devices.

**NOTE:** Some OPS displays equipped with USB ports may not support USB routing from the OPS port.

USB 2.0 data transport can be configured for Layer 2 or Layer 3. For the DM-NVX-D80-IOAV, Layer 2 supports USB signal extension in point-to-point applications. (At the time of publication of this document, the DM-NVX-D80-IOAV does not support Layer 2 multipoint applications.)

For the DM-NVX-D80-IOAV, Layer 2 also supports the Crestron USB-EXT-DM-LOCAL Extender Module, 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.

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

To configure USB routing, use the web interface or SIMPL Windows as discussed in the following sections.

## Using the Web Interface

Configure USB routing on the USB routing page:

1. Determine the DM NVX devices that are to be paired:

   • One DM-NVX-35x(C) device functions as the local extender; that is, the DEVICE port connects to a computer or other host device.

   • One DM-NVX-D80-IOAV device functions as the remote extender with host port functionality for connection to a USB mouse, keyboard, or other peripheral device.

   Continue with the following steps for each DM NVX device.

2. In the **USB Mode** drop-down list, select **Local** for the DM-NVX-35x(C) local extender. For the DM-NVX-D80-IOAV, **USB Mode** is set to **Remote** by default and cannot be changed.

3. In the **Transport Mode** drop-down list, select either of the following:

   • **Layer 2:** Enables Layer 2 transport of USB 2.0 data. This mode is compatible with DM-NVX-35x(C) and DM-NVX-D80-IOAV devices as well as USB-EXT-DM extenders.

   • **Layer 3:** Enables Layer 3 transport of USB 2.0 data across VLANs. This mode is compatible with DM-NVX-35x(C) and DM-NVX-D80-IOAV devices only.

   For Layer 2 transport, the **Local Device ID** field displays the MAC address of the DM NVX device that is being configured. For Layer 3 transport, the **Local Device ID** field displays the IP address of the DM NVX device that is being configured.

4. Set **Automatic USB Pairing** to **Enabled** or **Disabled**.

   **NOTE:** When DM-NVX-35x(C) firmware is upgraded from version 2.0.3900.00056 or earlier to a later version, automatic USB pairing defaults to **Disabled**. If factory default settings are restored, automatic USB pairing is set to **Enabled**.

5. For DM-NVX-35x(C) devices in **Local** USB mode, do either of the following:

   • If **Transport Mode** is set to **Layer 2**:

      a. Set **Multiple Device Support** to **Disabled**. (At the time of publication of this document, the DM-NVX-D80-IOAV does not support Layer 2 multipoint applications.)

      b. In the **Remote Device ID** text box, enter the MAC address of a single remote extender.

   • If **Transport Mode** is set to **Layer 3**:

      In the **Remote Device ID** text box, enter the IP address of a single remote extender.

6.  For the DM-NVX-D80-IOAV in **Remote** USB mode, do either of the following:

    - In the **Remote Device ID** text box for **Layer 2** transport, enter the MAC address of the local extender.

    - In the **Remote Device ID** text box for **Layer 3** transport, enter the IP address of the local extender.

7.  (Applicable only when **Automatic USB Pairing** is set to **Disabled**) Click the **Pair** button for each DM NVX device to be paired. **Pairing Status** indicates *Not Paired* until the Pair button is clicked for each device. When devices are paired, the **Pairing Status** indicates *Paired.*

To remove pairing between DM NVX devices, do either of the following:

- If **Automatic USB Pairing** is set to **Disabled**, click the **UnPair** button for each device that is paired.

- If **Automatic USB Pairing** is set to **Enabled**, do either of the following:

  - For Layer 2, remove the current entry or enter `00:00:00:00:00:00` in the **Remote Device ID 1** text box.

  - For Layer 3, enter an unused IP address in the **Remote Device ID 1** text box.

**USB Routing Page (Layer 2 with Automatic USB Pairing Enabled)**
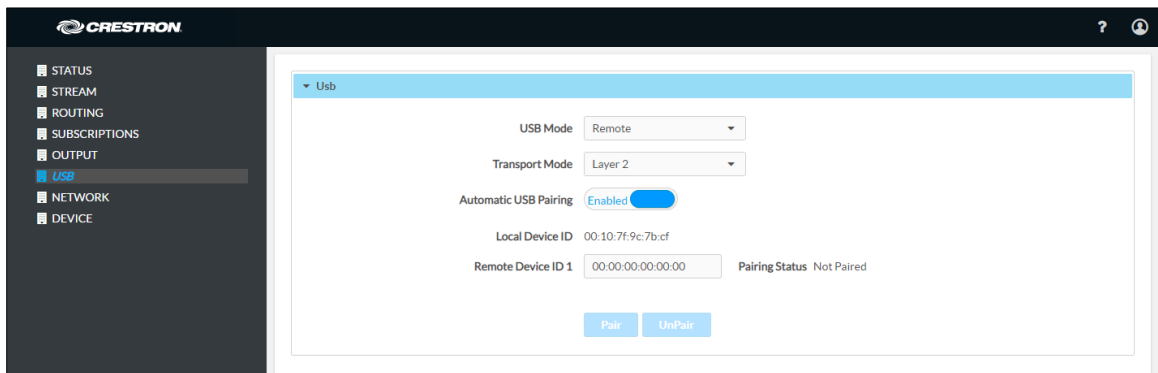


For additional information, refer to the online help of the web interface.

## Using SIMPL Windows

Using SIMPL Windows, configure USB routing in **Slot 30: USB**:

1.  Determine the DM-NVX-35x(C) devices that are to be paired:

    - One DM-NVX-35x(C) device functions as the local extender (LEX); that is, the DEVICE port connects to a computer or other host device.

    - One DM-NVX-D80-IOAV device functions as the remote extender (REX) with host port functionality for connection to a USB mouse, keyboard, or other peripheral device.

    Continue with the following steps for each DM NVX device.

2. Set the **<UsbMode>** analog input join to the appropriate mode: **0d = Local (LEX)** or **1d = Remote (REX)**. For the DM-NVX-D80-IOAV, set **USB Mode** to **1d = Remote (REX).** For the DM-NVX-35x(C) to be paired with the DM-NVX-D80-IOAV, set USB mode to **0d = Local (LEX)**.

3. Set the **<UsbTransportMode>** analog input join to the appropriate mode: **0d = Layer 2** (default) or **1d = Layer 3**.

   For Layer 2 transport, the **<UsbLocalDeviceId_F>** serial output join reports the corresponding MAC address of each DM-NVX-35x(C) device. For Layer 3 transport, the **<UsbLocalDeviceIpAddress_F>** serial output join reports the corresponding IP address of each DM-NVX-35x(C) device.

4. Do either of the following:

   • For Layer 2 transport:

     a. Copy the MAC address (UsbLocalDeviceId) of the LEX device into the **<UsbRemoteDeviceId>** serial input join on the REX device.

        On the REX device, the **<UsbRemoteDeviceId_F>** serial output join reports the MAC address of the LEX device to which the REX device is to be paired.

     b. Copy the MAC address (UsbLocalDeviceId) of the REX device into the **<UsbRemoteDeviceId>** serial input join on the LEX device.

        On the LEX device, the **<UsbRemoteDeviceId_F>** serial output join reports the MAC address of the REX device to which the LEX device is to be paired.

   • For Layer 3 transport:

     a. Copy the IP address (UsbLocalDeviceIpAddress) of the LEX device into the **<UsbRemoteDeviceIpAddress>** serial input join on the REX device.

        On the REX device, the **<UsbRemoteDeviceIpAddress_F>** serial output join reports the IP address of the LEX device to which the REX device is to be paired.

     b. Copy the IP address (UsbLocalDeviceIpAddress) of the REX device into the **<UsbRemoteDeviceIpAddress>** serial input join on the LEX device.

        On the LEX device, the **<UsbRemoteDeviceIpAddress_F>** serial output join reports the IP address of the REX device to which the LEX device is to be paired.

5. Do either of the following:

   • Trigger the **<Pair>** digital input join on each DM NVX device (LEX and REX).

   • Trigger the **<AutomaticUSBPairingEnabled>** digital input join on each DM NVX device (LEX and REX).

To remove pairing between DM NVX devices, do either of the following:

- If automatic USB pairing is not enabled, trigger the **<RemovePairing>** digital input join on each DM NVX device.

- If automatic USB pairing is enabled, do either of the following:

  - For Layer 2, enter `00:00:00:00:00:00` or an empty string into the **<UsbRemoteDeviceId>** serial input join.

  - For Layer 3, enter an unused IP address into the **<UsbRemoteDeviceIpAddress>** serial input join.

For additional information about configuration of USB routing, refer to the SIMPL Windows help file.

# Crestron XiO Cloud Service Connection

The Crestron XiO Cloud™ service allows supported Crestron devices across an enterprise to be managed and configured from one central and secure location in the cloud. Connection to the Crestron XiO Cloud service can be enabled or disabled using the web interface.

Configure the connection to the Crestron XiO Cloud service on the Device page. In the **Cloud Settings** section of the page, set **Cloud Configuration Service Connection** to **Enabled** (default setting) or **Disabled**.

**Device Page – Cloud Configuration Service Connection**
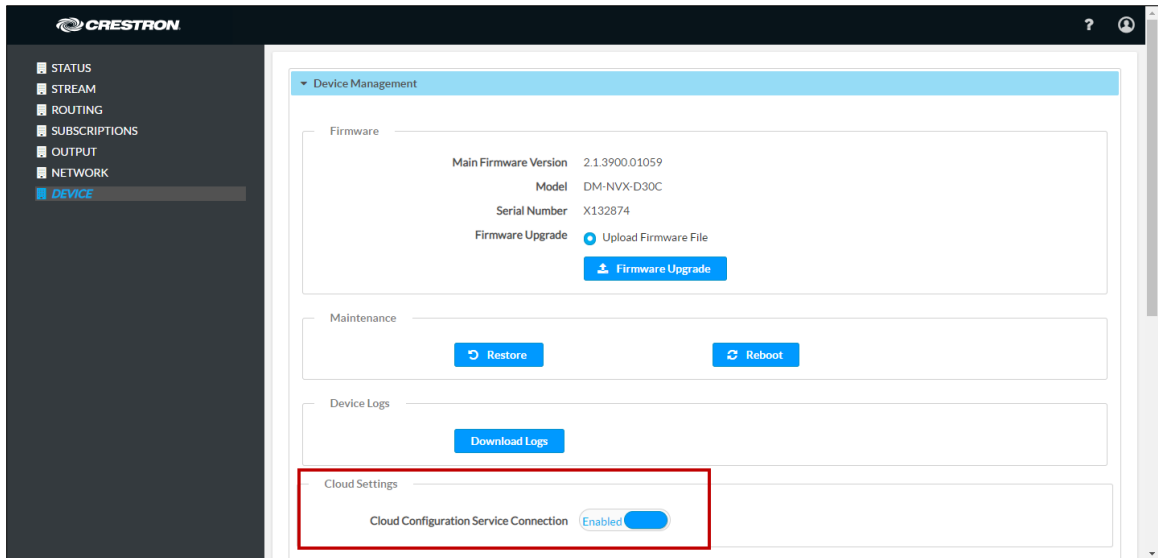


When **Cloud Configuration Service Connection** is set to **Enabled**, connection to the Crestron XiO Cloud service is allowed. For instructions about connecting to the service, refer to the DM-NVX-E30/DM-NVX-D30 Quick Start (Doc. 8211), DM-NVX-E30C/ DM-NVX-D30C Quick Start (Doc. 8346), or DM-NVX-D80-IOAV Quick Start (Doc. 8526) as appropriate. For information about using the service, refer to the Crestron XiO Cloud User Guide (Doc. 8214). The documents are available at www.crestron.com/manuals.

# Enterprise-Grade Security

DM NVX devices incorporate advanced security features such as IEEE 802.1X authentication, user and group authentication management, AES-128 content encryption, PKI authentication, TLS (Transport Layer Security), SSH (Secure Shell), and HTTPS (Hypertext Transfer Protocol Secure) to provide enterprise-grade security.

Configure IEEE 802.1X authentication as well as user and group authentication management using the web interface.

## IEEE 802.1X Authentication

IEEE 802.1X is a network standard designed to enhance the security of wireless and wired LANs. The standard defines how to provide authentication for devices trying to connect to other devices on the LAN.

Configure IEEE 802.1X authentication in the **802.1x Configuration** section of the Network page. For detailed information, refer to the online help of the web interface.

Network Page – IEEE 802.1X Configuration

# Authentication Management

Authentication management can be configured for users and groups including Active Directory® credential management groups. Predefined access levels can also be assigned.

Configure authentication management in the **Authentication Management** section of the Device page. For detailed information, refer to the online help of the web interface.

**Device Page – Authentication Management**

# Fan Control

> **NOTE:** Fan control is applicable to the DM-NVX-D30 and DM-NVX-D80-IOAV only.

Configure fan control or view fan status using the web interface or SIMPL Windows.

## Using the Web Interface

Configure fan control on the Device page. In the **Fan Control** section, set **Fan Mode** to one of the following:

- **Auto:** (Default setting) The fan automatically turns off when the following two conditions exist:

  1. No video stream is present.

  2. The internal temperature of the device does not exceed the normal operating range.

- **Always On:** The fan runs continuously regardless of video stream status and internal temperature of the device.

Fan status is indicated as either of the following:

- **Full On:** The fan is running.

- **Off:** The fan is not running.

**Device Page – Fan Control**
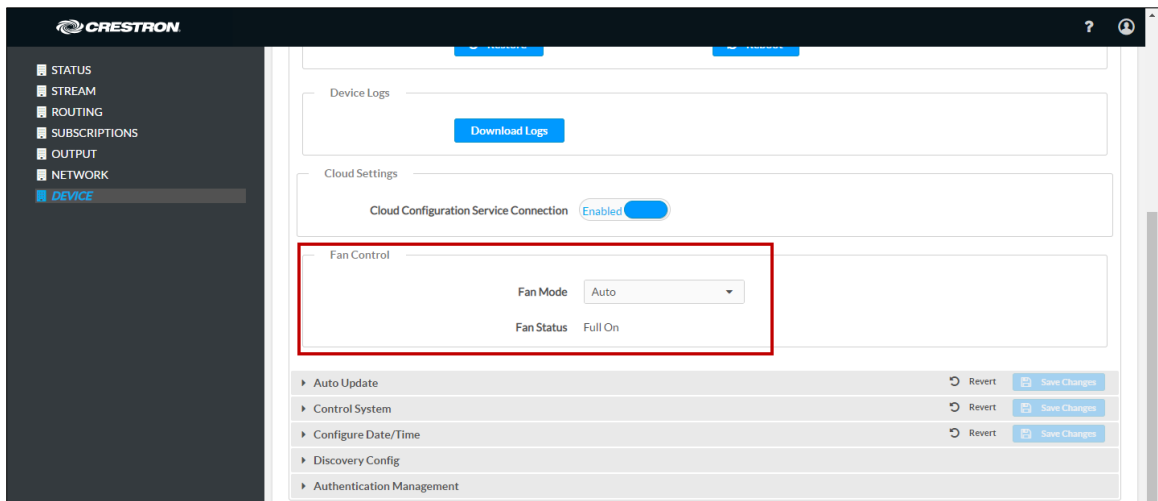


## Using SIMPL Windows

Using the top-level programming slot for the DM-NVX-D30, set the **<FanControl>** analog input join to the desired setting. The **<FanControl_F>** analog output join reports the fan mode of operation. The **<FanStatus_F>** analog output join reports the fan status. For additional information, refer to the SIMPL Windows help file.

# Automatic Firmware Update

A DM NXV device can be automatically updated with the latest firmware at scheduled intervals. To configure automatic firmware update:

1. Using the Crestron Auto Update Tool, generate a manifest file (*. mft). The file is placed on an FTP (File Transfer Protocol) or SFTP (Secure File Transfer Protocol) server.

2. Using the DM NVX web interface, configure automatic firmware update in the **Auto Update** section of the Device page:

   a. Set **Auto Update** to **Enabled**.

   b. In the **Custom URL Path** text box, enter the path to the manifest file in the following FTP or SFTP URL format:

      ftp://*username*:*password*@*host*:*port*/*path*/*filename*

      or

      sftp://*username*:*password*@*host*:*port*/*path*/*filename*

      where:

      - *username* is the username on the FTP or SFTP server

      - *password* is the password for the username

      - *host* is the fully qualified domain name or IP address of the FTP or SFTP server

      - *port* is the connection port on the host

      **NOTE:** The default FTP port number is 21. The default SFTP port number is 22. Entry of a port number is necessary only if the port number differs from the default value of 21 or 22.

      - *path* is the path to the manifest file

      - *filename* consists of the name and extension (.mft) of the manifest file

   c. Set a schedule for the automatic firmware update by doing either of the following:

      - Select the desired **Day of Week** and **Time of Day** (24-hour format) values.

      - Set the **Poll Interval** by entering a value from **60** to **65535** minutes. A value of **0** disables the Poll Interval.

3. Click **Save Changes**.

Clicking **Update Now** causes the firmware to be updated at the current time; however, the schedule that is set in step 2c above remains in effect.
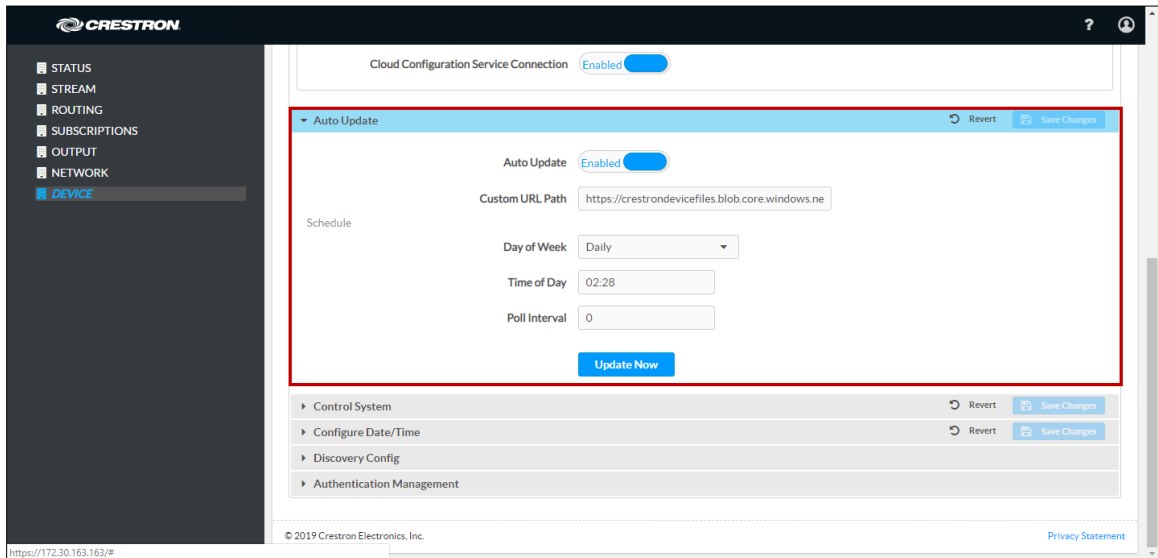
# HDCP 2.2 Compliance

DM NVX devices are HDCP 2.2 compliant. HDCP 2.2, commonly referred to as HDCP 2, is the next generation of HDCP (High-Bandwidth Digital Content Protection). Note the following about HDCP 2:

- Compared to HDCP 1, HDCP 2 brings a higher level of cryptographic protection to HDMI technology.

- HDCP 2 is **not** HDMI 2. It is possible to have a system built on HDCP 1 and HDMI 2 or on HDCP 2 and HDMI 2.

- Although not all 4K content requires HDCP 2, most 4K consumer video content does require HDCP 2.

- Any product that supports HDCP 2 also supports HDCP 1.

- HDCP matters only when the source demands HDCP. If the source demands HDCP 2, then every device in the signal path must support HDCP 2.

- There are no issues related to HDCP 2 and cabling—all cables are compatible.

# IGMP Snooping

A DM NVX device sends IGMP join and leave messages.

NOTE: DM NVX devices support IGMPv2 and IGMPv3 only. IGMPv1 is not supported.

The IGMP snooping support version (v2 or v3) is configurable in the web interface. The **Network Interface** section of the Network page allows the desired version to be selected. The default setting is **v2**.

Network Page - Network Interface



NOTE: When a different IGMP snooping support version is selected, the DM NVX device must be rebooted in order for the change to take effect.

The network switch port that connects to a DM NVX device must be enabled with IGMPv2 or IGMPv3 snooping to prevent the switch from flooding the multicast destination address traffic to all other connected ports. The multicast destination address that is configured for the DM NVX device must be within the range of qualified addresses. An upstrea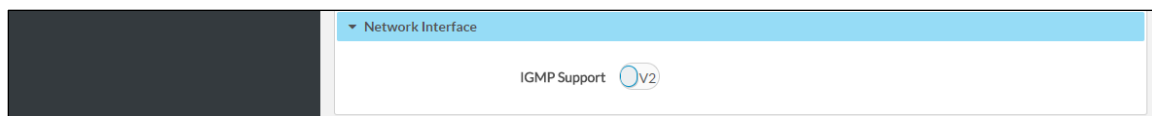m device such as a layer 3 router or switch periodically sends the IGMP General Query messages to hosts in order to maintain group membership state information. These queries can be either general or group-specific queries. The host responds to queries with IGMP membership reports. The host running IGMPv2 or IGMPv3 may also send a Leave Group message to routers or switches in order to withdraw from the group.

NOTES:

- DM NVX devices do not support random-timer and source-specific queries.

- As a host, a DM NVX device configured for support of IGMPv3 is compatible with a network switch (IGMP querier) that is configured for IGMPv2.

IGMP snooping switches build forwarding lists by listening for and, in some cases, intercepting IGMP messages. Although the software processing the IGMP messages may maintain state information based on the full IP group addresses, the forwarding tables are typically mapped to link layer addresses as shown in the following example.

Example of Forwarding Table

| MULTICAST MAC ADDRESS | MEMBER PORTS |
|---|---|
| 01-00-5E-00-00-01 | 2, 7 |
| 01-00-5E-01-02-03 | 1, 2, 3, 7 |
| 01-00-5E-23-E2-05 | 1, 4 |

Because only the least significant 23 bits of the IP address are mapped to Ethernet addresses (RFC 1112), there is a loss of information when forwarding solely on the destination MAC address. For example, IP addresses 224.0.0.123 and 239.128.0.123 and similar IP multicast addresses all map to MAC address 01-00-5e-00-00-7b for Ethernet.

As a result, IGMP snooping switches may collapse IP multicast group memberships into a single Ethernet multicast membership group.

In addition to building and maintaining lists of multicast group memberships, the snooping switch must also maintain a list of multicast routers. When multicast packets are forwarded, the packets should be forwarded not only on ports that have expressed joins using IGMP but also on ports to which multicast routers are attached.

### NOTES:

- Do not assign reserved multicast IP addresses to a DM NVX device for streaming. For additional information, go to https://www.iana.org/assignments/multicast-addresses/multicast-addresses.txt.

- Multicast collision is a concern with IPv4. For example, multicast IPv4 addresses 224.8.7.6 and 229.136.7.6 translate to the same MAC address (01:00:5E:08:07:06).

The following items provide recommendations for configuration of a network switch for IGMP snooping:

- Set the IGMP query interval to 60 seconds or 125 seconds. The recommended setting is the default setting of the network switch.

- For good network performance, ensure that there is only one IGMP querier in the network.

- Set IGMP snooping to v2 or v3.

- Enable IGMP snooping globally as well as for each specific VLAN for DM NVX connected ports.

- Configure the network switch to drop unknown multicast packets.

- If the network switch supports IGMP fast leave, enable the configuration at the port, global, or VLAN level.

- If the network switch supports PIM snooping, enable the configuration to prevent flooding IP multicast traffic toward multicast router (mrouter) ports.

# Troubleshooting

The following table provides troubleshooting information. If further assistance is required, contact a Crestron customer service representative.

DM NVX Encoder/Decoder Troubleshooting

| PROBLEM | POSSIBLE CAUSE(S) | CORRECTIVE ACTION(S) |
|---|---|---|
| 4K60 4:4:4 2-channel non-HDR or 4K60 4:4:4 2-channel HDR video is intermittent. | The display device is not configured properly. | Configure the display device properly. Refer to the display device documentation for proper configuration to support 4K60 4:4:4 2-channel non-HDR or 4K60 4:4:4 2-channel HDR video. |
| | A Crestron HDMI cable is not being used. | Use a Crestron HDMI cable only. |
| | The Crestron HDMI cable exceeds the maximum length of 20 ft (6.1 m). | Use a Crestron HDMI cable that does not exceed 20 ft (6.1 m). |
| The display flashes to a black screen momentarily. | Switching between HDR and non-HDR content is occurring. | No action required. Flashing to a black screen may occur on certain TVs. |
| The video is not being displayed, but the audio can be heard. | The HDCP settings of one or more DigitalMedia™ devices in the signal path do not support the HDCP level of the source. | Ensure that the HDCP settings of all DigitalMedia devices in the signal path support the HDCP level of the source. |
| | The display does not support the HDCP level of the source. | Ensure that the display supports the HDCP level of the source. |
| The video is intermittent. | The HDMI or Ethernet cable connections are faulty. | Verity that all cables are connected securely. |
| (Applicable to the DM-NVX-E30 and DM-NVX-E30C) A message indicating that the resolution is unsupported appears on the display. | The incorrect EDID is selected for the HDMI input. | Select the correct EDID. |
| | The resolution of the HDMI input is not supported. | Change the resolution of the input. |
| There is no video or audio. | Cable connections are faulty. | Verify that all cables are connected securely. |
| | The incorrect EDID is selected for the HDMI input. | Select the EDID supported by the devices in the signal path. |
| | The HDCP settings of one or more DigitalMedia devices in the signal path do not support the HDCP level of the source. | Ensure that the HDCP settings of all DigitalMedia devices in the signal path support the HDCP level of the source. |
| | (DM-NVX-D80-IOAV only) The input source of the display is not set to use the DM-NVX-D80-IOAV in the OPS slot. | Set the input source to use the DM-NVX-D80-IOAV in the OPS slot. |
| When the remote control of the display is used to turn off the display, the PWR LED on the DM-NVX-D80-IOAV turns off. | The OPS power setting of the display is turned off when the display is turned off. | Set the OPS power option to On. |

(Continued on following page)

**DM NVX Encoder/Decoder Troubleshooting (Continued)**

| PROBLEM | POSSIBLE CAUSE(S) | CORRECTIVE ACTION(S) |
|---|---|---|
| The analog audio output is not functioning. | (Applicable to compatible DM-NVX-35x[C] encoders/decoders only) The analog audio mode is set to insert audio. | Set the analog audio mode to extract audio. |
| | (Applicable to compatible DM-NVX-35x[C] encoders only) An incorrect audio source is selected. | Set the audio source to analog audio. |
| | The audio is multichannel on a DM-NVX-E30 or DM-NVX-E30C, which do not downmix a 2-channel signal from a multichannel surround sound source. | Switch the audio input to 2-channel audio. |
| The video flickers or drops when the DM NVX device is touched or when metal in the vicinity of the device is touched. | The DM NVX device is not properly grounded. | Properly ground the DM NVX device. |
| The DM NVX device indicates that the stream has started, but video is not being displayed. | Neither IGMPv2 nor IGMPv3 is enabled in the IGMP snooping configuration. | Ensure that IGMPv2 or IGMPv3 is enabled on the network switch. |
| Video is flickering or video is not displayed when multiple DM NVX devices connect to a network switch. | Neither IGMPv2 nor IGMPv3 snooping is enabled in the network switch for the associated port or VLAN. | Enable IGMPv2 or IGMPv3 snooping in the correct VLAN. |
| Video is flickering when multiple DM NVX transmitters connect to a network switch. | The IGMP filter is not set to drop an unknown multicast IP address. | Configure the network switch to drop the unknown multicast IP address. |
| A DM NVX multicast stream stopped. | The multicast address is not set properly on the DM NVX device | Ensure that the multicast address is not a duplicate of a multicast address that is set on another DM NVX device. Use a valid multicast address on the DM NVX device. |
| DM NVX streaming video is not seen in the receiver. | The DM NVX receiver is not configured with the correct streaming URL and multicast IP address. | Configure the DM NVX receiver using the correct streaming URL and multicast IP address. |
| Video stops suddenly, and the IGMP reports disappear in the network switch. | The IGMP querier is not configured correctly. | Configure the IGMP querier correctly. The recommended setting is the default setting of the network switch. |

If, for any reason, the factory default settings of a DM NVX device must be restored, do one of the following:

- On the Device page of the web interface, click the **Restore** button.

- From the **Tools** menu in the Crestron Toolbox software, select **Text Console** and issue the **restore** command.

- Power cycle the device 10 times. After the tenth power cycle, wait until the device boots and then press the **SETUP** button for 5 seconds.

# Appendix: Device Discovery

A DM NVX device can be discovered on the network by using the Device Discovery Tool within the Crestron Toolbox software. To discover a DM NVX device:

1. Open the Crestron Toolbox software.

2. From the **Tools** menu, select **Device Discovery Tool**.

   **NOTES:**

   - You can also access the Device Discovery Tool by clicking the Device Discovery Tool button ( ) in the Crestron Toolbox software toolbar.

   - The security software running on the computer may send a program alert regarding the attempt of the Crestron Toolbox software to connect to the network. Allow the connection so that the Device Discovery Tool can be used.

   The DM NVX device is discovered and is listed in the device list on the left side of the screen. The associated host name, IP address, and firmware version are also displayed.

3. In the Device Discovery Tool list, double-click the name of the DM NVX device (**DM-NVX-E30, DM-NVX-D30, DM-NVX-E30C, DM-NVX-D30C, or DM-NVX-D80-IOAV**).

   The Authentication dialog box opens.

4. Do the following:

   a. Enter a user name and password. The default user name and password are both *admin*.
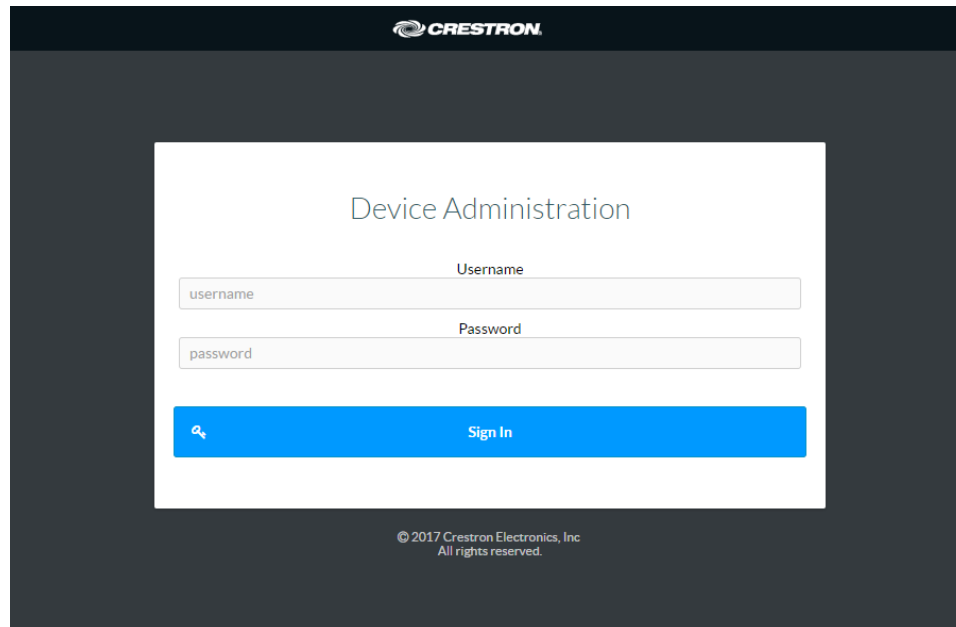
   b. Click **OK**.

   A configuration pane appears for the DM NVX device.

5. Click the **Web Configuration** button in the **Configuration** page that appears on the left side of the Device Discovery Tool.

   **NOTE:** A warning indicating a security certificate problem or privacy error may appear. Ignore the warning and continue to access the web interface of the DM NVX device.

   The Device Administration login page opens.

**Device Administration Login Page**



6.   Enter the user name and password. The default user name and password are both *admin*.

    **NOTE:** The user name and password are case sensitive.

7.   Click **Sign In**.

    The Status page of the DM NVX device opens. For additional information, refer to the online help of the web interface.

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Crestron Electronics, Inc.                                    Product Manual – DOC. 8425B
15 Volvo Drive, Rockleigh, NJ 07647                                            (2053136)
Tel: 888.CRESTRON                                                               11/01/19
Fax: 201.767.7576                                                    Specifications subject to
www.crestron.com                                                  change without notice.