DM NVX® Network AV Encoders/Decoders

DM-NVX-350
DM-NVX-351
DM-NVX-352
DM-NVX-350C
DM-NVX-351C
DM-NVX-352C

Product Manual

Crestron Electronics, Inc.

Original Instructions
The U.S. English version of this document is the original instructions.
All other languages are a translation of the original instructions.

The product warranty can be found at www.crestron.com/legal/sales-terms-conditions-warranties.

The specific patents that cover Crestron products are listed at www.crestron.com/legal/patents.

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

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 then decoded to achieve imperceptible end-to-end latency of less than 1 frame.

DM-NVX-35x(C) encoders/decoders consist of the following:

- Surface-mountable endpoints: DM-NVX-350, DM-NVX-351, and DM-NVX-352. Compact in design, the endpoints are designed to fit in various locations, for example, behind a flat panel display.
- Card endpoints: DM-NVX-350C, DM-NVX-351C, and DM-NVX-352C. The cards are designed to occupy the DMF-CI-8 card chassis.

The DM-NVX-351 and DM-NVX-351C provide the same functionality as the DM-NVX-350 and DM-NVX-350C with the addition of surround sound to stereo downmixing. The DM-NVX-352 and DM-NVX-352C provide the same functionality as the DM-NVX-350 and DM-NVX-350C with the addition of Dante® audio networking. All DM-NVX-35x(C) devices offer encoding and decoding capabilities in a single unit.

This manual provides information about the following:

- Physical description
- Configuration and status
- 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 DM-NVX-35x(C) installation information, refer to the following documents as applicable:

- DM-NVX-350, DM-NVX-351, and DM-NVX-352 Quick Start (Doc. 8391)
- DM-NVX-350C, DM-NVX-351C, and DM-NVX-352C Quick Start (Doc. 8392)

For information about designing a DM NVX system, refer to the DM NVX AV-over-IP System Design Guide (Doc. 7977).

Physical Description

The following sections provide information about the connectors, controls, and indicators that are available on DM-NVX-35x(C) devices.

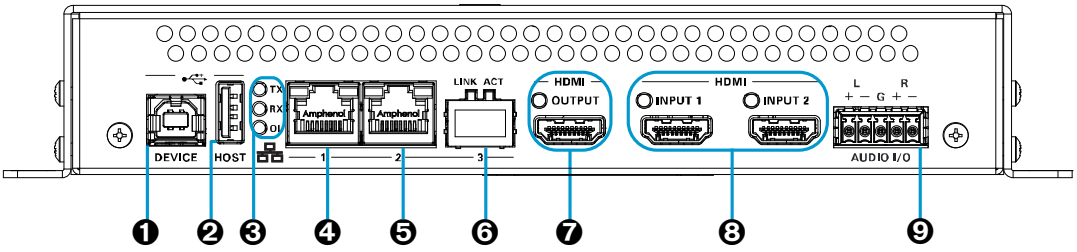
DM-NVX-350, DM-NVX-351, and DM-NVX-352

This section provides information about the front and rear panels of the DM-NVX-350, DM-NVX-351, and DM-NVX-352.

Front Panel, DM-NVX-350 and DM-NVX-351

The following illustration shows the front panel of the DM-NVX-350 and DM-NVX-351.

DM-NVX-350 and DM-NVX-351 Front Panel



❶ **DEVICE:** USB Type B connector, female;
USB 2.0 device port;
USB signal extender port for connection to a computer or other USB 2.0 host*

❷ **HOST:** 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;*
Available Power: 500 mA at 5 VDC

* The DEVICE and HOST ports cannot be used simultaneously.

❹ **LAN 1:** 8-pin RJ-45 connector, female;
100BASE-TX/1000BASE-T Ethernet port;[1]
PD (powered device) port compatible with UPOE compliant Ethernet switch, Crestron DM-PSU-ULTRA-MIDSPAN, or approved third-party PSE;[2]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **LAN 2:** 8-pin RJ-45 connector, female;
100BASE-TX/1000BASE-T Ethernet port;[1]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❻ **LAN 3:** SFP port;
Accepts one Crestron SFP-1G Series SFP transceiver module;[3]
Green LINK LED indicates Ethernet link status;
Green ACT LED indicates Ethernet activity

❼ **HDMI OUTPUT:** 19-pin HDMI® Type A connector, female;
HDMI digital video/audio output (DVI compatible);[4,5]
Green LED indicates video signal transmission at the HDMI output

❽ **HDMI INPUTS 1–2:** 19-pin HDMI Type A connectors, female;
HDMI digital video/audio inputs (DVI and Dual-Mode DisplayPort™ compatible);[4, 5]
Two green LEDs, each indicates sync detection at the corresponding HDMI input

❾ **AUDIO I/O:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio input or output;
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

[1] Either LAN 1 or LAN 2 can be used as the primary LAN connection, allowing the other port to be used for connection to a local network device or to another DM NVX device. If one of the ports is used as the primary LAN connection, the port requires connection to a 1000BASE-T switch in order to stream network video.

[2] The DM-NVX-350 and DM-NVX-351 can be powered by the connection of LAN 1 to a UPOE compliant Ethernet switch, a Crestron DM-PSU-ULTRA-MIDSPAN, or other Crestron approved power injector (sold separately). For additional information, refer to Answer ID 5791 in the Online Help section of the Crestron website (www.crestron.com/onlinehelp). The DM-NVX-350 and DM-NVX-351 can also be powered using the included power pack.

[3] LAN 3 can be used as the primary LAN connection or can be connected to another DM NVX device. LAN 3 can connect to a fiber-optic network using the appropriate Crestron SFP-1G transceiver module (sold separately). Refer to the SFP-1G Series Installation Guide (Doc. 7979) for information about installing Crestron SFP-1G Series transceiver modules.

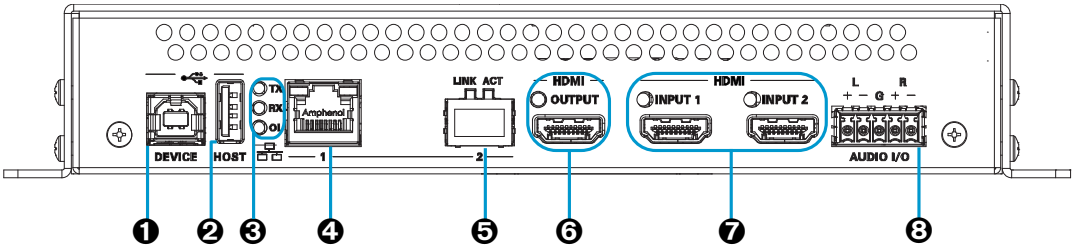
[4] HDMI connections require an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.

[5] Device control via CEC requires the use of a Crestron 3-Series® or later control system.

Front Panel, DM-NVX-352

The following illustration shows the front panel of the DM-NVX-352.

DM-NVX-352 Front Panel



❶ **DEVICE:** USB Type B connector, female;
USB 2.0 device port;
USB signal extender port for connection to a computer or other USB 2.0 host[1]

❷ **HOST:** 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;[1]
Available Power: 500 mA at 5 VDC

❸ **TX, RX, and OL LEDs:** Green TX LED indicates that unit is in transmitter (encoder) mode;
Green RX LED indicates that unit is in receiver (decoder) mode;
Green OL LED indicates an online connection to a control system via Ethernet

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PD (powered device) port compatible with UPOE compliant Ethernet switch, Crestron DM-PSU-ULTRA-MIDSPAN, or approved third-party PSE;[3]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **LAN 2:** SFP port;
Accepts one Crestron SFP-1G Series SFP transceiver module;[2, 4]
Green LINK LED indicates Ethernet link status;
Green ACT LED indicates Ethernet activity

[1] The DEVICE and HOST ports cannot be used simultaneously.
[2] Either LAN 1 or LAN 2 can be used as the primary LAN connection, allowing the other port to be used for connection to a local network device or to another DM NVX device. The port that is used as the primary LAN connection requires connection to a 1000BASE-T switch in order to stream network video.
[3] The DM-NVX-352 can be powered by the connection of LAN 1 to a UPOE compliant Ethernet switch, a Crestron DM-PSU-ULTRA-MIDSPAN, or other Crestron approved power injector (sold separately). For additional information, refer to Answer ID 5791 in the Online Help section of the Crestron website (www.crestron.com/onlinehelp). The DM-NVX-352 can also be powered using the included power pack.
[4] LAN 3 can connect to a fiber-optic network using the appropriate Crestron SFP-1G transceiver module (sold separately). Refer to the SFP-1G Series Installation Guide (Doc. 7979) for information about installing Crestron SFP-1G Series transceiver modules.

❻ **HDMI OUTPUT:** 19-pin HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible);[1, 2]
Green LED indicates video signal transmission at the HDMI output

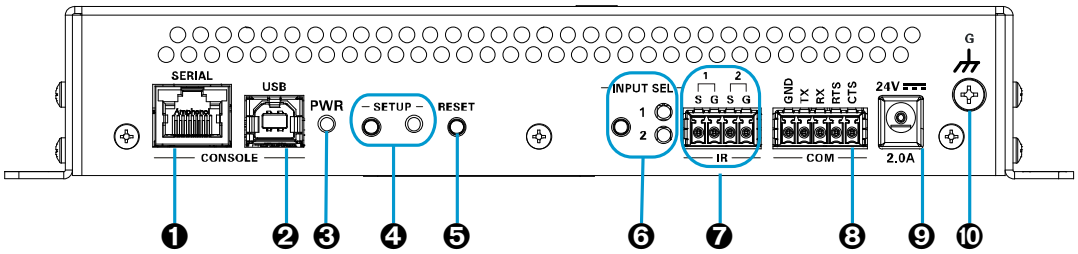
❼ **HDMI INPUTS 1–2:** 19-pin HDMI Type A connectors, female;
HDMI digital video/audio inputs (DVI and Dual-Mode DisplayPort compatible);[1, 2]
Two green LEDs, each indicates sync detection at the corresponding HDMI input

❽ **AUDIO I/O:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio input or output;
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

Rear Panel

The following illustration shows the rear panel of the DM-NVX-350, DM-NVX-351, and DM-NVX-352.

DM-NVX-350, DM-NVX-351, and DM-NVX-352 Rear Panel



❶ **CONSOLE, SERIAL:** 8-pin RJ-45 connector, female;
RS-232 computer console port for setup

❷ **CONSOLE, USB:** USB Type B connector, female;
USB 2.0 computer console port for setup

❸ **PWR:** Bicolor green/amber LED, indicates operating power supplied via the power pack (included), UPOE compliant Ethernet switch, or injector/PSE, lights amber while booting and green when operating

[1] HDMI connections require an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.
[2] Device control via CEC requires the use of a Crestron 3-Series® or later control system.

NOTES:

- When a DM-NVX-35x decoder is connected to a DM-NVX-35x(C), DM-NVX-36x(C), or DM-NVX-E30(C) encoder, pressing the **SETUP** button on the decoder for less than 10 seconds displays the decoder IP address on the display connected to the HDMI output of the decoder.
- When a DM-NVX-35x encoder is connected to a DM-NVX-35x(C) decoder, pressing the **SETUP** button on the encoder for less than 10 seconds displays the encoder IP address on the display connected to the HDMI output of the encoder. In addition, the decoder IP address is shown on the display connected to the HDMI output of the decoder.
- When a DM-NVX-35x encoder is connected to a DM-NVX-36x(C), DM-NVX-D30(C) or DM-NVX-D80-IOAV decoder, pressing the **SETUP** button on the encoder for less than 10 seconds displays the encoder IP address on the display connected to the HDMI output of the encoder. Both encoder and decoder IP addresses are shown on the display connected to the HDMI output of the decoder.
- When the **SETUP** button is pressed for 10 seconds, a message appears on the display stating that the button must be pressed again to change the operating mode. Pressing the button a second time changes the operating mode from a receiver (decoder) to a transmitter (encoder) or from a transmitter to a receiver and reboots the device.

  The **SETUP** button can be used to change the operating mode only if **Device Mode Lock** is disabled in the **System Setup** section under the **Settings** tab. For additional information, refer to "Device Mode Locking" on page 70.

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

❻ **INPUT SEL:** Push button for manual input selection and two bicolor green/amber LEDs. Green LED indicates that the corresponding input is selected. Amber LED indicates that the corresponding input is detected but is not selected.

❼ **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

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

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

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

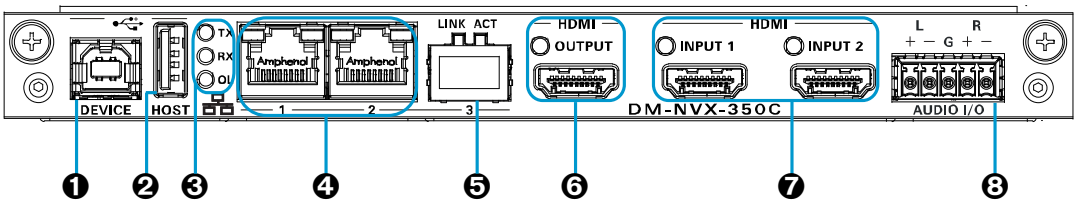
* Device control via IR and RS-232 requires integration with a Crestron 3-Series or later control system.

DM-NVX-350C and DM-NVX-351C

The following illustration shows the connectors, controls, and indicators that are available on the DM-NVX-350C and DM-NVX-351C.

NOTE: The DM-NVX-350C and DM-NVX-351C contain the same connectors, controls, and indicators. For illustrative purposes, only the card named **DM-NVX-350C** is shown below.

DM-NVX-350C



❶ **DEVICE:** 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[1]

❷ **HOST:** 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;[1]
Available Power: 500 mA at 5 VDC

❸ **TX, RX, and OL LEDs:** Green TX LED indicates that unit is in transmitter (encoder) mode;
Green RX LED indicates that unit is in receiver (decoder) mode;
Green OL LED indicates an online connection to a control system via Ethernet

❹ **LAN 1–2:** 8-pin RJ-45 connectors, female;
100BASE-TX/1000BASE-T Ethernet ports[2]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **LAN 3:** SFP port;[2]
Accepts one Crestron SFP-1G Series SFP transceiver module;[3]
Green LINK LED indicates Ethernet link status;
Green ACT LED indicates Ethernet activity

[1] The DEVICE and HOST ports cannot be used simultaneously.
[2] Either LAN 1 or LAN 2 can be used as the primary LAN connection, allowing the other port to be used for connection to a local network device or to another DM NVX device. If one of the ports is used as the primary LAN connection, the port requires connection to a 1000BASE-T switch in order to stream network video.
[3] LAN 3 can be used as the primary LAN connection or can be connected to another DM NVX device. LAN 3 can connect to a fiber-optic network using the appropriate Crestron SFP-1G transceiver module (sold separately). Refer to the SFP-1G Series Installation Guide (Doc. 7979) for information about installing Crestron SFP-1G Series transceiver modules.

❻ **HDMI OUTPUT:** 19-pin HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible)[1, 2]
Green LED indicates video signal transmission at the HDMI output

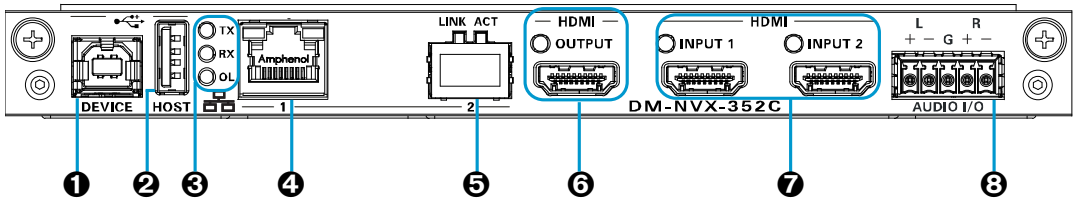
❼ **HDMI INPUTS 1–2:** 19-pin HDMI Type A connectors, female;
HDMI digital video/audio inputs (DVI and Dual-Mode DisplayPort compatible)[1, 2]
Two green LEDs, each indicates sync detection at the corresponding HDMI input

❽ **AUDIO I/O:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio input or output;
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

DM-NVX-352C

The following illustration shows the connectors, controls, and indicators that are available on the DM-NVX-352C.

DM-NVX-352C



❶ **DEVICE:** 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[3]

❷ **HOST:** 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;[3]
Available Power: 500 mA at 5 VDC

❸ **TX, RX, and OL LEDs:** Green TX LED indicates that unit is in transmitter (encoder) mode;
Green RX LED indicates that unit is in receiver (decoder) mode;
Green OL LED indicates an online connection to a control system via Ethernet

[1] HDMI connections require an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.
[2] Device control via CEC requires integration with a Crestron 3-Series or later control system.
[3] The DEVICE and HOST ports cannot be used simultaneously.

❹ **LAN 1:** 8-pin RJ-45 connector, female;
100BASE-TX/1000BASE-T Ethernet port;[1]
Green LED indicates Ethernet link status;
Amber LED indicates Ethernet activity

❺ **LAN 2:** SFP port;
Accepts one Crestron SFP-1G Series SFP transceiver module;[1, 2]
Green LINK LED indicates Ethernet link status;
Green ACT LED indicates Ethernet activity

❻ **HDMI OUTPUT:** 19-pin HDMI Type A connector, female;
HDMI digital video/audio output (DVI compatible)[3, 4]

❼ **HDMI INPUTS 1–2:** 19-pin HDMI Type A connector, female;
HDMI digital video/audio inputs (DVI and Dual-Mode DisplayPort compatible)[3, 4]
Two green LEDs, each indicates sync detection at the corresponding HDMI input

❽ **AUDIO I/O:** 5-pin 3.5 mm detachable terminal block;
Balanced/unbalanced stereo line-level audio input or output;
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

[1] Either LAN 1 or LAN 2 can be used as the primary LAN connection, allowing the other port to be used for connection to a local network device or to another DM NVX device. The port that is used as the primary LAN connection requires connection to a 1000BASE-T switch in order to stream network video.
[2] LAN 2 can connect to a fiber-optic network using the appropriate Crestron SFP-1G transceiver module (sold separately). Refer to the SFP-1G Series Installation Guide (Doc. 7979) for information about installing Crestron SFP-1G Series transceiver modules.
[3] HDMI connections require an appropriate adapter or interface cable to accommodate a DVI or Dual-Mode DisplayPort signal. CBL-HD-DVI interface cables are sold separately.
[4] Device control via CEC requires integration with a Crestron 3-Series or later control system.

Status and Configuration

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

- DMF-CI-8 chassis details
- DM NVX Director® virtual switching appliance
- Encoding and decoding functionality
- Automatic point-to-point connectivity
- Stream statistics
- Image preview
- Multicast TTL (Time-to-Live)
- Differentiated Services Code Point (DSCP)
- Automatic routing of video inputs
- Automatic display control
- Video wall processing
- Adjustable underscan
- User-selectable output resolution
- Maximum color depth and color space mode
- Background image
- Still image detection
- EDID (Extended Display Identification Data)
- Fixed, adaptive, or variable bit rate
- Subscriptions
- Daisy chain
- 7.1 surround sound audio
- DM NAX audio over IP (AES67)
- Dante and AES67 audio embedding and de-embedding
- Analog audio input or output
- Breakaway audio
- USB 2.0 routing
- Network port selection
- Device mode locking

- Crestron XiO Cloud service connection
- Test pattern generator
- Interoperability with DM NVX 4K60 4:2:0 and 1080p Encoders and Decoders
- Enterprise-grade security
- Automatic firmware update

DMF-CI-8 Chassis Details

NOTE: DMF-CI-8 chassis details apply to the DM NVX cards only and do not apply to DM NVX surface-mountable endpoints.

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

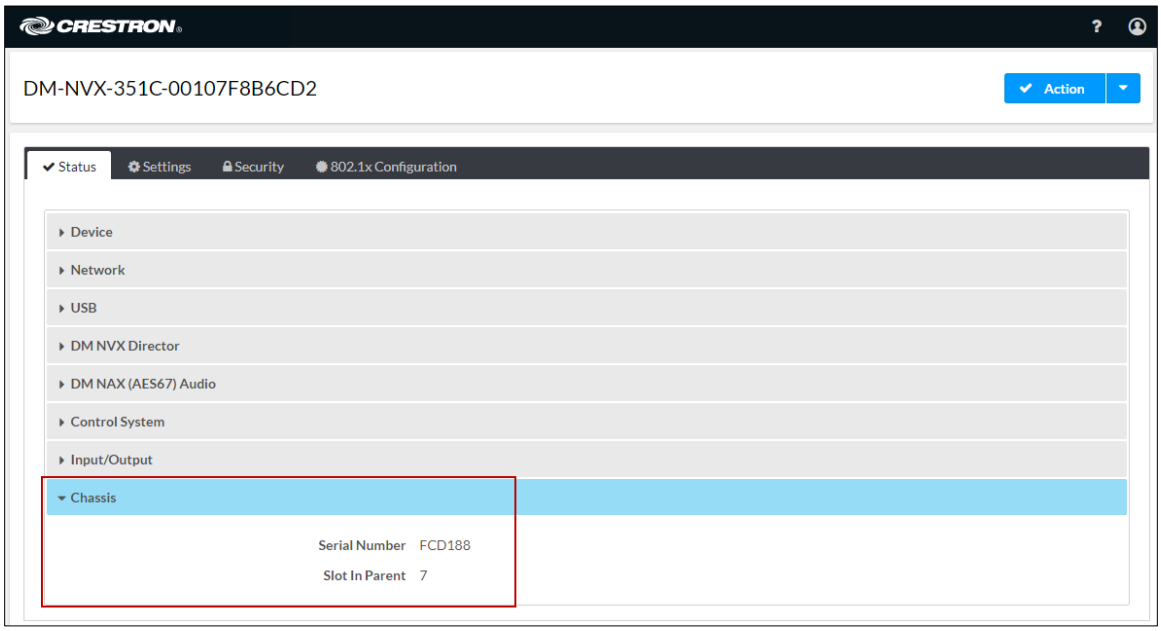
Using the Web Interface

To view DMF-CI-8 chassis information, click the **Status** tab and then click **Chassis**.

The **Chassis** section displays the following information:

- Serial number of the chassis
- Number of the slot into which the card is installed

Status Tab – Chassis



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 in which the card is installed. Program the **<CardSlotInfo_F>** serial output join to report the slot number in which the card is installed in the chassis.

DM NVX Director Virtual Switching Appliance

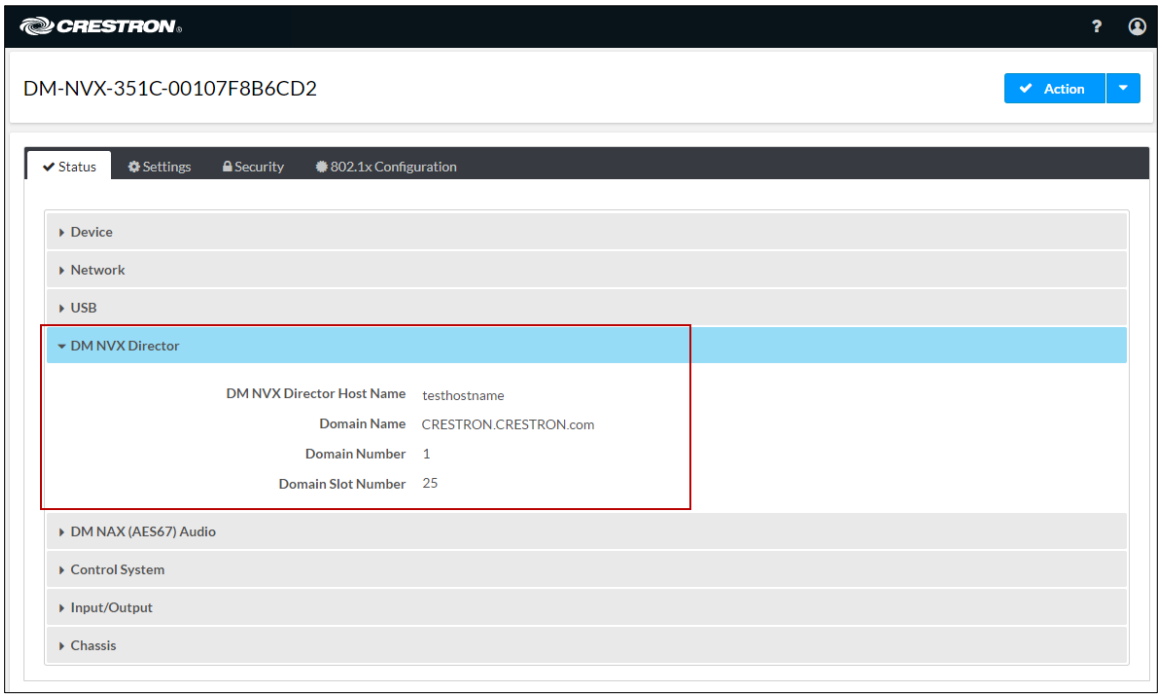
If a DM NVX device is managed by a DM NVX Director™ virtual switching appliance, information about the appliance can be viewed using the web interface.

To view DM NVX Director appliance information, click the **Status** tab and then click **DM NVX Director**.

The **DM NVX Director** section displays the following information:

- DM NVX Director host name
- Domain name, number, and slot number to which the DM NVX device is assigned

Status Tab – DM NVX Director



Encoding and Decoding Functionality

A DM-NVX-35x(C) device can be configured to function as a network AV encoder (transmitter) or decoder (receiver):

- As an encoder, a DM NVX device allows a laptop computer, camera, or other media source to be connected via an HDMI cable and then transmitted over the network.
- As a decoder, a DM NVX device receives the signal from a DM NVX encoder and feeds the signal to a display device via the HDMI output. A DM NVX decoder can switch streams among multiple DM NVX encoders on the network alongside locally connected HDMI sources.

To set the operating mode of a DM-NVX-35x(C) device as a transmitter or receiver, use the web interface or SIMPL Windows as discussed in the following sections.

NOTES:

- When DM-NVX-35x(C) devices are used with DM-NVX-E30(C) and DM-NVX-36x(C) encoders, the DM-NVX-35x(C) devices must be in Receiver mode. When DM-NVX-35x(C) devices are used with DM-NVX-D30(C), DM-NVX-D80-IOAV, and DM-NVX-36x(C) decoders, the DM-NVX-35x(C) devices must be in Transmitter mode.
- For a DM-NVX-35x surface-mountable endpoint, the **SETUP** button can be used to change the operating mode from a receiver to a transmitter or from a transmitter to a receiver. For additional information, refer to the description of the **SETUP** button on page 5.

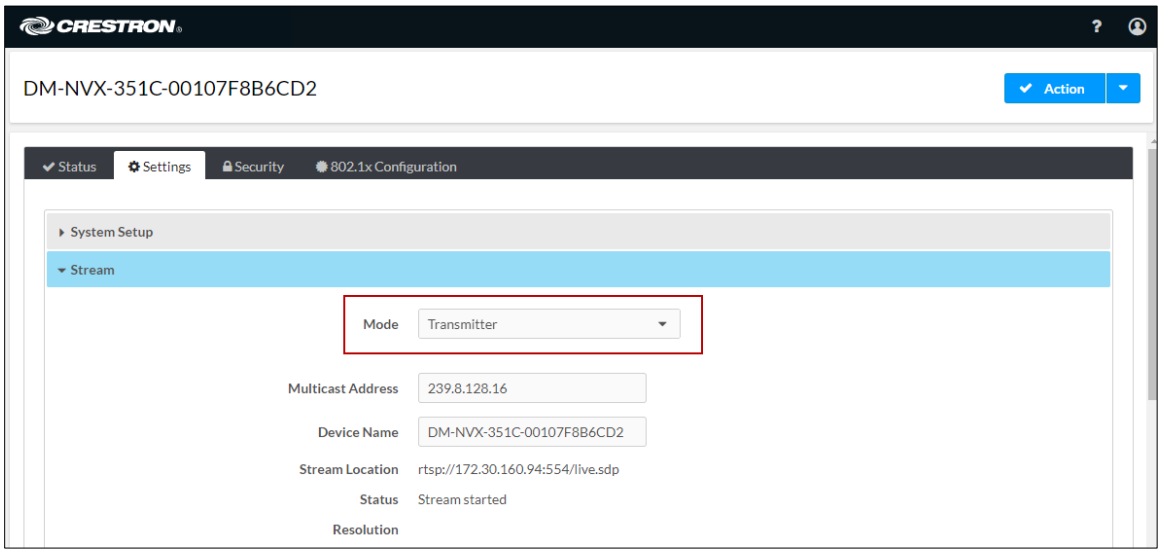
  For a DM-NVX-35xC card, the front panel of the DMF-CI-8 chassis can be used to change the operating mode. For additional information, refer to the DMF-CI-8 Supplemental Guide (Doc. 7861).

Using the Web Interface

To set the DM-NVX-35x(C) operating mode:

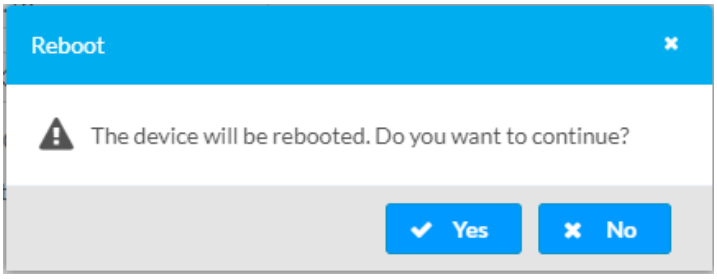
1. Click the **Settings** tab and then click **Stream**.
2. In the **Mode** drop-down list, select **Receiver** or **Transmitter**. The default setting is **Receiver** (decoder).

Settings Tab – Stream, Mode Configuration



When a different mode is selected, a prompt appears asking for confirmation that the device be rebooted. Click **Yes** to reboot the device.

Device Reboot Prompt



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-35x(C) device, set the **<DeviceMode>** analog input join to the desired mode (**Receiver** or **Transmitter**). The default setting is **Receiver**.

Changing modes requires that the device be rebooted. Trigger the **<Reboot>** digital input join to reboot the device. For additional information, refer to the SIMPL Windows help file.

Automatic Point-to-Point Connectivity

Point-to-point connectivity enables a DM NVX 4K60 4:4:4 encoder to be connected directly to a DM NVX 4K60 4:4:4 decoder to stream video, audio, and USB. Rather than being connected to an Ethernet switch, a 1000BASE-T Ethernet port of an encoder is connected directly to a 1000BASE-T port of a decoder. By default, point-to-point mode is enabled (set to **Auto**) and can be disabled if desired.

When point-to-point mode is enabled, no additional configuration is required for the encoder or decoder to operate in point-to-point mode; however, the operating mode of a DM-NVX-35x(C) device must be set correctly. If the device is to function as an encoder, the operating mode must be set to **Transmitter**. If the device is to function as a decoder, the operating mode must be set to **Receiver**. For information about setting the operating mode of DM-NVX-35x(C) devices, refer to Encoding and Decoding Functionality.

To enable or disable point-to-point mode, use the web interface or SIMPL Windows as discussed in the following sections.

Using the Web Interface

Enable or disable point-to-point mode by clicking the **Settings** tab and then clicking **System Setup**.

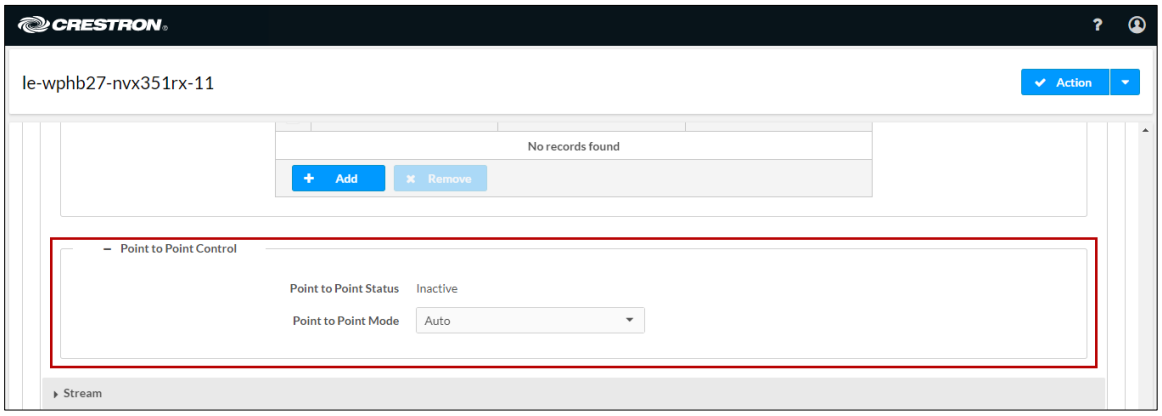
In the **Point-to-Point Control** section, **Point to Point Status** indicates whether point-to-point mode is **Active** or **Inactive**.

In the **Point-to-Point Mode** drop-down list, select either of the following:

- **Auto:** (Default setting) A 1000BASE-T port of a DM NVX 4K60 4:4:4 encoder detects a direct connection to a DM NVX 4K60 4:4:4 decoder or a connection to a 1000BASE-T switch. Similarly, a 1000BASE-T port of a DM NVX 4K60 4:4:4 decoder detects a direct connection to a DM NVX 4K60 4:4:4 encoder or a connection to a 1000BASE-T switch. If a direct connection between an encoder and decoder is detected, point-to-point mode is automatically enabled.
- **Disable:** Disables point-to-point mode

To enable or disable point-to-point mode, use the web interface or SIMPL Windows as discussed in the following sections.

Settings Tab - System Setup, Point-to-Point Control



Using SIMPL Windows

Using the top-level programming slot for the DM-NVX-35x(C) device, set the **<PointToPointMode>** analog input join to the desired value. For additional information, refer to the SIMPL Windows help file.

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 or to reset stream statistics, use the web interface or SIMPL Windows as discussed in the following sections.

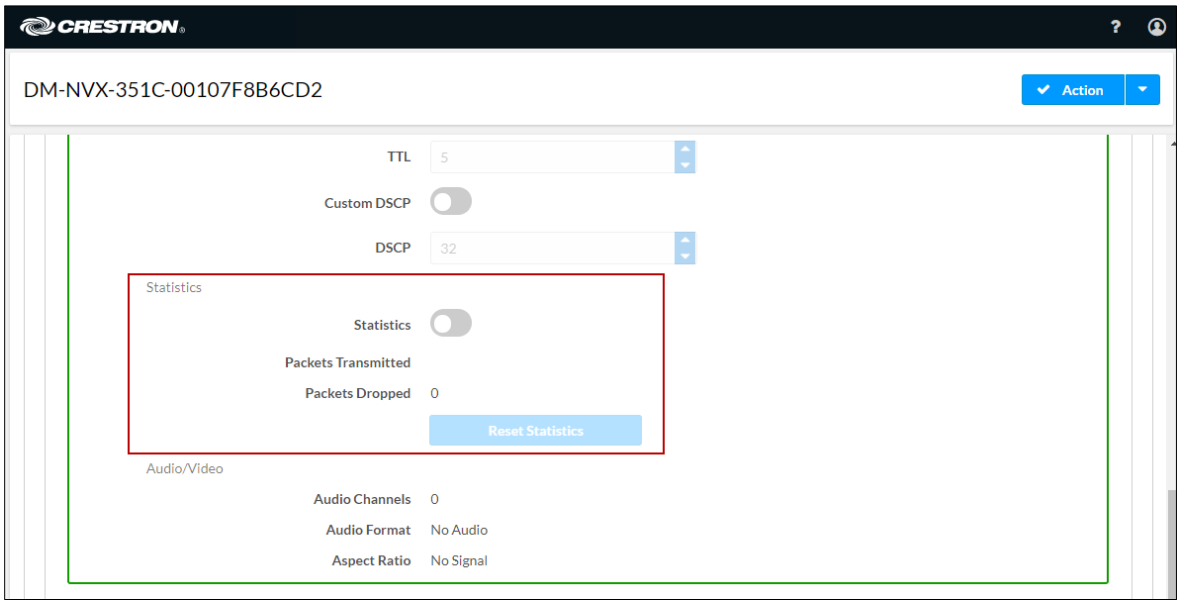
Using the Web Interface

To enable, disable, or reset stream statistics:

1. Click the **Settings** tab and then click **Stream**.
2. In the **Advanced** section:
   - To enable or disable **Statistics,** set the **Statistics** toggle switch in the On (right) or Off (left) position, respectively. The default setting is in the Off (left) position.
   - To reset statistics, click **Reset Statistics**.

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

Settings Tab – Stream, Statistics



Using SIMPL Windows

Configure stream statistics in **Slot-01: Stream Transmit** or **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.

Image Preview

Image preview provides still images (thumbnails) that show the current video being received by an input of a DM NVX transmitter or displayed by an output of a DM NVX receiver. Still images are shown at one frame per second. Image preview supports the maximum resolution of the source and scales the image, while maintaining the aspect ratio. Images can be previewed in the DM NVX web interface and accessed remotely using a web browser. The images can also be previewed on a Crestron touch screen or third-party interface.

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

Using the Web Interface

To configure image preview:

1. Click the **Settings** tab and then click **Stream**.
2. Under **Services**, enable **Preview Output** if it is disabled. The default setting is **Enabled.** If video is present, video is displayed in the Preview window above **Services**. (Double-clicking the Preview window displays the video window full screen.)
3. Enter a base file name (prefix) to the file name of the images to be generated. The default base file name is **preview**.

   The **Generated Preview Images** table lists the image previews. **Type** indicates the height of the image in pixels. **File Name** indicates the file name of the image in the following format:

   <base file name>_<vertical resolution>px.<extension>

   - **<base file name>** is the prefix assigned to the image preview followed by an underscore. If the default base file name of **preview** is changed, clicking the table updates the base name in the table.
   - **<vertical resolution>** is the height of the image in pixels (px).
   - **<extension>** is the file format of the image. The default file extension is .jpeg.

   For example, using the default base file name, which is **preview**, and a JPEG image with a vertical resolution of 240 pixels, the file name of the image preview is **preview_240px.jpeg.**

   Local Preview Path indicates the **/preview** location to which image preview files are saved to the web server of the DM NVX device. An image preview file can be accessed from a web browser on a remote device by entering the following URL:

   https://<username>:<password>@<ip address>/preview/<filename>

   - **<username>** is the user name used to access the DM NVX web server
   - **<password>** is the password used to access the DM NVX web server

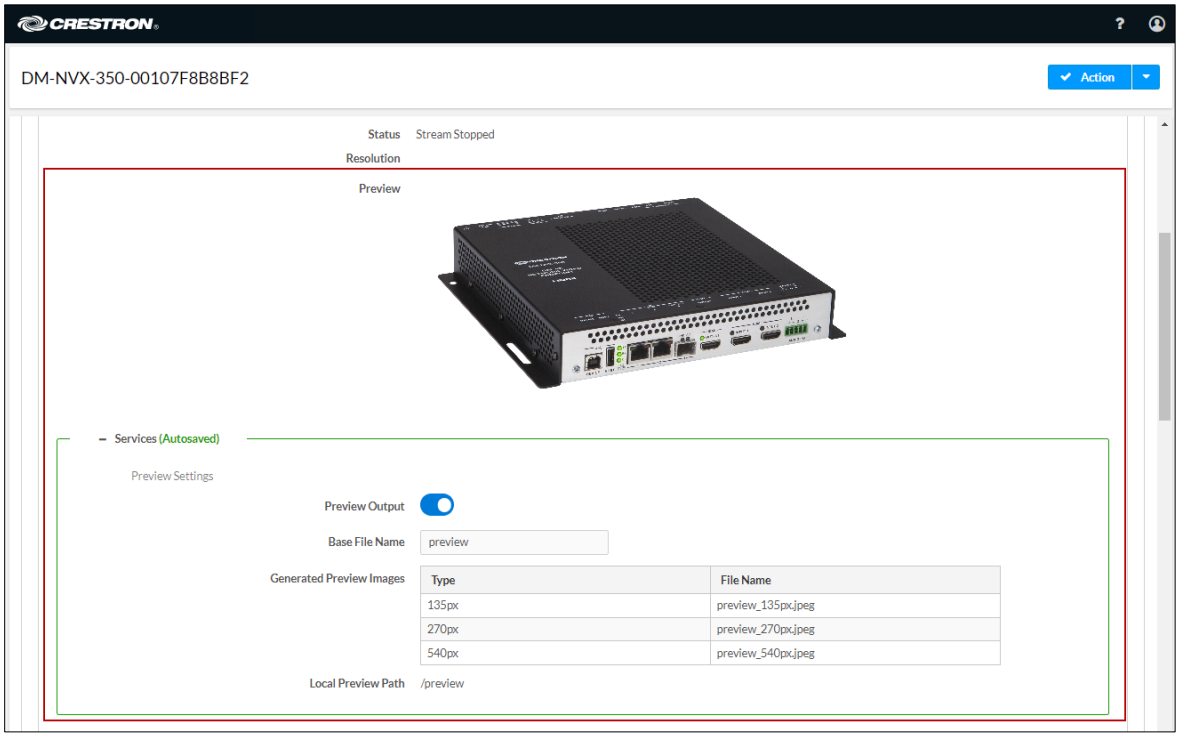
- **<ip address>** is the IP address of the DM NVX device.
- **<filename>** is the file name of the image preview file.

For example:

https://admin:admin@172.30.160.90/preview/preview_540px.jpeg

- **admin** is the user name used to access the DM NVX web server
- **admin** is the password used to access the DM NVX web server
- **172.30.160.90** is the IP address of the DM NVX device
- **preview_540px.jpeg** is the file name of the image preview file

Settings Tab – Stream, Services, Image Preview (Sample Image Shown)



Using SIMPL Windows

Enable or disable image preview functionality in **Slot-1003: DM Preview Image.** Trigger the **<Enable>** digital input join to enable image preview functionality. To disable image preview functionality, trigger the **<Disable>** digital input join. For additional information, refer to the SIMPL Windows help file.

Multicast TTL (Time-to-Live)

NOTE: Multicast TTL configuration applies to a DM-NVX-35x(C) device that is operating as a transmitter.

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.

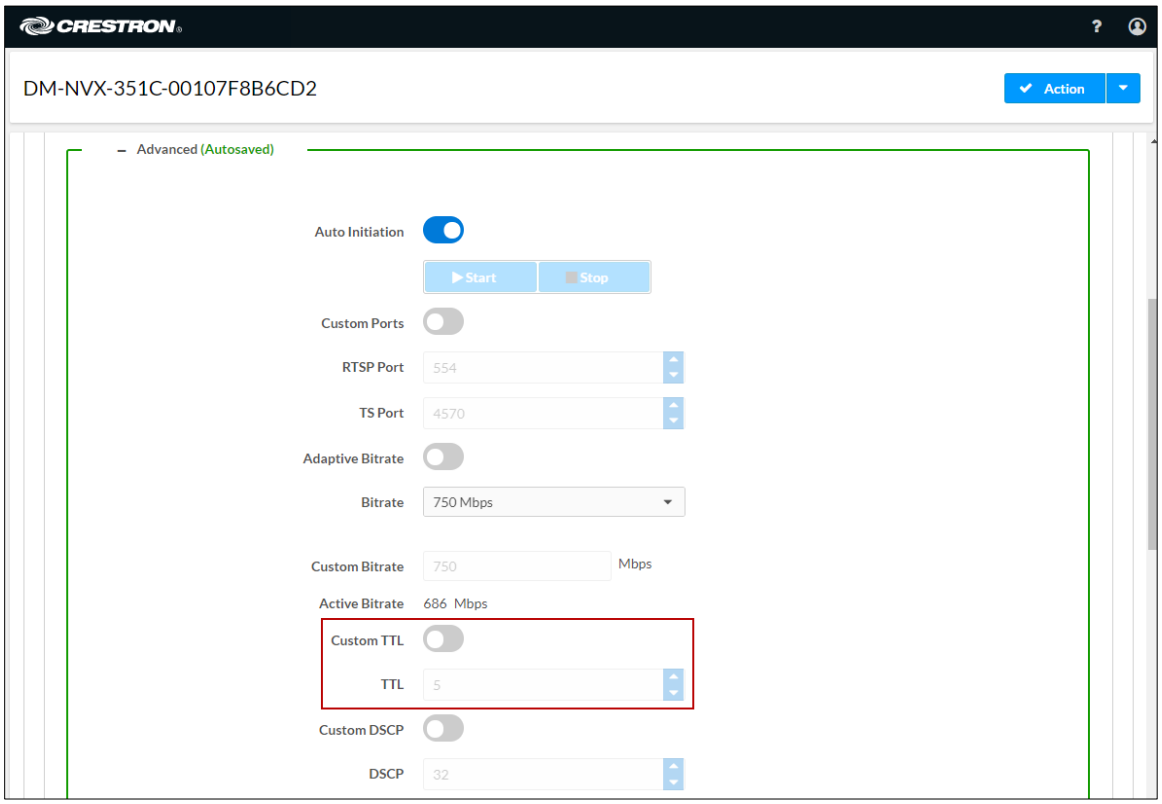
Using the Web Interface

To configure multicast TTL:

1. Click the **Settings** tab and then click **Stream**.
2. In the **Advanced** section:
   a. Disable **Auto Initiation** by setting the **Auto Initiation** toggle switch in the Off (left) position.
   b. Stop the stream by clicking **Stop**.
   c. Enable **Custom TTL** by setting the **Custom TTL** toggle switch in the On (right) position.
   d. In the **TTL** text box, enter the desired TTL value (**1** to **255**). The default setting is **5**.
   e. Enable **Auto Initiation** by setting the **Auto Initiation** toggle switch in the On (right) position. The stream automatically restarts.

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

Settings Tab – Stream, 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 applies to a DM-NVX-35x(C) device that is operating as a transmitter.

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**.

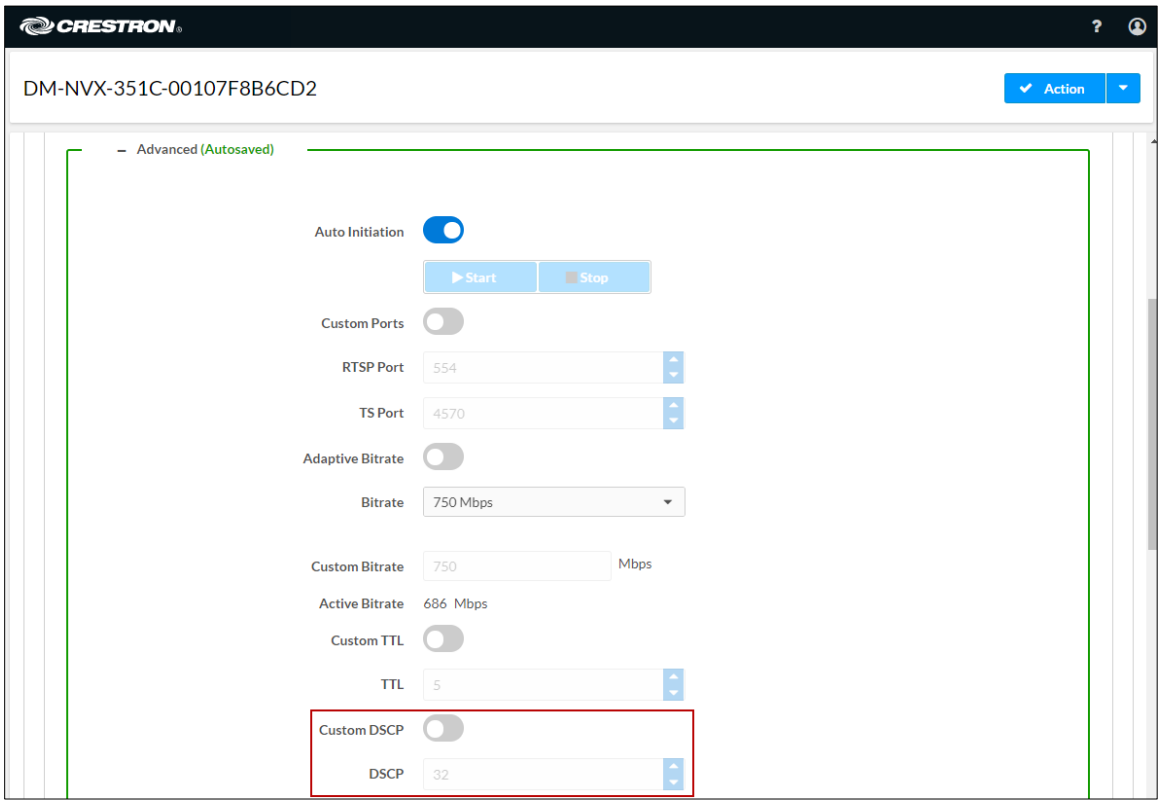
NOTE: Change the DSCP default setting of **32** only if required by IT department policies.

To configure DSCP:

1. Click the **Settings** tab and then click **Stream**.
2. In the **Advanced** section:
   a. Disable **Auto Initiation** by setting the **Auto Initiation** toggle switch in the Off (left) position.
   b. Stop the stream by clicking **Stop**.
   c. Enable **Custom DSCP** by setting the **Custom DSCP** toggle switch in the On (right) position.
   d. In the **DSCP** text box, enter the desired DSCP value (**0** to **63**).
   e. Enable **Auto Initiation** by setting the **Auto Initiation** toggle switch in the On (right) position. The stream automatically restarts.

NOTE: Disabling **DSCP** returns the DSCP value to the default setting.

Settings Tab – Stream, Custom DSCP



Automatic Routing of Video Inputs

Automatic routing between video inputs can be enabled or disabled. When automatic routing is enabled, the device automatically routes the last connected input.

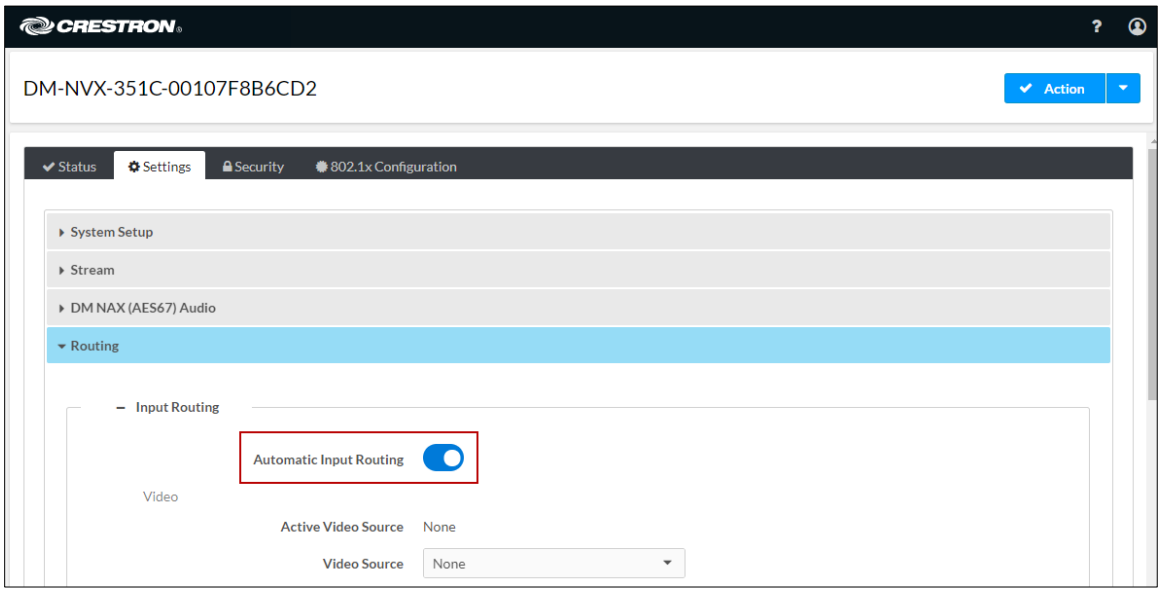
To configure automatic routing, use the web interface or SIMPL Windows as discussed in the following sections.

Using the Web Interface

To configure automatic routing of video inputs:

1. Click the **Settings** tab and then clicking **Routing**.
2. In the **Input Routing** section, enable automatic input routing by setting the **Automatic Input Routing** toggle switch in the On (right) position (default setting). To disable automatic input routing, set the switch in the Off (left) position.

Settings Tab – Routing, Automatic Input Routing



Using SIMPL Windows

Using the top-level programming slot for the DM NVX device, trigger the **<AutomaticRoutingEnabled>** digital input join to enable automatic routing. To disable automatic routing, trigger the **<AutomaticRoutingDisabled>** digital input join. For additional information, refer to the SIMPL Windows help file.

Automatic Display Control

For the DM-NVX-350, DM-NVX-351, and DM-NVX-352, the display device can be turned on or off automatically via RS-232, IR, or CEC (Consumer Electronics Control). For the DM-NVX-350C, DM-NVX-351C, and DM-NVX-352C, CEC can be used to automatically turn a display device on or off.

To configure automatic display control:

1. Click the **Settings** tab and then click **Outputs.**
2. In the **Outputs** table, click **Edit**.
3. In the **Automatic Display Power** section, enable automatic power by setting the **Automatic Power** toggle switch in the On (right) position. By default, automatic power is disabled.
4. Set **Command Interface** to one of the following:
   - **None**
   - **CEC**
   - **RS232** (DM-NVX-350, DM-NVX-351, and DM-NVX-352 only)
   - **IR** (DM-NVX-350, DM-NVX-351, and DM-NVX-352 only)

   The selected interface (CEC, RS232, or IR) will send the power-on or power-off command as specified in the **Power Off (No Sync Detected)** and **Power On (Sync Detected)** sections discussed in step 8 below. If **None** is selected, no command will be sent.
5. (Applicable only when the DM NVX device is in **Receiver** mode) Set **Output Timeout** to enable the display device to turn off after a predetermined period of time in which no signal is detected. Select the desired number of seconds, or select **Custom** and then set the desired **Custom Output Timeout** in seconds.
6. (Applicable only when the DM NVX device is in **Receiver** mode) Disable or enable **Turn Off Output** by setting the toggle switch in the Off (left) or On (right) position, respectively. When **Turn Off Output** is enabled, the output turns off based on the **Output Timeout** or **Custom Output Timeout** setting. When **Turn Off Output** is disabled (default setting), the output remains active after the display device is turned off.
7. If **Infrared** is selected in step 2, set the IR port number (**Port 1** or **Port 2**).

8. Do one of the following:

   - If **CEC** is selected in step 4, enter the CEC command in the **Power Off (No Sync Detected)** and **Power On (Sync Detected)** sections. If a custom command is desired, enter the desired command, and then select the desired terminator and format.

     To test the command, click the **Test** button.

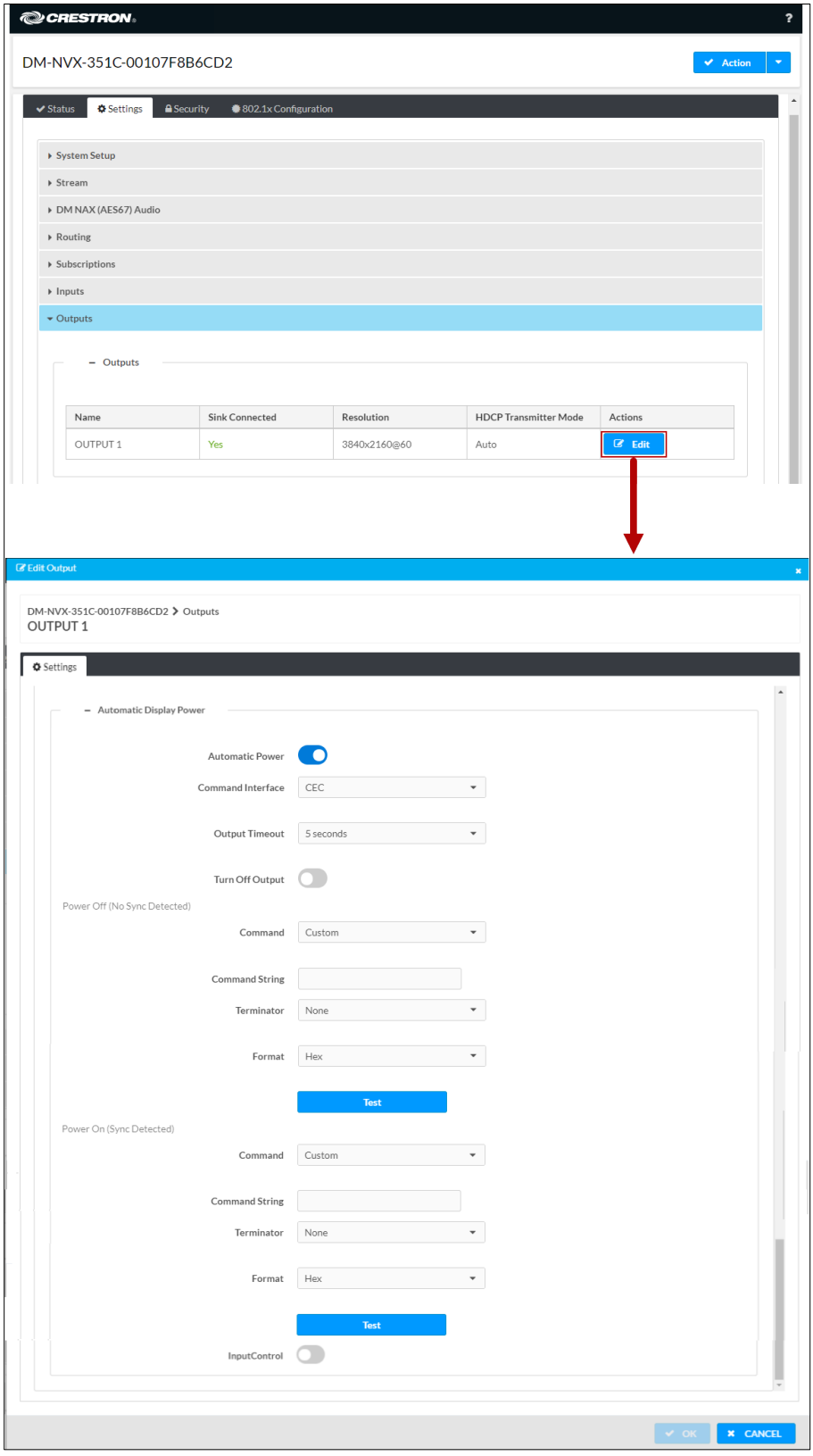
   - If **RS232** is selected in step 4, enter the RS232 command in the **Power Off (No Sync Detected)** and **Power On (Sync Detected)** sections, and then select the desired terminator and format.

     To test the command, click the **Test** button.

   - If **Infrared** is selected in step 4, click **IR Ports** under the **Settings** tab and then click the **Load IR File** button for port 1 or port 2. Browse to select and upload the desired IR file.

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

Settings Tab – Outputs, Automatic Display Power (Shown with DM NVX Device in Receiver Mode and CEC Interface Command Selected)



Video Wall Processing

NOTE: Video wall processing applies to DM-NVX-35x(C) devices that function as receivers.

Multiple DM-NVX-35x(C) receivers can be combined to configure a video wall composed of up to 64 individual displays (up to eight columns of displays by eight rows of displays). A separate DM-NVX-35x(C) device is required for each display.

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

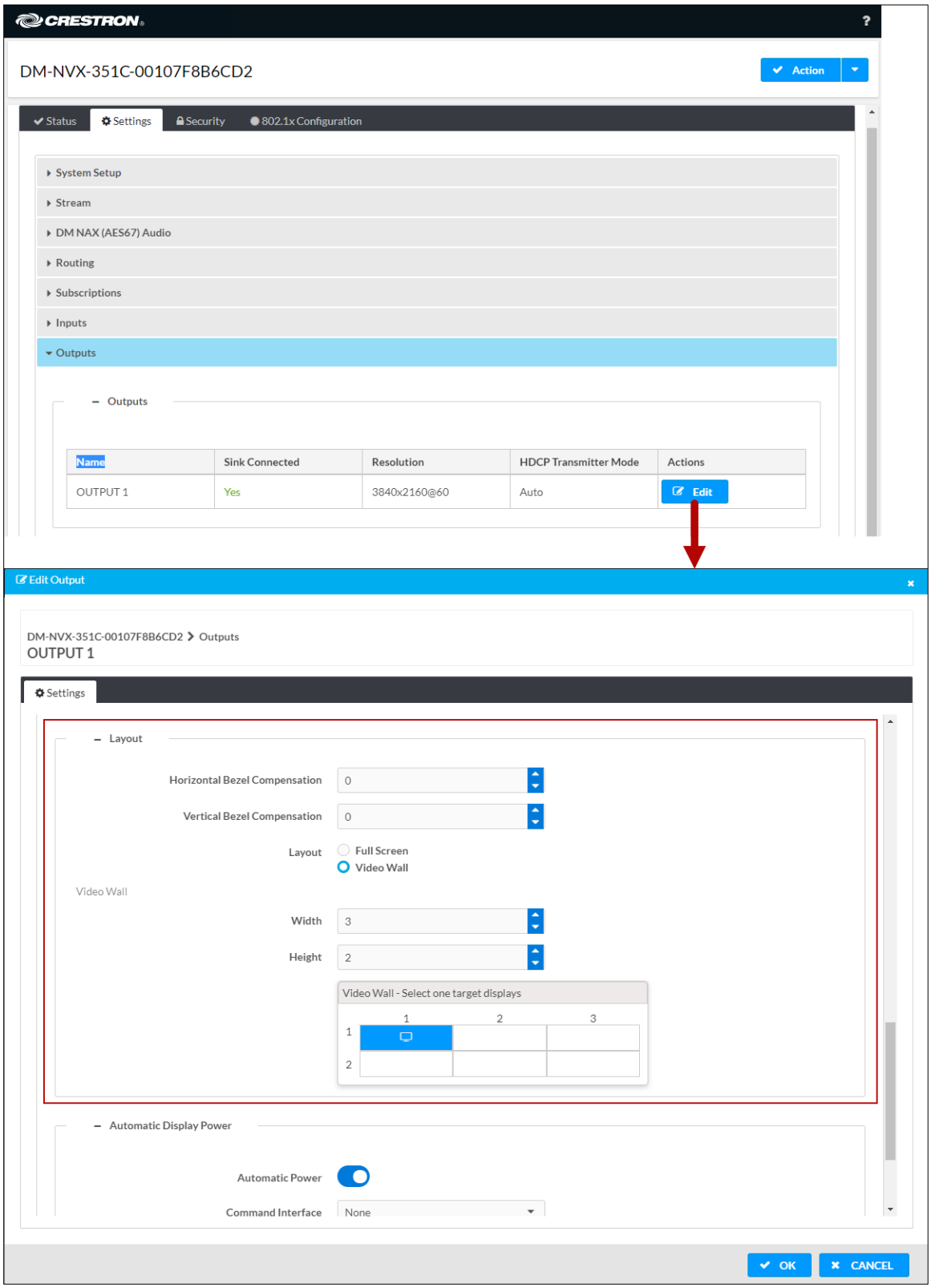
Using the Web Interface

To configure video wall processing:

1. Click the **Settings** tab and then click **Outputs**.
2. In the **Outputs** table, click the **Edit** button.
3. In the **Layout** section:
   a. In the **Horizontal Bezel Compensation** text box, enter a value ranging from **0** to **500** pixels.
   b. In the **Vertical Bezel Compensation** text box, enter a value ranging from **0** to **500** pixels.
   c. Select the **Video Wall** radio button.
   d. In the **Width** combo box, select the desired number of rows of displays.
   e. In the **Height** combo box, select the desired number of columns of displays.
   f. Set the location of the display in the video wall by clicking the appropriate box.
   g. Click **OK** to save the changes.
4. Repeat steps 1-3 for each DM-NVX-35x(C) receiver that connects to a display for inclusion in the video wall.

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

Settings Tab – Outputs, Video Wall Configuration



Using SIMPL Windows

Configure a video wall in **Slot-06: HDMI OUT**:

1. Set the **<VideoWallMode>**, **<Horizontal_Bezel_Compensation>**, and **<Vertical_Bezel_Compensation>** analog input joins to the desired values.
2. Repeat step 1 for each DM-NVX-35x(C) receiver that connects to a display for inclusion in the video wall.

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

Adjustable Underscan

NOTE: Adjustable underscan applies to a DM-NVX-35x(C) device that functions as a receiver.

If content does not fit properly on a display, adjustments to underscan may be desired. Adjusting underscan reduces the image size by the specified percentage so that the entire video frame is displayed.

To adjust underscan, use the web interface or SIMPL Windows as discussed in the following sections.

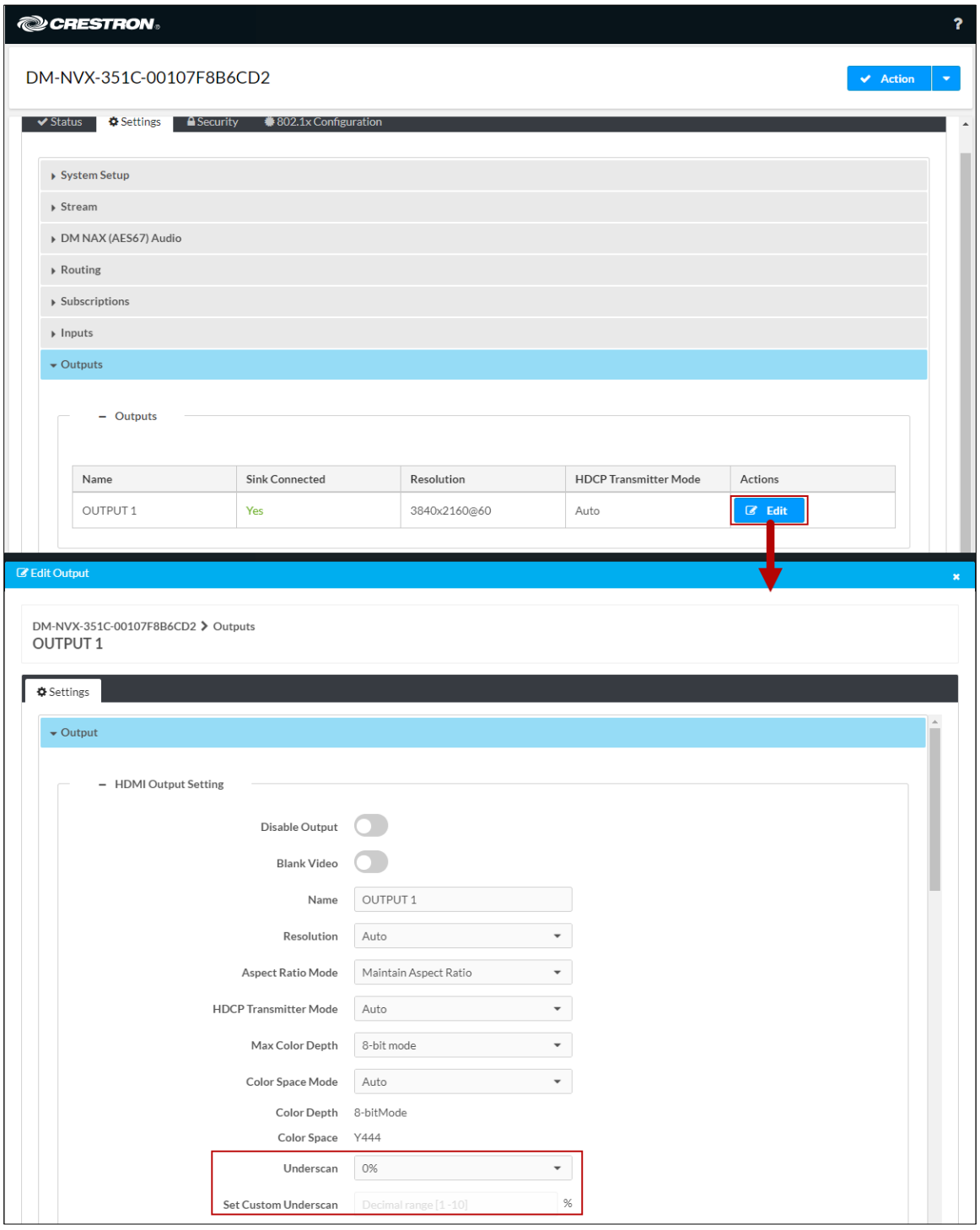
Using the Web Interface

To configure underscan:

1. Click the **Settings** tab and then click **Outputs**.
2. In the **Outputs** table, click the **Edit** button.
3. In the **HDMI Output Setting** section, configure underscan in the **Underscan** drop-down list. Select the desired percentage or select **Custom**. If **Custom** is selected, enter the desired percentage in the **Set Custom Underscan** text box.

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

Settings Tab – Outputs, Underscan Configuration



Using SIMPL Windows

Adjust underscan in **Slot-06: HDMI Out**. Set the **<Underscan>** analog input join to the desired value. For additional information, refer to the SIMPL Windows help file.

User-Selectable Output Resolution

NOTE: User-selectable output resolution applies to a DM-NVX-35x(C) device that functions as a receiver.

To select the desired output resolution, use the web interface or SIMPL Windows as discussed in the following sections.

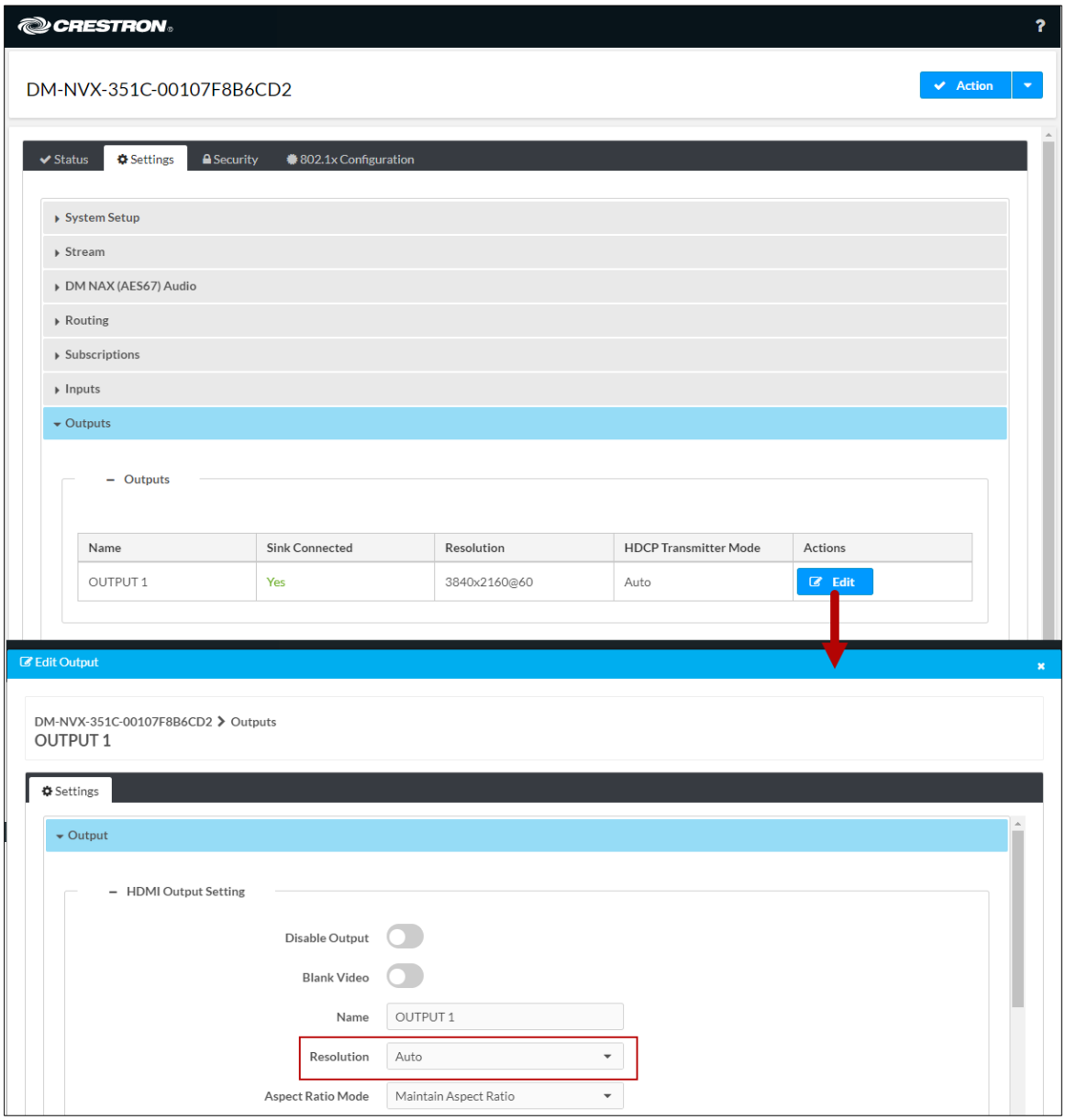
Using the Web Interface

To configure the output resolution:

1. Click the **Settings** tab and then click **Outputs**.
2. In the **Outputs** table, click the **Edit** button.
3. In the **HDMI Output Setting** section, select the desired resolution in the **Resolution** drop-down list.

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

Settings Tab – Outputs, HDMI Output Resolution Configuration



Using SIMPL Windows

Configure the output resolution in **Slot-06: HDMI Out**. Set the **<Resolution>** analog input join to the desired value. For additional information, refer to the SIMPL Windows help file.

Maximum Color Depth and Color Space Mode

Configure the maximum color depth (maximum bit depth supported by the output) and HDMI color space mode using the web interface or SIMPL Windows.

Using the Web Interface

To configure maximum color depth and color space mode:

1. Click the **Settings** tab and then click **Outputs**.
2. In the **Outputs** table, click the **Edit** button.
3. In the **HDMI Output Setting** section:
   - Configure maximum color depth in the **Max Color Depth** drop-down list by selecting the desired setting.

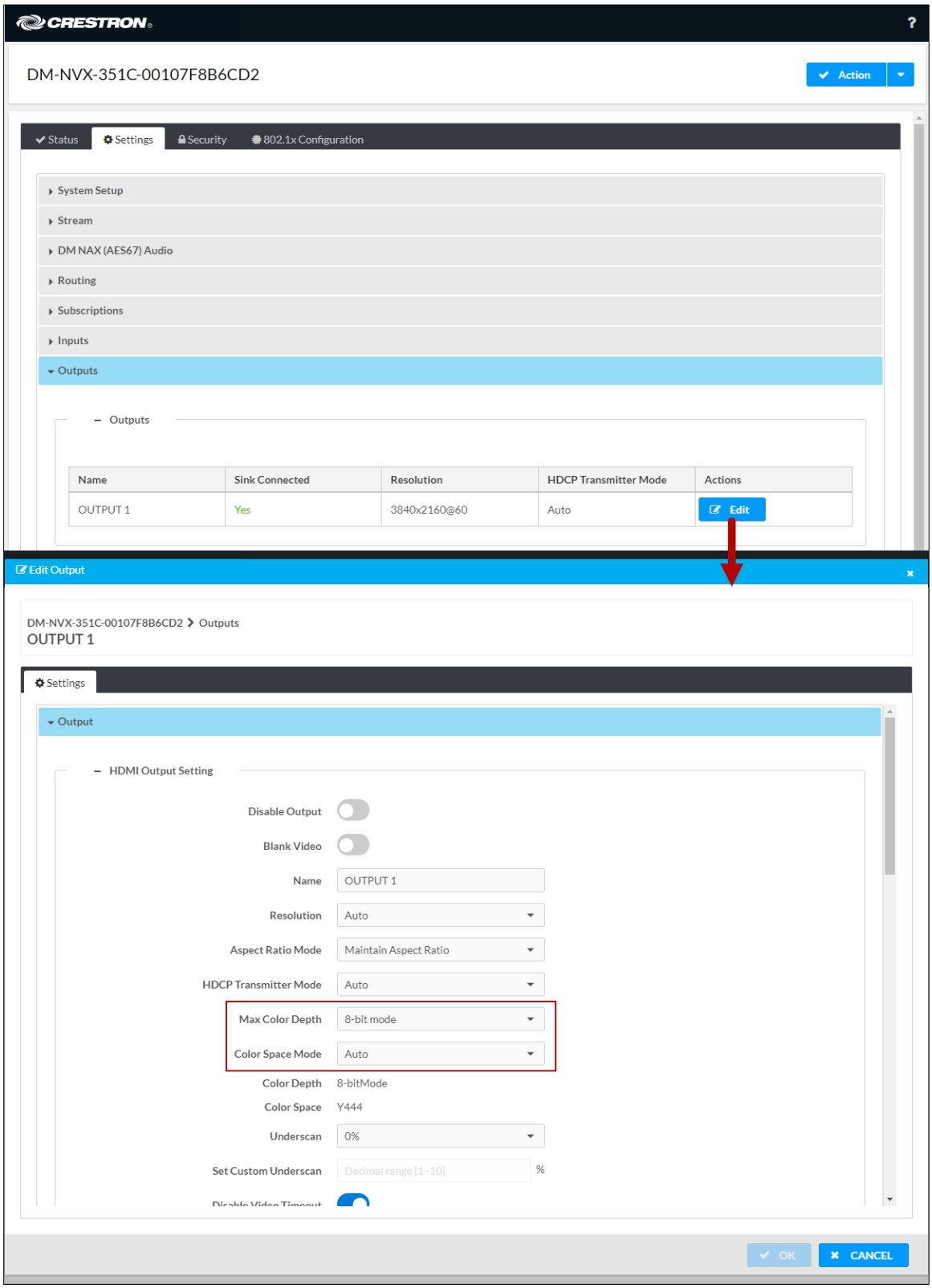
     NOTE: If HDR video is desired at the output, set **Max Color Depth** to **10-bit mode**.

   - Configure color space mode in the **Color Space Mode** drop-down list by selecting the desired setting.

     NOTE: If HDR video is desired at the output, set **Color Space Mode** to **Force Y422** or **Force Y420**.

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

Settings Tab – Outputs, HDMI Output Maximum Color Depth and Color Space Mode



Using SIMPL Windows

Configure maximum color depth and color space mode in **Slot-06: HDMI Out**. Set the **<MaximumColorDepth>** analog input join to the appropriate value for the maximum bit depth supported by the output. Set the **<ColorSpaceMode>** analog input join to the desired value for the HDMI color space.

NOTE: If HDR video is desired at the output, set the **<MaximumColorDepth>** analog input join to 10-bit maximum bit depth and the **<ColorSpaceMode>** analog input join to **Force YCbCr422** or **Force YCbCr420.**

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

Background Image

NOTE: Background image applies to a DM-NVX-35x(C) device that functions as a receiver.

An image can be uploaded to the DM-NVX-35x(C) and then used as a background image for on-screen display whenever active video content is not being displayed.

NOTE: Supported image file types are .jpeg, .jpg, and .png. The supported maximum resolution of an image is 3840x2160 pixels. Up to 20 image files can be uploaded for a total storage capacity of up to 100 MB.

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

Using the Web Interface

To upload and configure a background image for on-screen display:

1. Click the **Settings** tab and then click **Outputs**.
2. In the **Outputs** table, click the **Edit** button.
3. Click **On Screen Display**.
4. In the **Image Display** section:
   a. Set the **Background Image** toggle switch in the On (right) position to enable the functionality.
   b. In the **Time to wait after no video is detected** list box, select the number of seconds that must pass without active video content before the background image can be displayed. Values range from **5** to **65,535** seconds. The default setting is **5** seconds.

c. In the **Aspect Ratio Mode** drop-down list, select the desired setting:

- **Maintain Aspect Ratio:** (Default setting) Maintains the aspect ratio of the image.
- **Stretch:** Stretches the image to fill the screen in both the horizontal and vertical directions. The aspect ratio of the image is not maintained.
- **1:1:** Sets a 1x1 pixel image.

d. For **Image Retrieval**, click the desired radio button for the location from which the image is to be retrieved: **From Local Device** or **From Remote Server**.

If **From Local Device** is selected, continue with step 5. If **From Remote Server** is selected, omit step 5 and proceed to step 6.

5. If the image is to be retrieved from the local device, do either of the following:

a. In the **Image File** drop-down list, select the desired image from the list of available files. The selected image appears in the Preview window.

b. If no images appear in the **Image Files** drop-down list or if the desired image does not appear in the list, click **Manage Images**. The Manage Images dialog box opens.

Upload an image file as follows:

a. Click **Add**. The File Upload dialog box opens.

b. Click **Browse**, navigate to the desired image file, select the image file, and then click **Open**.

c. In the File Upload dialog box, click **Load**. When the progress bar indicates that the upload process is complete, click **OK**.

The image is added to the list in the **Manage Images** dialog box, which indicates the following:

- **Index:** Specifies a number that indicates the order in which the file was uploaded. If an image is deleted, the next image that is loaded is added to the row that was previously occupied by the image that was deleted.
- **File Name:** Specifies the file name of the image
- **Status:** Indicates that the status of the image is **Ready** or **Failed**
- **Preview:** Provides a preview of the image. Clicking the image enlarges the view.

d. Click **Close** to close the **Manage Images** dialog box.

e. In the **Image File** drop-down list, select the desired image. The selected image appears in the Preview window.

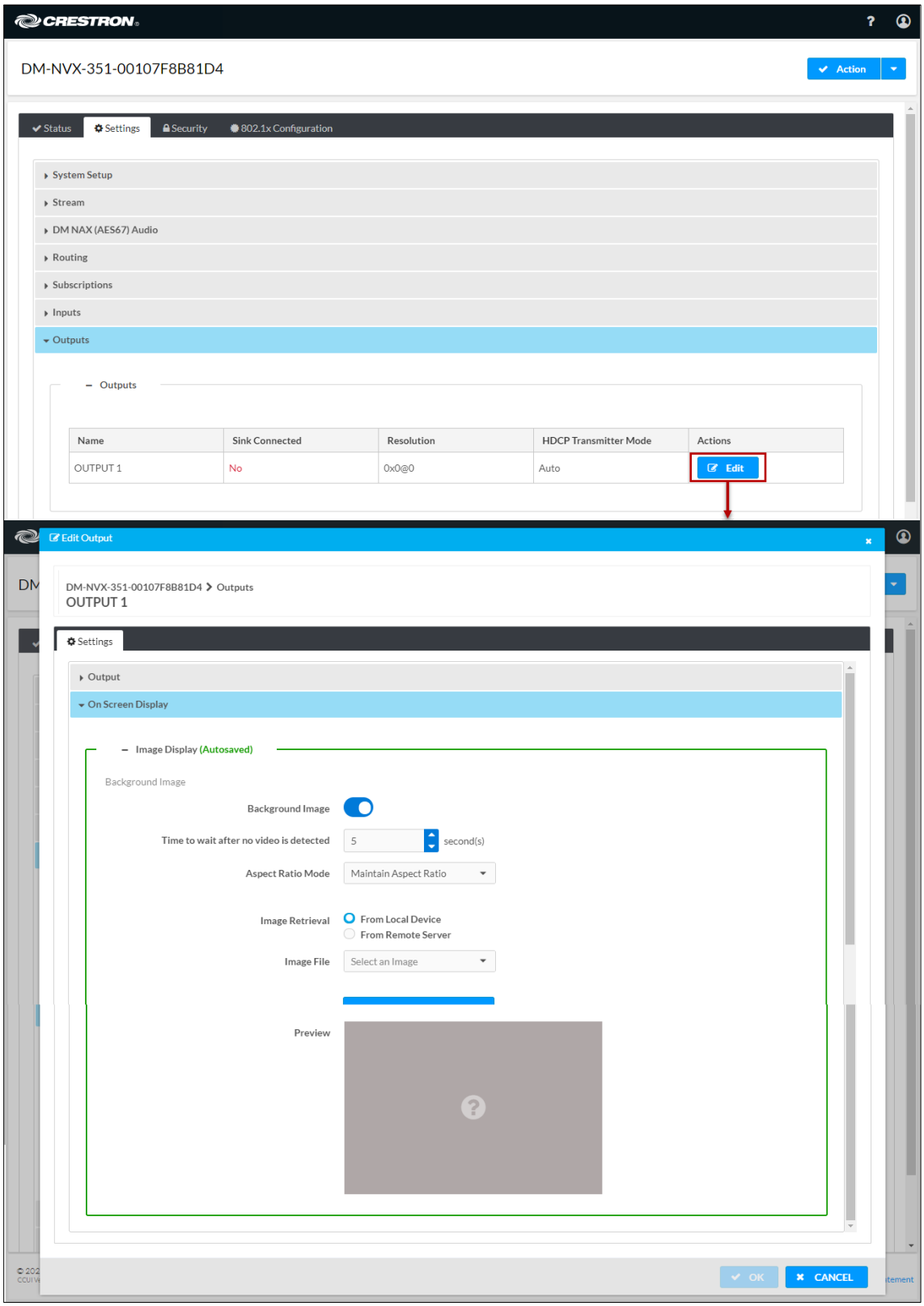
6. If the image is to be retrieved from a remote server:

    a. In the **Remote Path** text entry box, enter the URL (HTTP, HTTPS, or FTP) to access the image file from a remote server. The image is uploaded and appears in the Preview window.

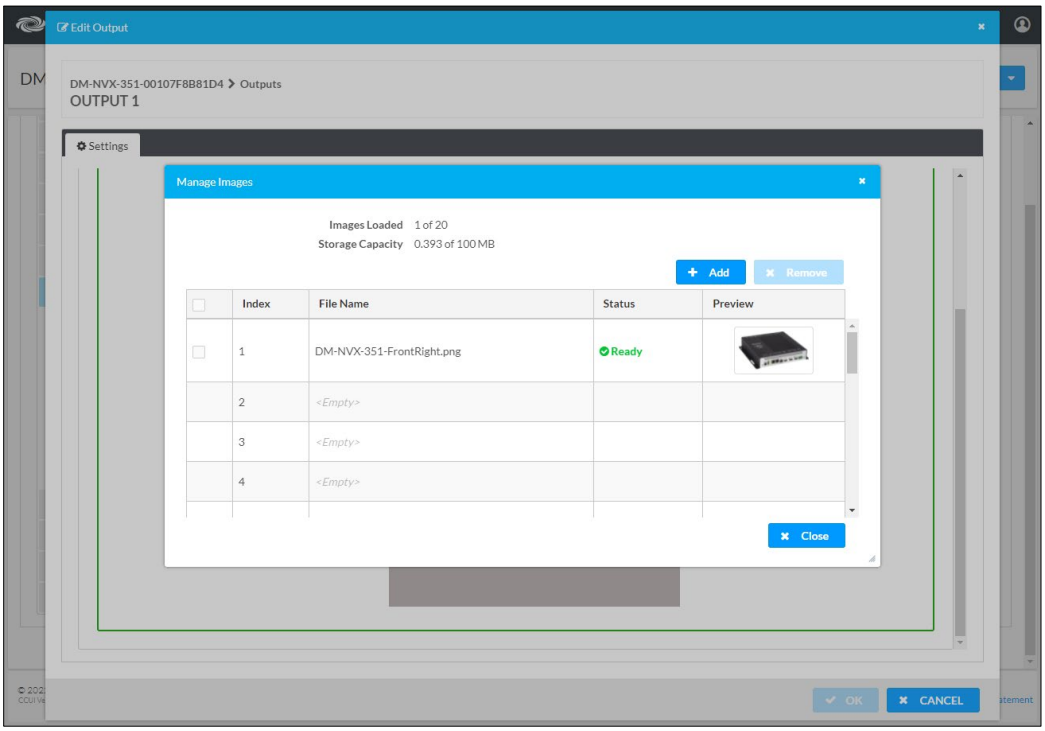
    b. If you wish to have the image refreshed based on a specified number of minutes, select the **Refresh** checkbox, and then select the desired refresh rate in minutes in the **Refresh Rate** list box. The refresh rate ranges from 1 to 65,535 minutes. The default setting is **60** minutes.

To disable the background image, set the **Background Image** toggle switch in the Off (left) position (default setting).

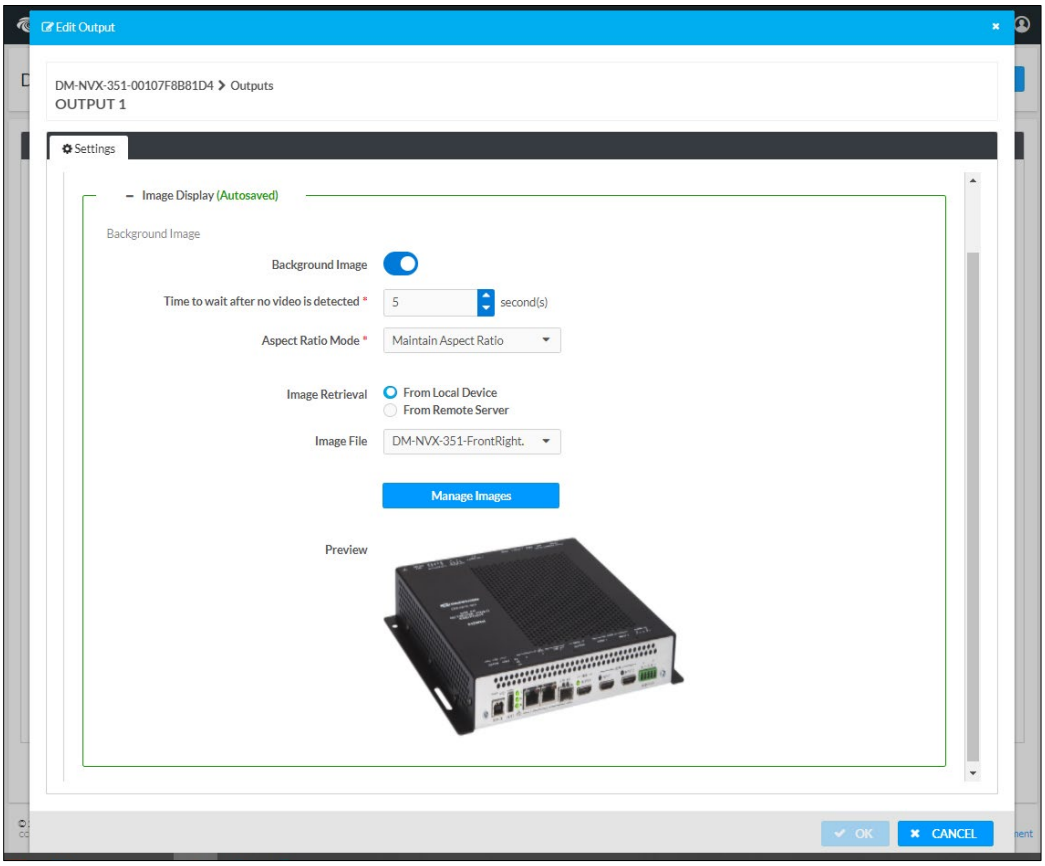
Settings Tab, Outputs, Background Image



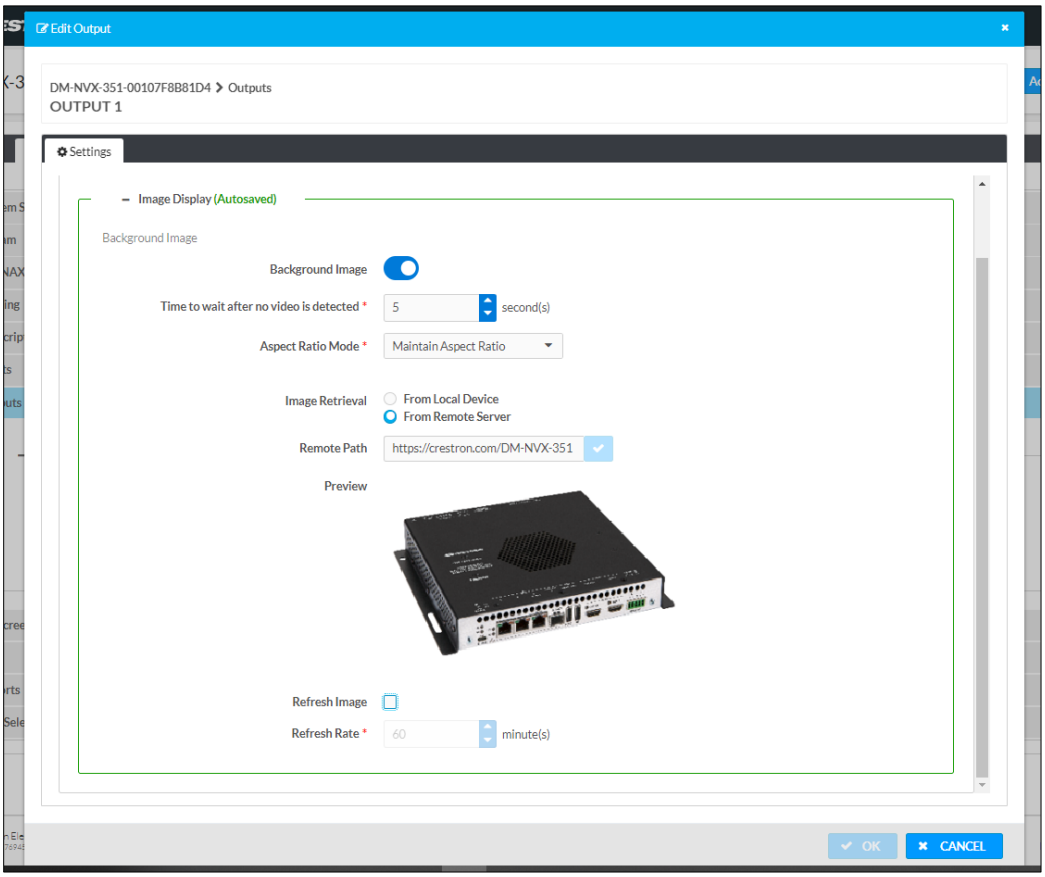
Settings Tab, Outputs, Background Image Retrieval from Local Device, Adding an Image



Settings Tab, Outputs, Background Image Retrieval from Local Device



Settings Tab, Outputs, Background Image Retrieval from Remote Server



Using SIMPL Windows

Enable or disable background image functionality in **Slot-06-05: Background Image.** Trigger the **<Enable>** digital input join to enable background image functionality. To disable background image functionality, trigger the **<Disable>** digital input join. For additional information, refer to the SIMPL Windows help file.

Still Image Detection

Still image detection enables a DM NVX endpoint to detect a still image and pass the information to a control system. Still image detection occurs when a sync is detected at the HDMI input (encoder only) or at the HDMI input or stream that is routed to the HDMI output (decoder only) and 5 seconds have elapsed in which no motion occurred within the image.

NOTE: Detection of still images is not supported for certain sources in which pixel changing is occurring within the images but is not visible in the images.

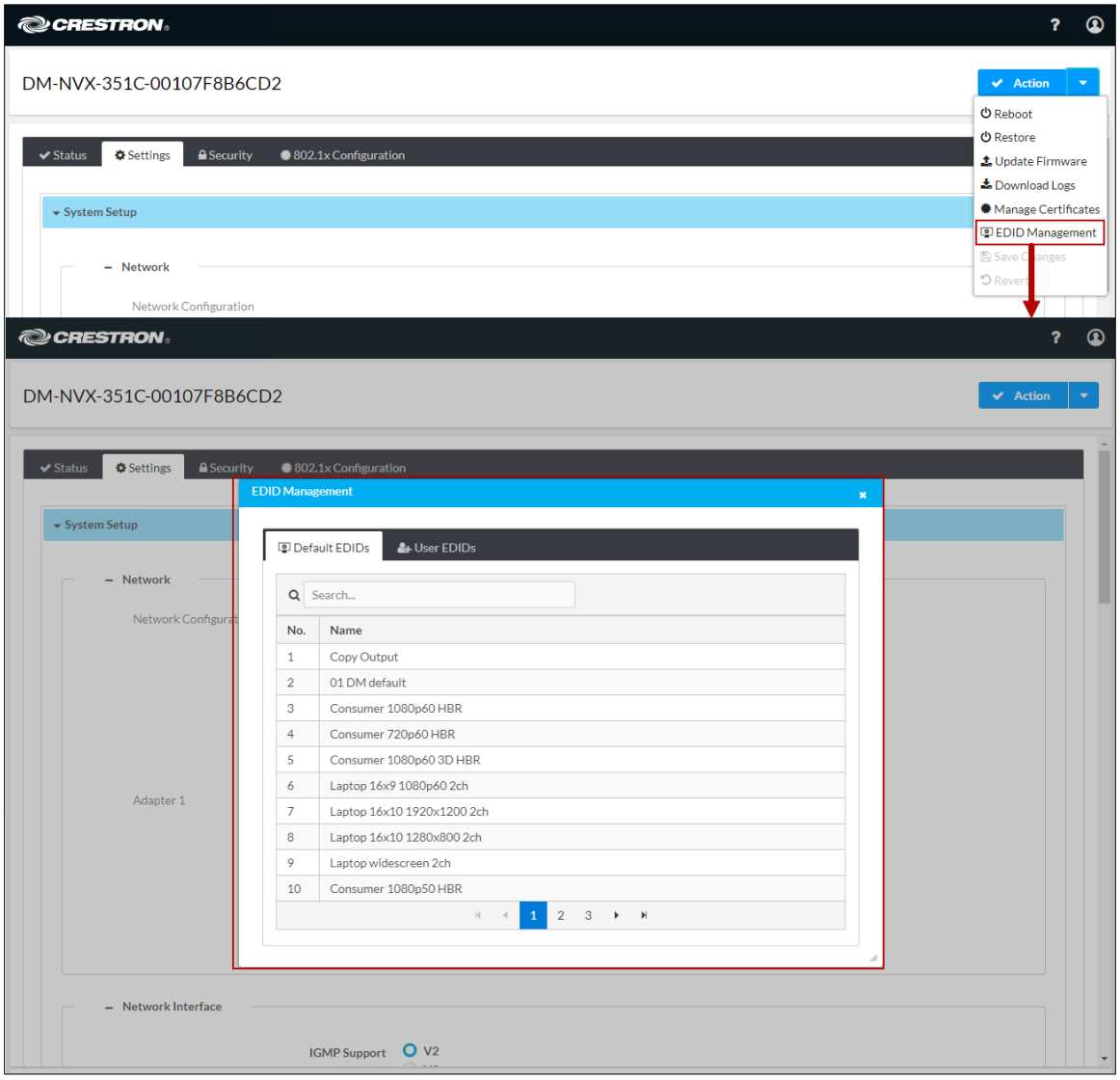
Still image detection is reported in the top-level programming slot of SIMPL Windows via the **<StillImageDetection_F>** analog output join.

EDID (Extended Display Identification Data)

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

To view a list of default or user EDID files, search for an EDID file, or add or delete user EDID files, go to the **Action** menu in the upper-right corner of the web interface and select **EDID Management**.

Action Menu - EDID Management

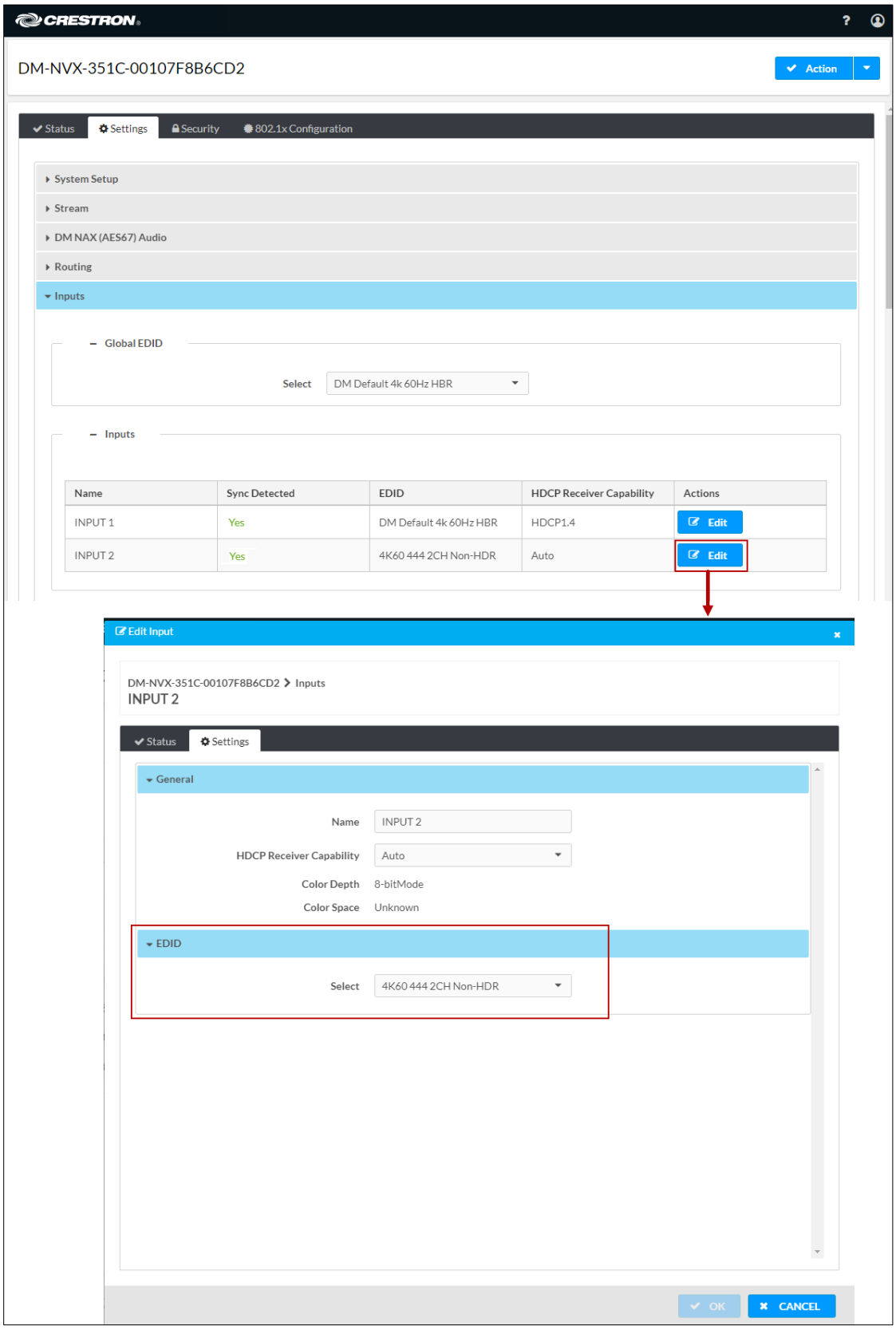


To select an EDID for the inputs:

1. Click the **Settings** tab and then click **Inputs**.
2. Do either of the following:
   - In the **Global EDID** section, set a global EDID for all inputs.
   - In the **Inputs** section, set the desired EDID for Input 1 and Input 2 by clicking the corresponding **Edit** button and selecting the desired EDID.

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

Settings Tab – Inputs, EDID Configuration



Fixed, Adaptive, or Variable Bit Rate

NOTES:

- Configuration of a fixed, adaptive, or variable bit rate setting is applicable to a DM-NVX-35x(C) device that functions as a transmitter.
- A nonblocking network is required for DM NVX devices.

The bit rate of a stream can be set to fixed, adaptive, or variable:

- A fixed bit rate, also referred to as Constant Bit Rate (CBR), is user specified and can be set to a value ranging from 200 Mbps to 950 Mbps.
- Adaptive bit rate (ABR) enables the encoder to automatically set a fixed bit rate based on the input resolution of the stream. For example, the adaptive bit rate for a common resolution such as 1920x1080p@60Hz (1080p60) would automatically be set to 400 Mbps. Adaptive bit rate makes better use of the available bandwidth than a user-specified fixed bit rate.

  The following table lists common resolutions and the associated adaptive bit rate setting.

  Resolution and Associated Adaptive Bit Rate Setting

RESOLUTION	PIXELS PER SECOND	ADAPTIVE BIT RATE (Mbps)
720x480@60 Hz (480p60)	20,736,000	302.777778
1280x720@50 Hz (720p50)	46,080,000	326.543210
1280x720@60 Hz (720p60)	55,296,000	335.185185
1920x1080@50 Hz (1080p50)	103,680,000	380.555556
1920x1080@60 Hz (1080p60)	124,416,000	400
3840x2160@24 Hz (4k24)	199,065,600	470
3840x2160@25 Hz (4k25)	207,360,000	477.777778
3840x2160@30 Hz (4k30)	248,832,000	516.666667
3840x2160@50 Hz (4k50)	414,720,000	672.222222
3840x2160@60 Hz (4k60)	497,664,000	750
4096x2160@50 Hz (DCI50)	442,368,000	698.148148
4096x2160@60 Hz (DCI60)	530,841,600	781.111111

- Variable bit rate (VBR) enables the encoder to automatically vary the bit rate based on the content and input resolution of the stream. The bit rate can vary from less than 150 Mbps to a maximum of 750 Mbps. A variable bit rate results in the use of less bandwidth to produce the same image quality as a user-specified fixed bit rate or an adaptive bit rate.

Using the Web Interface

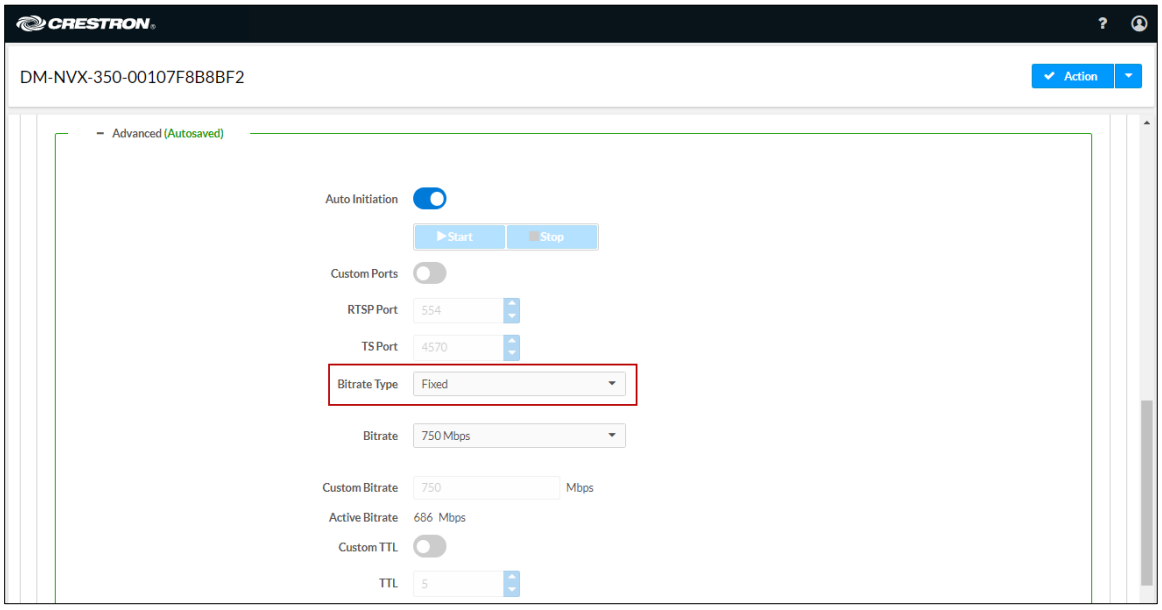
For a DM NVX device that is set to Transmitter mode, set the bit rate of the stream:

1. Click the **Settings** tab and then click **Stream**.
2. In the Advanced section, select the bit rate type in the **Bitrate Type** drop-down list: **Fixed**, **Adaptive**, or **Variable**.

   If **Fixed** is selected, select a bit rate in the **Bitrate** drop-down list. If **Custom** is selected as the **Fixed** bit rate, enter a custom bit rate value in the **Custom Bitrate** text box. The custom bit rate must be a value ranging from 200 Mbps to 950 Mbps.

   NOTE: For 4K60 video, a bit rate below 350 Mbps may display a black screen.

Settings Tab – Stream, Advanced, Bitrate Type



Using SIMPL Windows

In **Slot-01: Stream Transmit**, set the **<BitrateType>** analog input join to the desired bit rate type (**Constant Bitrate [Default]**, **ABR, or VBR**). For additional information, refer to the SIMPL Windows help file.

Subscriptions

NOTE: Subscription configuration applies to a DM-NVX-35x(C) device that functions as a receiver.

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

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

Using the Web Interface

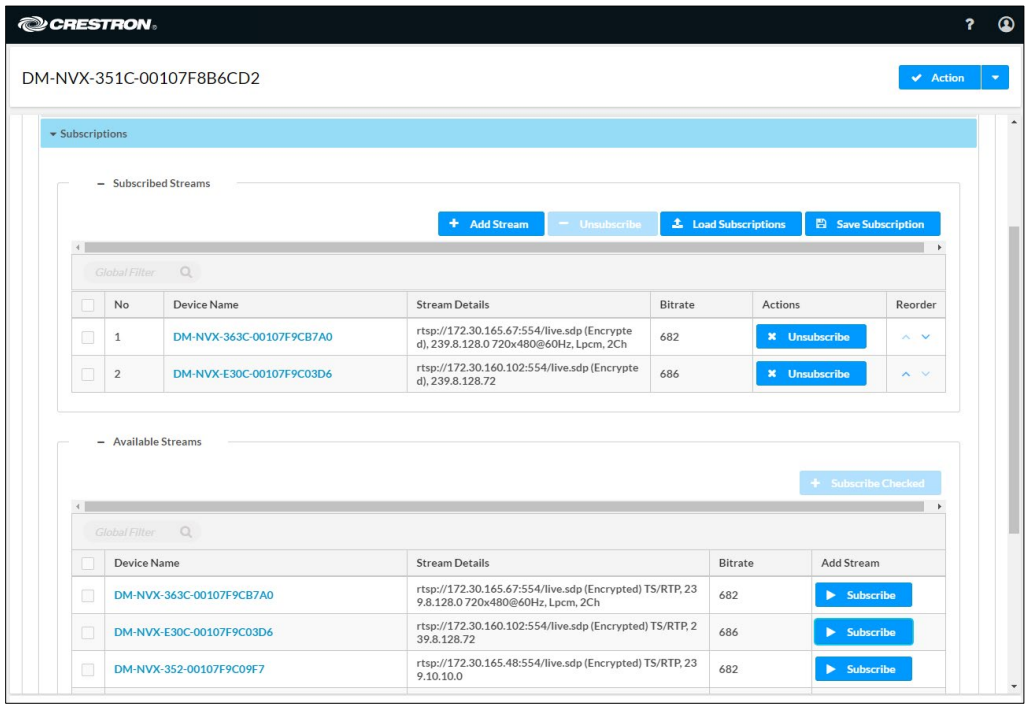
To configure subscriptions:

1. Click the **Settings** tab.
2. Click **Subscriptions** and then do either of the following:
   - In the **Subscribed Streams** section, manually add each transmitter that is to be subscribed to the receiver 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 Move up or Move down icon in the **Reorder** column until the transmitter appears in the desired location in the list.

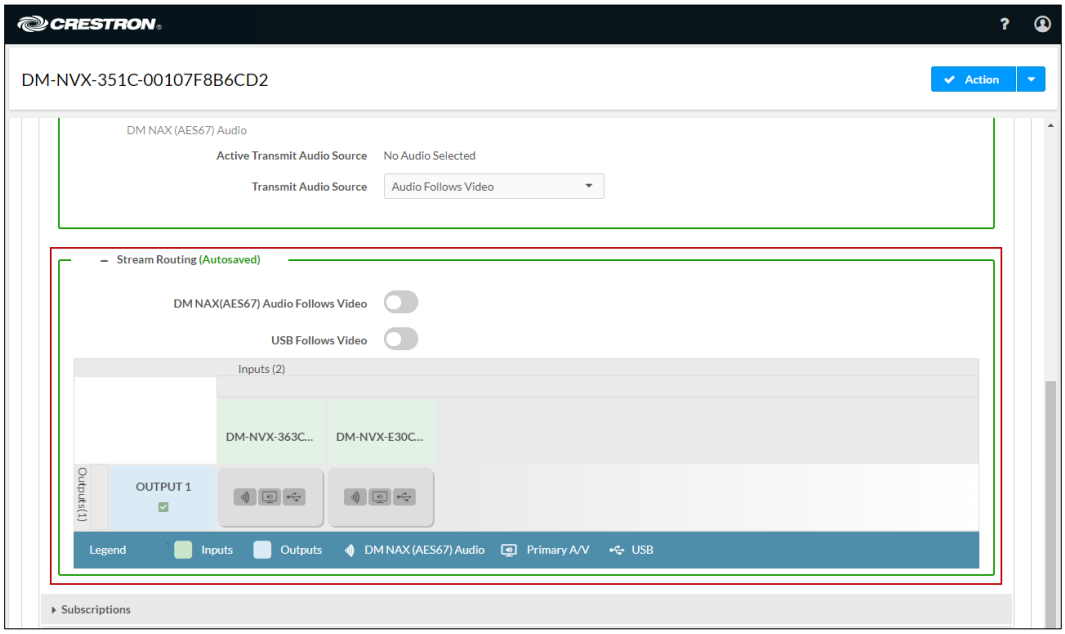
   - In the **Available Streams** section, click **Subscribe Checked** or **Subscribe** for the transmitters that are to be subscribed to the receiver.

Settings Tab – Subscriptions



3. Under the **Settings** tab, click **Routing.** In the **Stream Routing** section, select the desired transmitter to be routed to the receiver.

Settings Tab – Routing, Stream Routing



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

Using SIMPL Windows

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

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

Daisy Chain

DM-NVX-350(C) and DM-NVX-351(C) devices include three LAN ports (two RJ-45 LAN ports and one SFP LAN port). A DM-NVX-352(C) device includes two LAN ports (one RJ-45 LAN port and one SFP LAN port). The LAN ports can be used to daisy chain multiple DM NVX devices. In a daisy chain configuration, DM NVX devices connect directly to one another in a series. The daisy chain configuration can consist of one transmitter and up to 64 receivers or can include receivers only (maximum of 64). Only one DM NVX device in the daisy chain must connect to the LAN. All DM NVX devices in the daisy chain must use the same stream.

NOTES:

- A daisy chain configuration is not supported if **Port Selection** functionality is enabled. Refer to "Network Port Selection" on page 69 for additional information.
- A daisy chain configuration can be used for a video wall (refer to "Video Wall Processing" on page 27) and also for individual displays that are to show the same video image.

The following sections provide information about switching subscribed and nonsubscribed transmitters in a daisy chain configuration.

Switching Subscribed Transmitters

To switch transmitters that are subscribed to a receiver in a daisy chain configuration, use the web interface or SIMPL Windows.

Using the Web Interface

To switch subscribed transmitters in a daisy chain configuration:

1. Click the **Settings** tab and then click **Routing**.
2. In the **Stream Routing** section:
   a. For each receiver in the daisy chain, clear the existing route.

      NOTE: Do not proceed to step 2b until the route is cleared for all receivers in the chain.

   b. For each receiver in the daisy chain, route the desired subscribed transmitter.

Using SIMPL Windows

Switch subscribed transmitters in **Slot-1000: XIO Routing**:

1. For each receiver in the daisy chain, clear the existing route by setting the **<VideoOut>** analog input join to **0**. Using SIMPL Windows, all routes for all receivers in the chain can be cleared at one time.
2. For each receiver in the daisy chain, select the desired subscribed transmitter that is to be routed by setting the **<VideoOut>** analog input join to the desired value. Using SIMPL Windows, the desired transmitter can be selected for all receivers in the chain at one time.

Switching Nonsubscribed Transmitters

To switch nonsubscribed transmitters in a daisy chain configuration, use the web interface or SIMPL Windows.

Using the Web Interface

To switch nonsubscribed transmitters:

1. Click the **Settings** tab and then click **Stream**.
3. In the **Advanced** section:
   a. For each receiver in the daisy chain, disable **Auto Initiation** and then stop the stream.

      NOTE: Do not proceed to step 2b until **Auto Initiation** is disabled and the stream is stopped on all receivers in the chain.

   b. For each receiver in the daisy chain:
      i. Set a new stream location.
      ii. Start the stream.

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

Using SIMPL Windows

To switch nonsubscribed transmitters, use the top-level programming slot:

1. For each receiver in the daisy chain, trigger the **<AutomaticInitiationDisabled>** digital input join to disable automatic initiation, and then trigger the **<Stop>** digital input join to stop the stream.

   NOTE: Do not proceed to step 2 until **Auto Initiation** is disabled and the stream is stopped on all receivers in the chain.

2. For each receiver in the daisy chain:
   a. Set the **<StreamLocation>** serial input join to a new stream location.
   b. Trigger the **<Start>** digital input join to start the stream.

7.1 Surround Sound Audio

DM-NVX-35x(C) devices support the lossless transport of 7.1 surround sound audio signals (including Dolby® TrueHD, Dolby Atmos®, DTS HD®, and DTS:X® audio signals) and uncompressed linear PCM. In receiver mode, the DM-NVX-350(C) and DM-NVX-352(C) can receive both multichannel and 2-channel downmix signals from a DM-NVX-351(C) or DM-NVX-363(C) transmitter, allowing either signal to be selected at the HDMI output while the 2-channel signal is automatically routed to the analog output.

NOTE: The DSP of the DM-NVX-351(C) is compatible with Dolby Atmos audio using True HD or Dolby Digital Plus audio formats.

In receiver mode, the DM-NVX-351(C) can receive the incoming multichannel surround sound signal from the network or from an HDMI input and then downmix that signal to stereo. The stereo downmix signal is automatically routed to the onboard analog output, while the HDMI output can be configured to output either stereo or multichannel audio. In transmitter mode, the DM-NVX-351(C) can distribute both stereo and multichannel signals simultaneously over the network, allowing either signal to be selected at any receiver on the network.

To configure 7.1 surround sound audio, set the desired EDID (refer to EDID on page 41).

DM NAX Audio over IP (AES67)

NOTE: DM NAX™ audio over IP (AES67) requires firmware release 3.x or later for DM-NVX-35x(C) devices.

DM NAX audio over IP supports the AES67 standard. AES67 support allows the selected audio source to be transmitted as a 2-channel AES67 source while another 2-channel AES67 audio stream is received from a Crestron DSP or other third-party device and combined with the video signal. When the DM-NVX-35x(C) device functions as a transmitter, the received AES67 audio stream can be output via the local HDMI output, primary AV stream, and analog audio output. When the DM-NVX-35x(C) device functions as a receiver, the received AES67 audio stream can be combined with the video and then output via the HDMI output and analog audio output.

NOTE: An AES67 stream that is received by an endpoint cannot be transmitted from that endpoint.

To configure DM NAX (AES67) audio, use the web interface or SIMPL Windows as discussed in the following sections.

Using the Web Interface

Configure DM NAX (AES67) audio by clicking the **Settings** tab and then configuring DM NAX (AES67) audio and routing:

- The **DM NAX (AES67) Audio** section varies depending on whether the DM NVX endpoint is in Transmitter or Receiver mode. Refer to the "Configuring DM NAX (AES67) Audio for a DM NVX Transmitter" and "Configuring DM NAX (AES67) Audio for a DM NVX Receiver" sections as appropriate.
- The **Routing** section enables the appropriate settings to be configured for DM NAX (AES67) audio. Refer to the "Configuring DM NAX (AES67) Audio Routing" section.

Configuring DM NAX (AES67) Audio for a DM NVX Transmitter

In the **DM NAX (AES67) Audio** section under the **Settings** tab:

- In the **DM NAX (AES67) Transmit** section, select the desired setting in the **Mode** drop-down list: **Automatic**, **Disabled,** or **Manual**. The default setting is **Automatic,** which adds 1 to the outgoing video stream multicast address. For example, if the video multicast address is 239.8.0.0, the DM NAX (AES67) multicast address is automatically set to 239.8.0.1.

  If **Mode** is set to **Manual,** enter the desired multicast address and port number.

- In the **DM NAX (AES67) Transmit Advanced** section, set the **Auto Initiation** toggle switch in the On (right) position or Off (left) position. By default, **Auto Initiation** is set to **On**. If **Auto Initiation** is set to **Off**, start or stop the stream as desired.

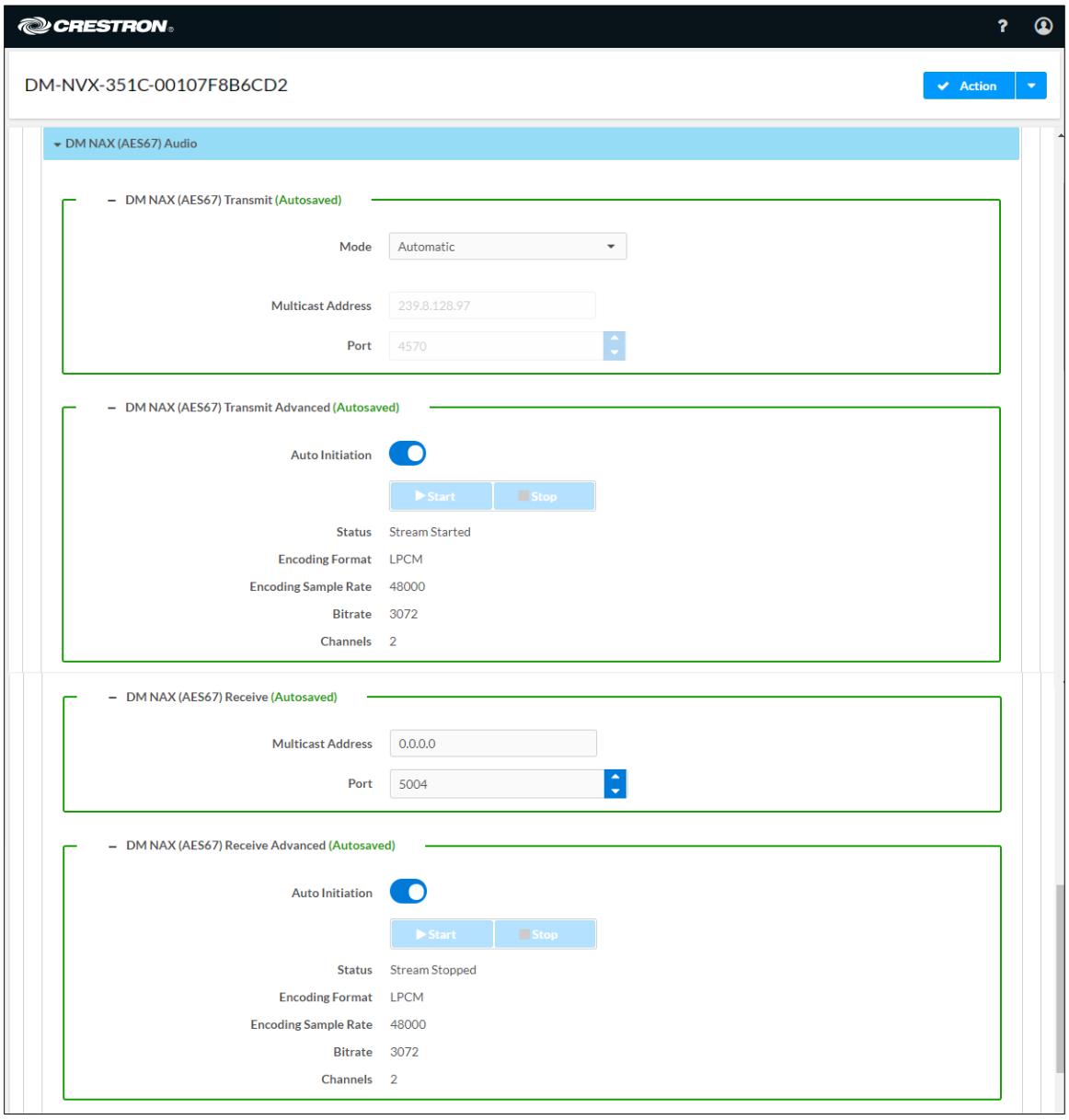
  The following AES67 audio stream information is displayed: status, encoding format, encoding sample rate, bit rate, and number of channels.

- In the **DM NAX (AES67) Receive** section, enter the multicast address and port number.

- In the **DM NAX (AES67) Receive Advanced** section, set the **Auto Initiation** toggle switch in the On (right) position or Off (left) position. By default, **Auto Initiation** is set to **On**. If **Auto Initiation** is set to **Off**, start or stop the stream as desired.

  The following AES67 audio stream information is displayed: status, encoding format, encoding sample rate, bit rate, and number of channels.

Settings Tab - DM NAX (AES67) Audio Configuration in Transmitter Mode



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

Configuring DM NAX (AES67) Audio for a DM NVX Receiver

In the **DM NAX (AES67) Audio** section under the **Settings** tab,

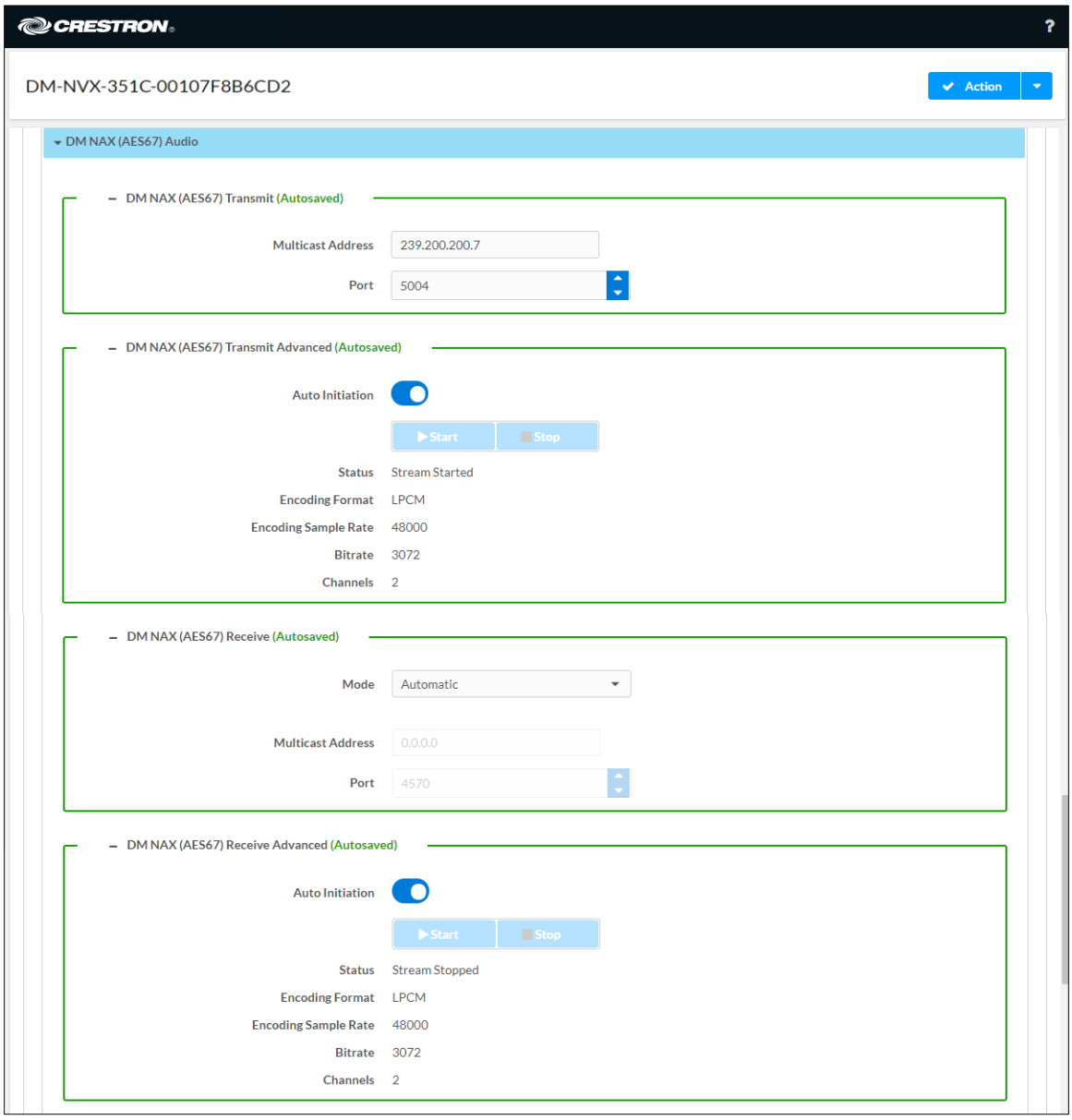
- In the **DM NAX (AES67) Transmit** section, enter the multicast address and port number.
- In the **DM NAX (AES67) Transmit Advanced** section, set the **Auto Initiation** toggle switch in the On (right) position or Off (left) position. By default, **Auto Initiation** is set to **On**. If **Auto Initiation** is set to **Off**, start or stop the stream as desired.

  The following AES67 audio stream information is displayed: status, encoding format, encoding sample rate, bit rate, and number of channels.
- In the **DM NAX (AES67) Receive** section, select the desired setting in the **Mode** drop-down list: **Automatic**, **Disabled,** or **Manual**. The default setting is **Automatic,** which adds 1 to the incoming video stream multicast address. For example, if the video multicast address is 239.8.0.0, the DM NAX (AES67) multicast address is automatically set to 239.8.0.1.

  If **Mode** is set to **Manual,** enter the desired multicast address and port number.
- In the **DM NAX (AES67) Receive Advanced** section, set the **Auto Initiation** toggle switch in the On (right) position or Off (left) position. By default, **Auto Initiation** is set to **On**. If **Auto Initiation** is set to **Off**, start or stop the stream as desired.

  The following AES67 audio stream information is displayed: status, encoding format, encoding sample rate, bit rate, and number of channels.

Settings Tab - DM NAX (AES67) Audio Configuration in Receiver Mode

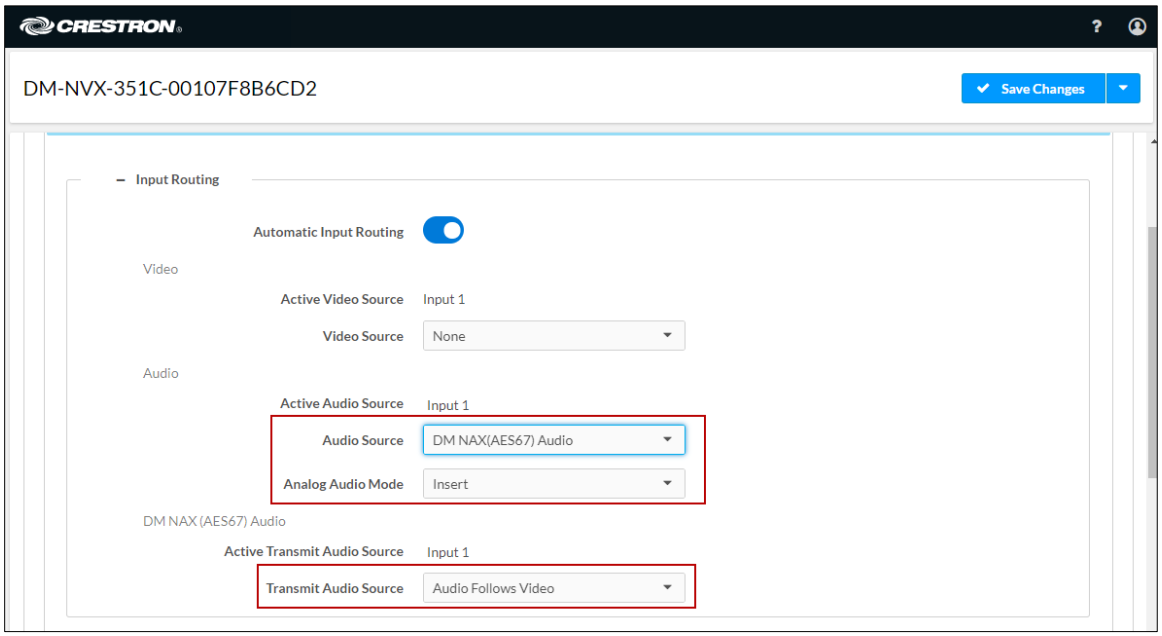


Configuring DM NAX (AES67) Audio Routing

To configure DM NAX (AES67) audio routing:

1. Click the **Settings** tab and then clicking **Routing.**
2. In the **Input Routing** section:
   a. Set **Audio Source** to **DM NAX (AES-67) Audio**.
   b. Set **Analog Audio Mode** to **Insert** or **Extract.**
   c. Set **DM NAX (AES-67) Transmit Audio Source** to the desired audio source for the DM NAX (AES67) audio output.

Settings Tab – Routing, DM NAX (AES67) Routing



Using SIMPL Windows

Using the top-level programming slot for the DM-NVX-35x(C) device:

- Set the **<AudioSource>** analog input join to **DM NAX (AES67) audio** as the audio source for the network video stream or HDMI output.
- Set the **<DM NAX(AES67)AudioSource>** analog input join to the desired value for the audio source of the DM NAX (AES67) audio output.

For a DM NVX transmitter or receiver, configure DM NAX (AES67) audio in **Slot-18: DM NAX (AES67) Routing**. In order for a DM NVX device to transmit DM NAX (AES67) audio, configure DM NAX (AES67) audio in **Slot-18-01: DM NAX (AES67) TX**. In order for a DM NVX device to receive DM NAX (AES67) audio, configure DM NAX (AES67) in **Slot-18-33: DM NAX (AES67) RX**. For additional information, refer to the SIMPL Windows help file.

Dante or AES67 Audio Embedding and De-embedding

NOTE: This section applies to the DM-NVX-352 and DM-NVX-352C only.

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

When the DM-NVX-352(C) functions as a transmitter, the Dante or AES67 received audio stream can be output via the local HDMI output, primary AV stream, and analog audio output. When the DM-NVX-352(C) functions as a receiver, the Dante or AES67 received audio stream can be combined with the video and then output via the HDMI output and analog audio output.

NOTE: A Dante or AES67 stream that is received by a DM NVX endpoint cannot be transmitted from that endpoint.

Prerequisites for Dante or AES67 audio networking consist of the following:

1. Audio routing between Dante or AES67 devices requires Audinate® Dante Controller software. Download Dante Controller software from the Audinate website at www.audinate.com/products/software/dante-controller.
2. Dante and AES67 audio can coexist with DM-NVX-352(C) devices on the same network; however, additional network considerations may need to be addressed. For Ethernet switch guidelines, refer to the information provided on the Audinate website at www.audinate.com/networks-and-switches.
3. For AES67 audio networking with DM-NVX-352(C) devices, enable AES67 mode using the Dante Controller software. Enabling AES67 mode results in a multicast stream that is compatible with AES67 receiver and transmitter devices.
4. For additional information, go to www.audinate.com.

To configure Dante or AES67 audio for DM-NVX-352(C) devices, use the web interface or SIMPL Windows as discussed in the following sections.

Using the Web Interface

Configure Dante or AES67 audio by clicking the **Settings** tab and then configuring stream and routing settings:

1. In the **Stream** section, fill in the appropriate information in the **Dante/Aes-67Name** text box by entering the name of the Dante module that will be used in the Dante Controller.

   The default **Dante/Aes-67Name** text box entry is either of the following: DM-NVX-352-*xxxxxxyyyyyy* or DM-NVX-352C-*xxxxxxyyyyyy*, where:

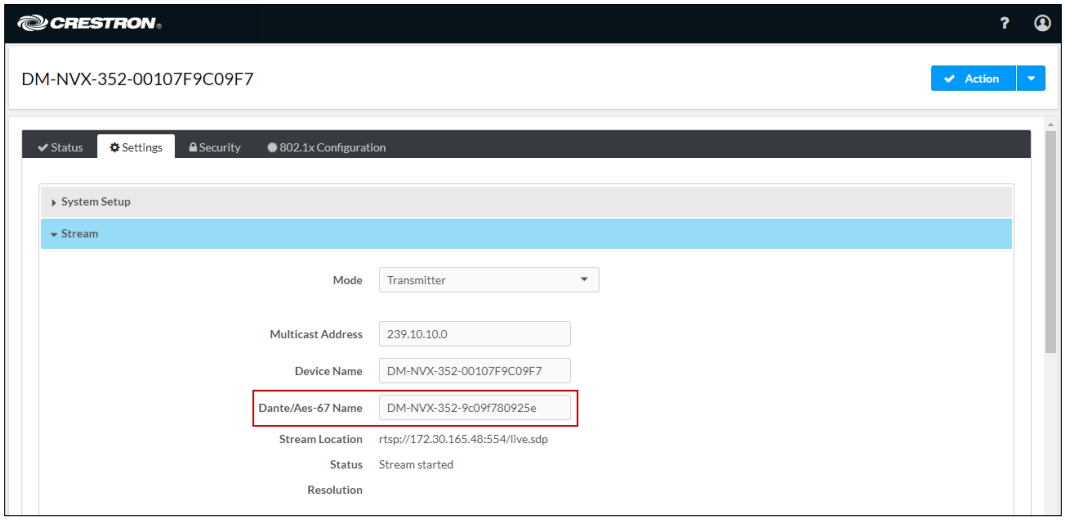
   - *xxxxxx* equals the last six MAC address characters of the DM NVX device (for example, 9c099e)
   - *yyyyyy* equals the last six MAC address characters of the Dante module (for example, 80924b)

   The name matches the default name in the Dante Controller.

NOTES:

- If the **Dante/Aes-67Name** text box entry is changed in the web interface, the new name is automatically added in the Dante Controller but the previous name is not removed. Changing the **Dante/Aes-67Name** text box entry may disconnect the audio until the route is reestablished in the Dante Controller.
- If the Dante or AES67 name is changed in the Dante Controller rather than the DM NVX web interface, the name is automatically changed in the **Dante/Aes-67Name** text box of the web interface.

Settings Tab – Stream, Dante or AES67 Name



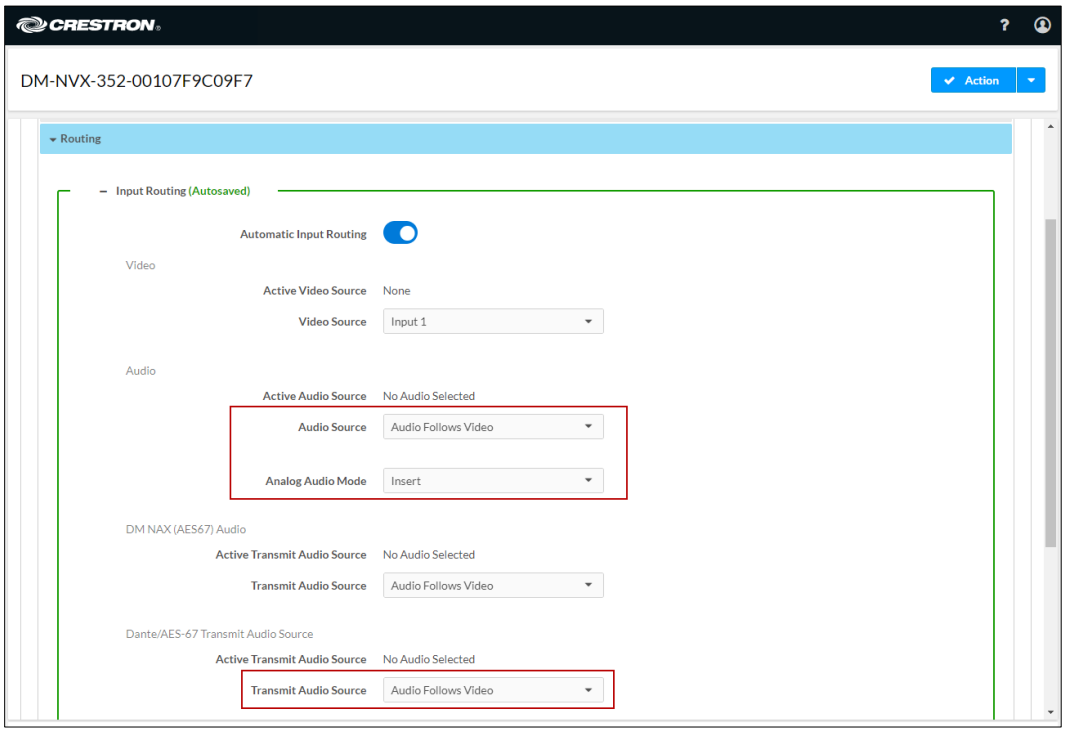
2. In the **Routing** section:

   a. Set **Audio Source** to **Dante/AES-67 Audio**.

   b. Set **Analog Audio Mode** to **Insert** or **Extract**.

   c. Set **Dante/AES-67 Transmit Audio Source** to the desired audio source for the Dante or AES67 output.

Settings Tab – Routing, Dante or AES67 Configuration



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

Using SIMPL Windows

NOTE: To insert or extract Dante or AES67 audio, use the web interface.

Using the top-level programming slot for the DM NVX device, set the **<AudioSource>** analog input join to **Dante/AES-67 Audio Input** if Dante or AES67 audio is to be inserted into a network video stream or the HDMI output. Set the <**DanteAudioSource>** analog input join to **Dante/AES-67 Audio Input** if Dante or AES67 audio is to be the audio source for the Dante or AES67 output. For additional information, refer to the SIMPL Windows help file.

Analog Audio Input or Output

Analog audio can be configured as either an input or an output:

- As an input on a DM-NVX-35x(C) device that functions as a transmitter, analog audio can be configured as the audio source and be inserted into a network video stream and the HDMI output. As an output on a DM-NVX-35x(C) transmitter, analog audio can be configured to extract audio from the routed HDMI input.
- As an input on a DM-NVX-35x(C) device that functions as a receiver, analog audio can be configured as the audio source and be inserted into the HDMI output. As an output on a DM-NVX-35x(C) receiver, analog audio can be configured to extract audio from the routed audio/video source—either the network stream or one of the HDMI inputs.

NOTE: Analog audio output from a DM-NVX-350, DM-NVX-350C, DM-NVX-352, or DM-NVX-352C is functional only when the device is receiving a 2-channel stereo input signal. The DM-NVX-351 and DM-NVX-351C can derive a 2-channel downmix signal from a multichannel surround sound source.

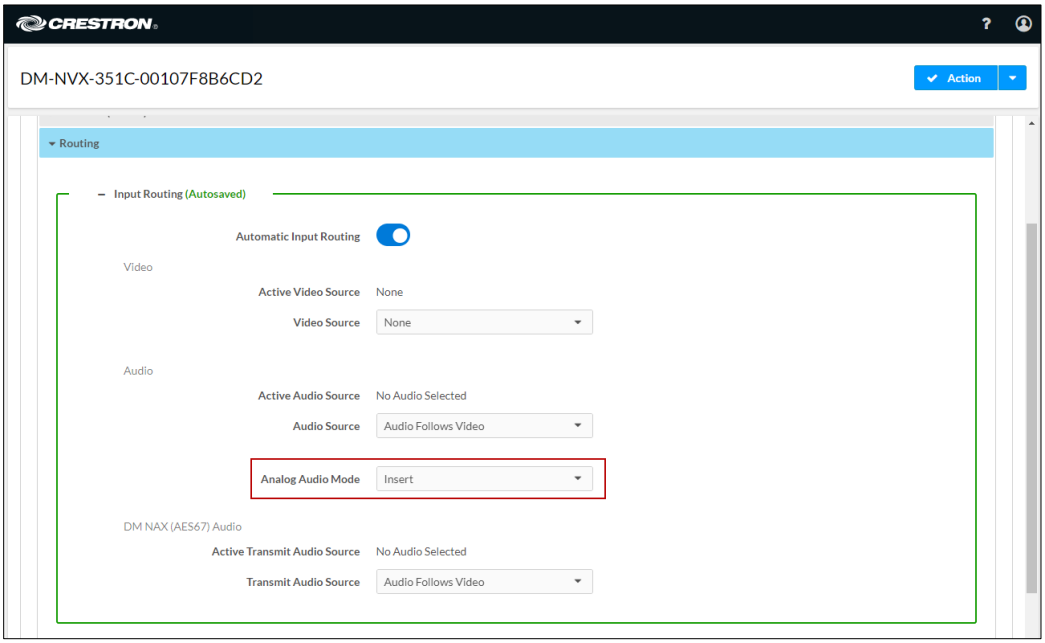
To configure analog audio, use the web interface or SIMPL Windows as discussed in the following sections.

Using the Web Interface

Configure analog audio by clicking the **Settings** tab and then configuring routing and output settings:

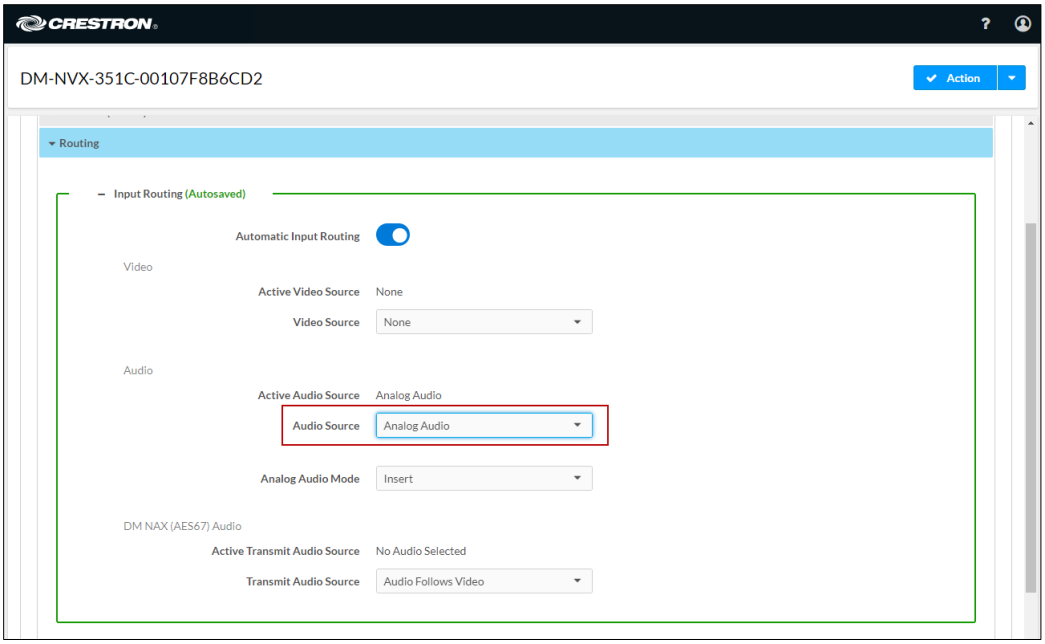
1. In the **Routing** section:
   a. Set **Analog Audio Mode** to **Insert** or **Extract**.

Settings Tab – Routing, Analog Audio Mode Configuration



b. (Applicable only when **Audio Mode** is set to **Insert**) Set **Audio Source** to **Analog Audio**.

Settings Tab – Routing, Analog Audio Source Configuration

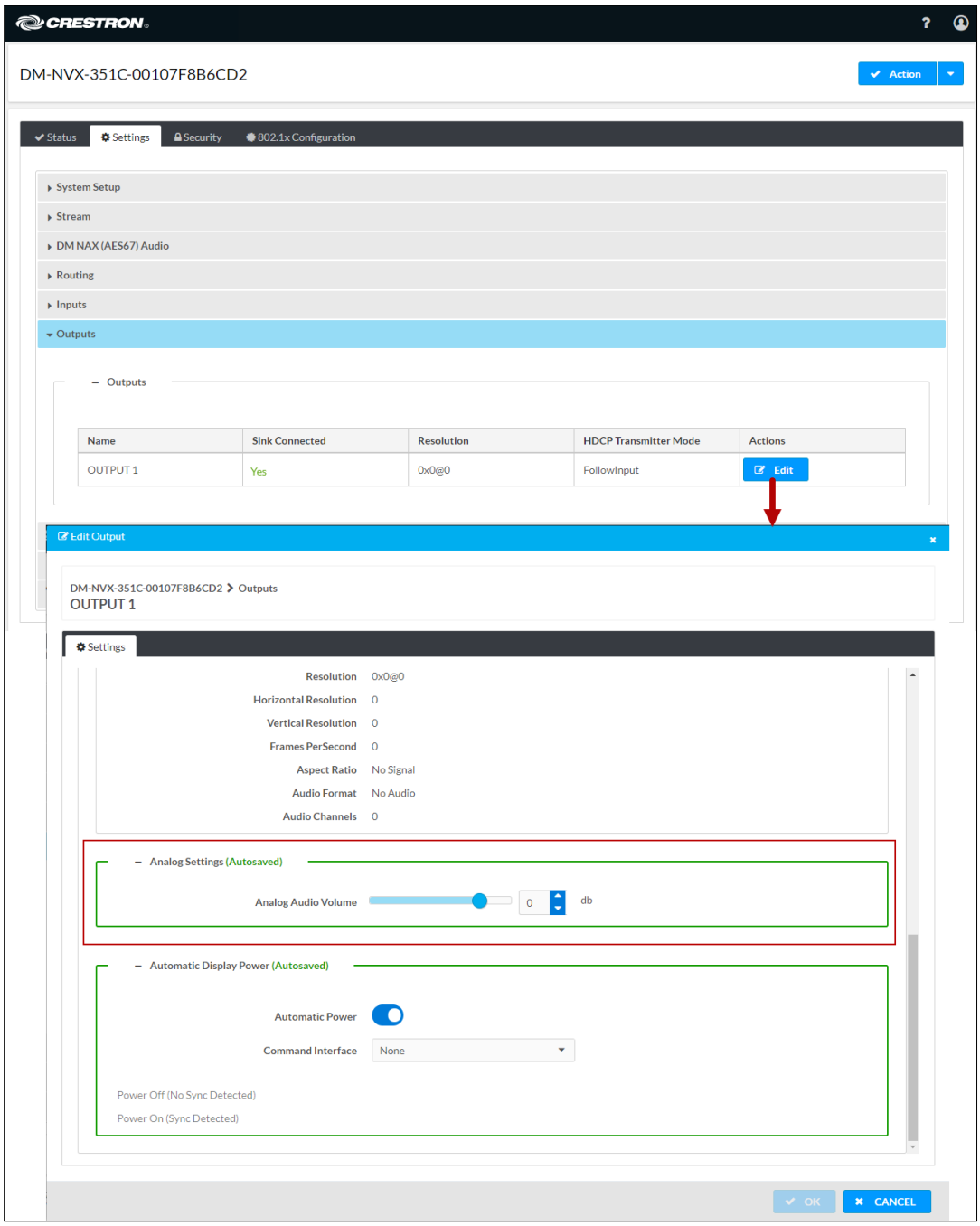


2. (Applicable only if **Analog Audio Mode** is set to **Extract**) Under the **Settings** tab:

   a. Click **Outputs** and then click the **Edit** button.

   b. In the **Analog Settings** section, set **Analog Audio Volume** to the desired volume.

Settings Tab – Outputs, Analog Audio Volume Configuration



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

Using SIMPL Windows

NOTE: To insert or extract analog audio, use the web interface.

Using the top-level programming slot for the DM NVX device, set the **<AudioSource>** analog input join to **Analog Audio** if analog audio is to be inserted into a network video stream or the HDMI output. If analog audio is configured as an output, set the **<AnalogAudioOutputVolume>** analog input join to the desired volume. For additional information, refer to the SIMPL Windows help file.

Breakaway Audio

A DM-NVX-35x(C) decoder can select and combine separate video and audio signals from two different inputs; however, audio from one onboard HDMI input cannot be combined with video from the other onboard HDMI input. In receiver mode, a DM-NVX-35x(C) device can combine separate video and audio signals from two different DM NVX transmitters. Combining audio from one transmitter with video from another transmitter uses the 2-channel AES67 or Dante audio stream. Multichannel audio from one transmitter cannot be combined with video from another transmitter.

Using the Web Interface

To configure breakaway audio:

1. Click the **Settings** tab and then click **Routing**.
2. In the **Input Routing** section:
   a. Set **Audio Source** to one of the following:
      - **Input 1**
      - **Input 2**
      - **Analog Audio**
      - **Primary Stream Audio**
      - **DM NAX (AES67) Audio**
      - **Dante/AES-67 Audio** (DM-NVX-352[C] only)

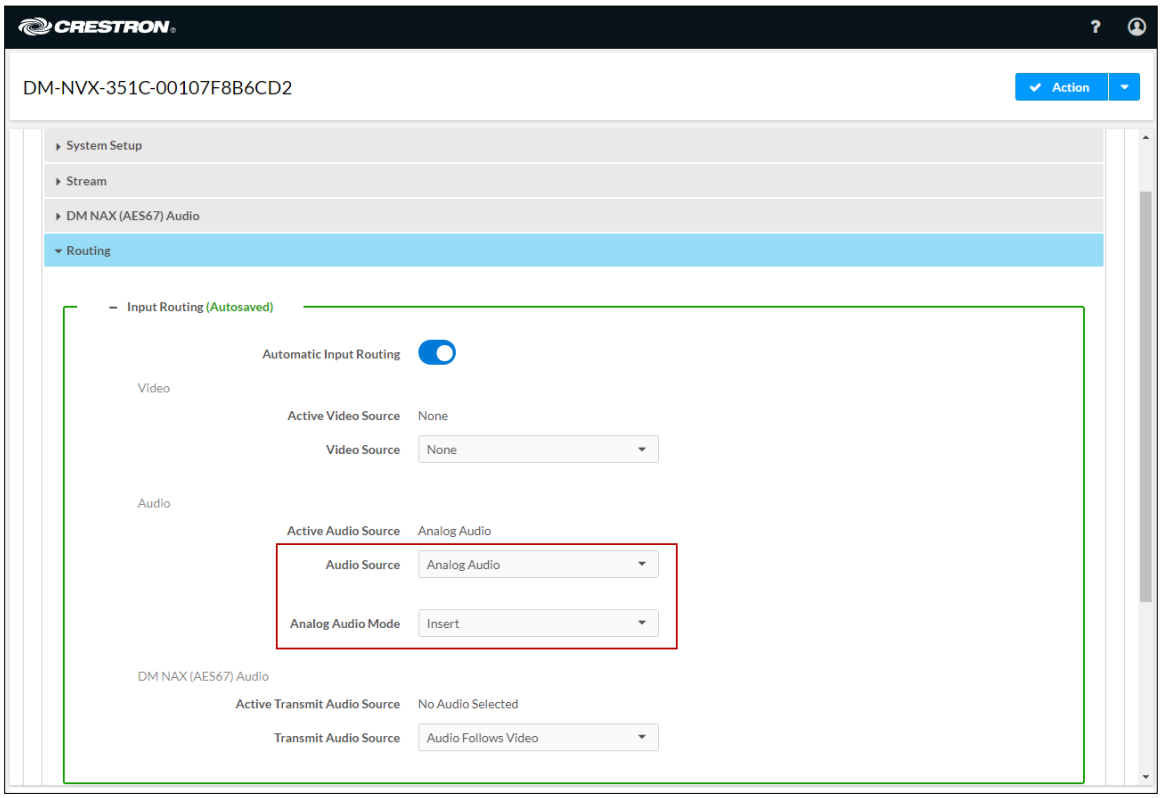
      NOTE: For audio breakaway:

      - Do not set **Audio Source** to **Audio Follows Video**.
      - Do not set **Audio Source** and **Video Source** to the same HDMI input. If **Audio Source** is set to **Input 1**, do not set **Video Source** to **Input 1**. If **Audio Source** is set to **Input 2**, do not set **Video Source** to **Input 2**.

   b. Set **Analog Audio Mode** to **Insert**.

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

Settings Tab – Routing, Breakaway Audio Configuration



Using SIMPL Windows

Using the top-level programming slot for the DM NVX device, set the **<AudioSource>** analog input join to one of the following:

- **Input 1**
- **Input 2**
- **Analog Audio**
- **Primary Stream Audio**
- **DM NAX (AES67 audio)**
- **Dante audio** (DM-NVX-352[C] only)

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

USB 2.0 Routing

DM-NVX-35x(C) devices support the extension of USB 2.0 signals. A DM-NVX-35x(C) device provides a USB 2.0 DEVICE port and a USB 2.0 HOST port; however, both ports cannot be used simultaneously. The DEVICE port on one DM NVX device can be connected to a computer or other host device. The HOST port on another DM NVX device can be connected to a USB mouse, keyboard, or other peripheral device. Connection to the DEVICE port is referred to as a local USB connection, and the DM NVX device is referred to as the local extender. Connection to the HOST port is referred to as a remote USB connection, and the DM NVX device is referred to as a remote extender.

NOTE: DM-NVX-35x(C) devices are engineered to deliver maximum compatibility with the widest possible range of USB products. In addition to KVM (keyboard, video, mouse) switch functionality, various types of USB peripheral devices are supported, including whiteboards, touch screens, game controllers, web cameras, mobile devices, headsets, and flash drives. Crestron does not guarantee that all USB products are compatible with DM NVX devices.

For USB 2.0 Layer 2 transport, one local (DEVICE port) connection supports up to seven remote (HOST port) connections simultaneously. When multiple remote connections are required, a hub must be used to connect to the HOST port of each DM NVX remote extender.

NOTE: Bandwidth management must be considered for the use of high-speed USB peripheral devices such as web cameras and flash drives. To prevent excessive USB traffic for Layer 2 support of multiple remote devices, only one high-speed USB device can be used regardless of the number of remote extenders. Multiple high-speed USB devices should not be connected to multiple remote extenders.

For Layer 3 transport, one local (DEVICE port) connection supports only one remote (HOST port) connection. Layer 3 supports USB 2.0 transport of data across VLANs.

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

Using the Web Interface

To configure USB routing:

1. Determine the DM-NVX-35x(C) devices that are to be paired:
   - One DM NVX device functions as the local extender; that is, the DEVICE port connects to a computer or other host device.
   - For Layer 2 transport, up to seven DM NVX devices can function as remote extenders; that is, the HOST port connects to a USB mouse, keyboard, or other peripheral device. For Layer 3 transport, only one DM NVX device can function as the remote extender.

   Continue with the following steps for each DM NVX device.
2. Click the **Settings** tab and then click **USB**.

3. In the **USB Mode** drop-down list, select **Local** for the local extender or **Remote** for a remote extender.
4. 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) devices as well as USB-NX2-LOCAL-1G, USB-NX2-REMOTE-1G, USB-EXT-DM-LOCAL, and USB-EXT-DM-REMOTE extenders. Up to seven remote connections are supported. Only one high-speed USB device can be used regardless of the number of remote connections.
   - **Layer 3:** Enables Layer 3 transport of USB 2.0 data across VLANs. This mode is compatible with DM-NVX-35x(C) devices only. Only one remote connection is supported.

   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.
5. Set the **Automatic USB Pairing** toggle switch in the On (right) or Off (left) position.

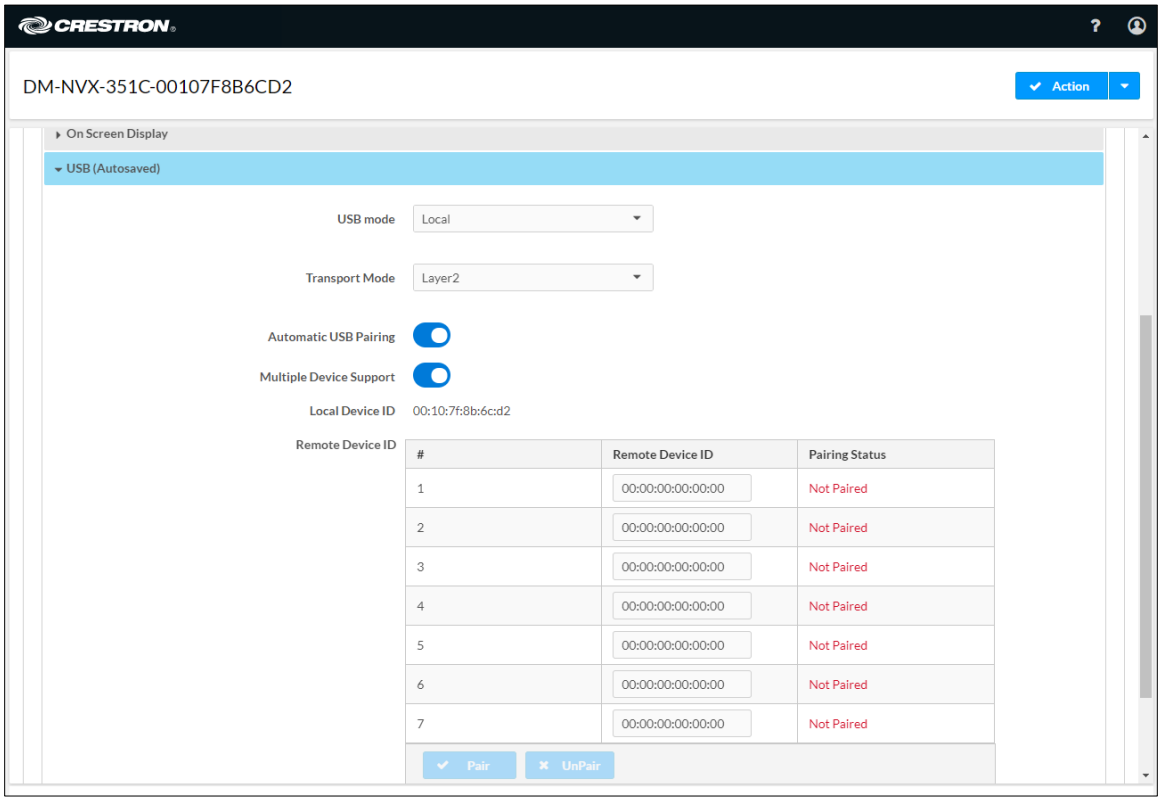
   NOTE: When firmware is upgraded from version 2.0.3900.00056 or earlier to a later version, automatic USB pairing is disabled. If factory default settings are restored, automatic USB pairing is enabled.
6. (Applicable to Layer 2 only) Set the **Multiple Device Support** toggle switch to the On (right) or Off (left) position. The default setting is **Off**. Enabling **Multiple Device Support** allows the local extender to be paired with up to seven remote extenders. A hub must be used to connect to the HOST port of each DM NVX remote extender.
7. (Applicable to **Local** USB mode only) Do either of the following:
   - In the **Remote Device ID** text boxes for **Layer 2** transport, enter the MAC address of one remote extender if **Multiple Device Support** is disabled. If **Multiple Device Support** is enabled, enter the MAC address of each remote extender.
   - In the **Remote Device ID** text box for **Layer 3** transport, enter the IP address of a single remote extender.

8. (Applicable to **Remote** USB mode only) 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.
9. (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 disabled, click the **UnPair** button for each device that is paired.
- If **Automatic USB Pairing** is enabled, do either of the following:
    - For Layer 2, remove the current entry or enter **00:00:00:00:00:00** in each Remote Device ID text box (**Remote Device ID 1** through **Remote Device ID 7**) as required.
    - For Layer 3, enter an unused IP address in the **Remote Device ID** text box.

Settings Tab - USB (Layer 2 with Automatic USB Pairing and Multiple Device Support 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 device functions as the local extender (LEX); that is, the DEVICE port connects to a computer or other host device.
   - For Layer 2 transport, up to seven DM NVX devices can function as remote extenders (REX); that is, the HOST port connects to a USB mouse, keyboard, or other device. For Layer 3 transport, only one DM NVX device can function as the remote extender.

   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)**.

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 device. For Layer 3 transport, the **<UsbLocalDeviceIpAddress_F>** serial output join reports the corresponding IP address of each 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. Do either of the following:

        - (Applicable when the **<MultipleUsbDeviceDisabled>** digital input join is triggered) 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.

        - (Applicable when the **<MultipleUsbDeviceEnabled>** digital input join is triggered) Copy the MAC address (UsbLocalDeviceId) of each REX device into a **<UsbRemoteDeviceId>** serial input join **(<UsbRemoteDeviceId>** through **<UsbRemoteDeviceId7>)** on the LEX device.

On the LEX device, the **<UsbRemoteDeviceId_F>** and **<UsbRemoteDeviceId2_F>** through **<UsbRemoteDeviceId7_F>** serial output joins report the MAC address of each 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 all DM NVX devices (LEX and REX).
   - Trigger the **<AutomaticUSBPairingEnabled>** digital input join on all DM NVX devices (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.

Network Port Selection

Network port selection enables network traffic to be managed and segregated based on traffic type. Internal VLANs are used to route different traffic types to specific external Ethernet ports, which are assigned to the various traffic types. AES67 or Dante audio can be separated from the primary video and control network resulting in a dedicated audio network.

CAUTION: When network port selection is set to **Off** (default setting), multiple Ethernet ports cannot be connected to the same Ethernet switch. Doing so will cause a network loop and bring down the network.

NOTE: If network port selection is enabled, daisy chain configuration is not supported.

To configure network port selection:

1. Click the **Settings** tab and then click **Port Selection**.
2. Enable or disable port selection by setting the **Port Selection** toggle switch in the **On** (right) or **Off** (left) position, respectively. The default setting is **Off**.
3. If **Port Selection** is set to **On**, assign each of the following traffic types to a specific Ethernet port:

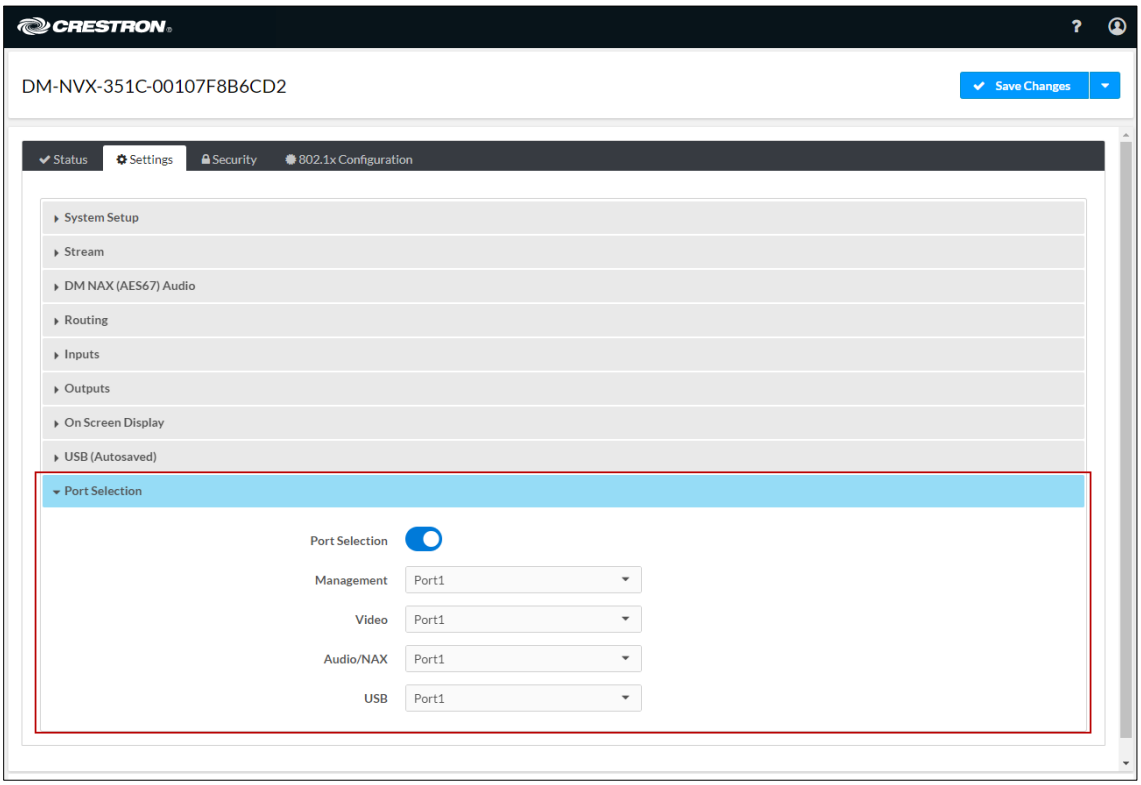
   NOTE: For the DM-NVX-350(C) and DM-NVX-351(C), Ethernet ports 1, 2, and 3 are available for use. For the DM-NVX-352(C), Ethernet ports 1 and 2 are available for use.

   - Management (default setting is port 1)

     NOTE: The management port controls the connection to the DM NVX web interface. Changing the port number will result in losing the connection to the web interface.

   - Video (default setting is port 1)
   - Audio/NAX (default setting is port 1)
   - Dante (applicable to DM-NVX-352 and DM-NVX-352C only, default setting is port 1)
   - USB (default setting is port 1)
4. Click **Save Changes** to apply the new settings.

Settings Tab, Port Selection



Device Mode Locking

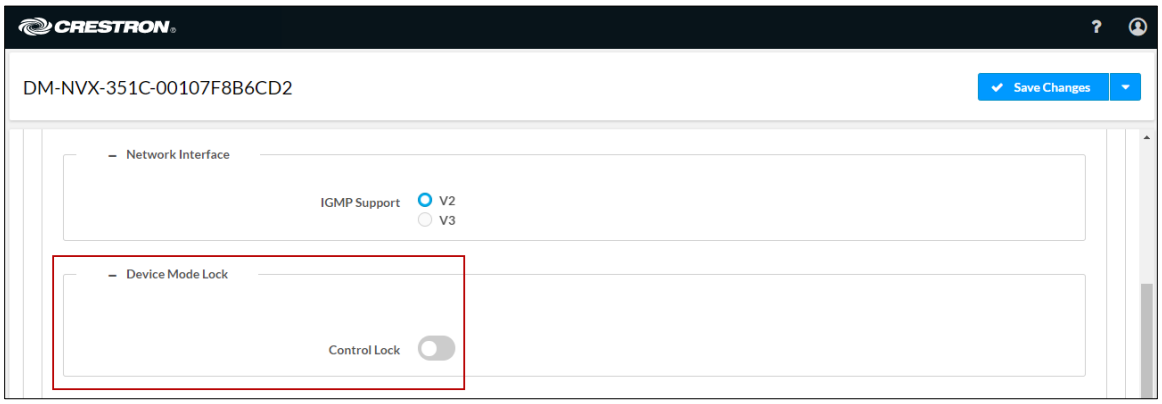
Device mode locking controls whether the **SETUP** button on a DM-NVX-35x and the DMF-CI-8 front panel can be used to change the operating mode of the DM-NVX-35x and DM-NVX-35xC devices, respectively. The operating mode determines when the DM-NVX-35x(C) device functions as a receiver or transmitter.

NOTE: Device mode locking does not apply to the **Mode** setting in the Stream section under the **Settings** tab.

To configure device mode locking:

1. Click the **Settings** tab and then click **System Setup**.
2. In the **Device Mode Lock** section, do either of the following:
   - Allow the operating mode to be changed by setting the **Control Lock** toggle switch in the Off (left) position (default setting).
   - Prevent the operating mode from being changed by setting the **Control Lock** toggle switch in the On (right) position.

Settings Tab – System Setup, Device Mode Lock Configuration



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

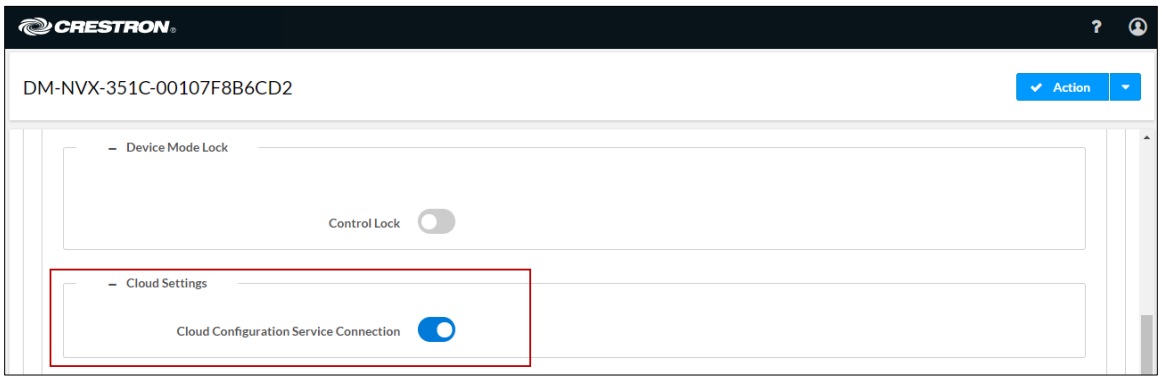
Crestron XiO Cloud Service Connection

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 XiO Cloud service can be enabled or disabled using the web interface.

To configure the connection to the Crestron XiO Cloud service:

1. Click the **Settings** tab and then click **System Setup**.
2. In the **Cloud Settings** section, set the **Cloud Configuration Service Connection** toggle switch in the On (right) or Off (left) position. The default setting is in the On position.

Settings Tab – System Setup, Cloud Settings



For instructions about how to connect to the service, refer to the DM-NVX-350, DM-NVX-351, and DM-NVX-352 Quick Start (Doc. 8391) or DM-NVX-350C, DM-NVX-351C, and DM-NVX-352C Quick Start as appropriate. For information about using the service, refer to the XiO Cloud Provisioning and Management Service User Guide (Doc. 8214).

Test Pattern Generator

NOTE: Test pattern generator applies to a DM-NVX-35x(C) device that functions as a transmitter.

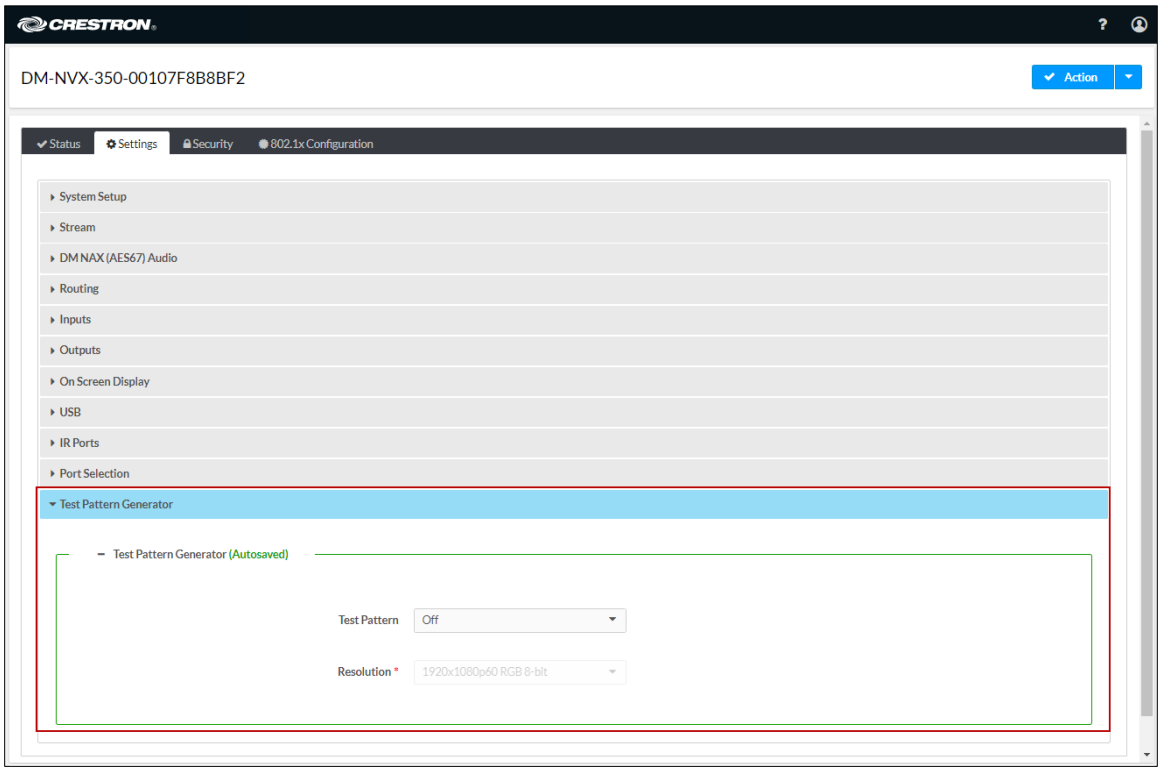
The built-in test pattern generator can be used during setup to ensure that video streaming is functional and can also be used as a tool for the adjustment, calibration, and alignment of displays, projectors, and video walls.

A DM NVX encoder can send the test pattern to any routed DM NVX decoder. The test pattern generator can be configured using the web interface or SIMPL Windows.

Using the Web Interface

Configure the test pattern generator by clicking the **Settings** tab and then clicking **Test Pattern Generator**.

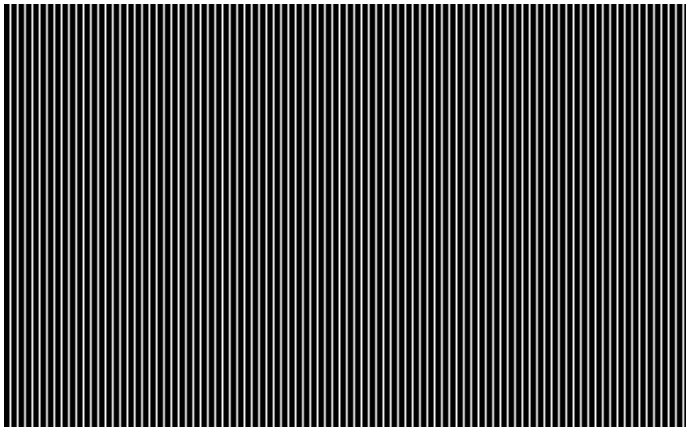
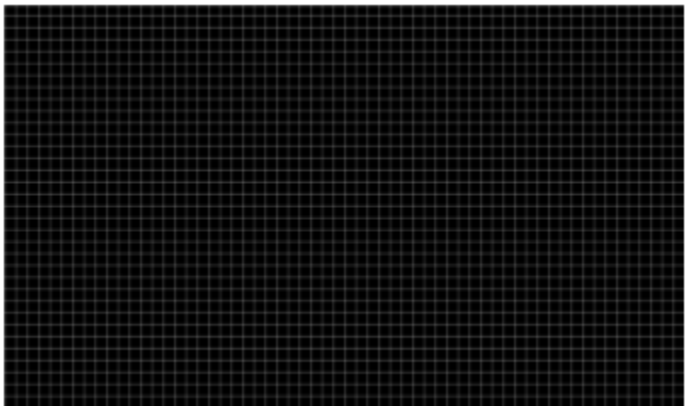
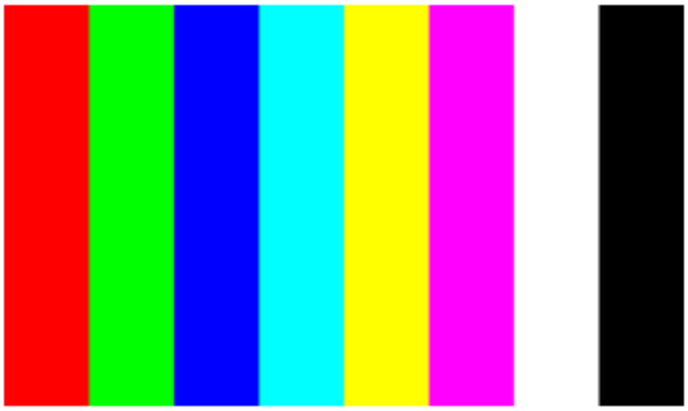
Settings Tab - Test Pattern Generator

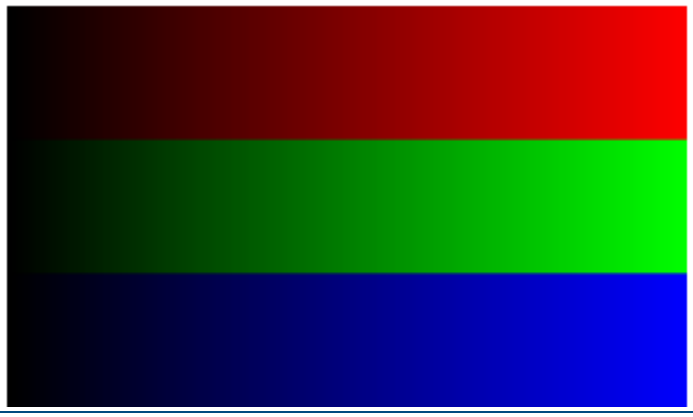


In the **Test Pattern Generator** section, do the following:

1. In the **Test Pattern** drop-down list, select the desired test pattern. Available options are listed in the following table.

TEST PATTERN OPTION	TEST PATTERN
Off (default setting)	Disables the test pattern generator
SMPTE ColorBars	
Black	
White	

Vertical Lines	
Grid	
Color Bars	
Gray Gradient	

RGB Gradient	
Frequency Adjust	

2. In the **Resolution** drop-down list, select the desired resolution of the test pattern. Available options are the following:

   3840x2160p60 RGB 8-bit

   3840x2160p60 Y420 8-bit

   3840x2160p30 RGB 8-bit

   1920x1080p60 RGB 8-bit

   720p60 RGB 8-bit

Using SIMPL Windows

Configure the test pattern generator in **Slot-12: Test Pattern Generator**. Set the **<TestPatternGenerator>** analog input join to the desired test pattern. Set the **<TestPatternResolution>** analog input join to the desired value. For additional information, refer to the SIMPL Windows help file.

Interoperability with DM NVX 4K60 4:2:0 and 1080p Encoders and Decoders

DM-NVX-35x(C) devices are interoperable with DM NVX 4K60 4:2:0 Series and 1080p Series encoders and decoders. The following table lists the 4K60 4:2:0 and 1080p encoders and decoders based on functionality.

DM NVX 4K60 4:2:0 and 1080p Encoders and Decoders

FUNCTIONALITY	DM NVX 4K60 4:2:0 SERIES	DM NVX 1080p SERIES
Encoder Only	DM-NVX-E20	DM-NVX-E10
Decoder Only	DM-NVX-D20 DM-NVX-D200	DM-NVX-D10

If a DM-NVX-35x(C) device operating in transmitter mode is used with a 4K60 4:2:0 or 1080p decoder, the stream type of the DM-NVX-35x(C) transmitter must be configured to interoperate with the decoder. In addition, the resolution of the DM-NVX-35x(C) transmitter must be configured so that it does not exceed the resolution of the decoder.

NOTE: It is recommended that a DM-NVX-35x(C) transmitter not be used with a 4K60 4:2:0 or 1080p decoder in order to maintain the higher resolutions supported by the DM-NVX-35x(C) transmitter. If a DM-NVX-35x(C) transmitter is used with a 4K60 4:2:0 or 1080p decoder, refer to EDID (Extended Display Identification Data) to set the proper resolution of the HDMI input.

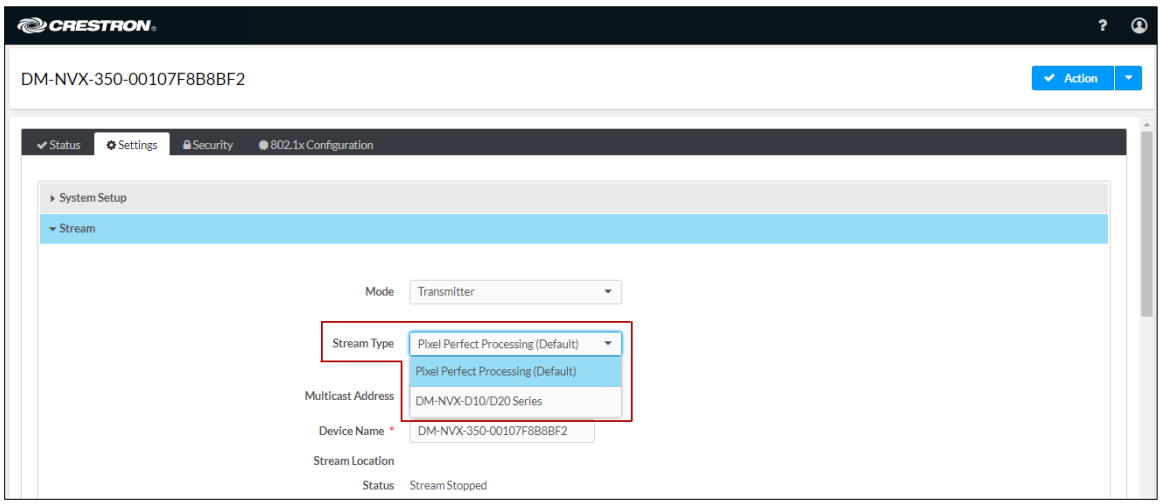
The stream type of a DM-NVX-35x(C) device operating in transmitter mode can be configured using the web interface or SIMPL Windows.

Using the Web Interface

To set the stream type of a DM-NVX-35x(C) transmitter:

1. Click the **Settings** tab and then click **Stream.**
2. In the **Stream Type** drop-down list, select either of the following:
   - **Pixel Perfect Processing (Default):** Sets the stream type to Pixel Perfect Processing for interoperability with DM NVX 4K60 4:4:4 decoders (default setting)
   - **DM-NVX-D10/D20 Series:** Sets the stream type for interoperability with DM-NVX-D10, DM-NVX-D20, and DM-NVX-D200 decoders

Settings Tab – Stream, Stream Type



Using SIMPL Windows

In **Slot-01: Stream Transmit**, set the **<StreamType>** analog input join to the desired stream type (**Pixel Perfect Processing [Default]** or **DM-NVX-D10/D20 Series**). For additional information, refer to the SIMPL Windows help file.

Enterprise-Grade Security

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

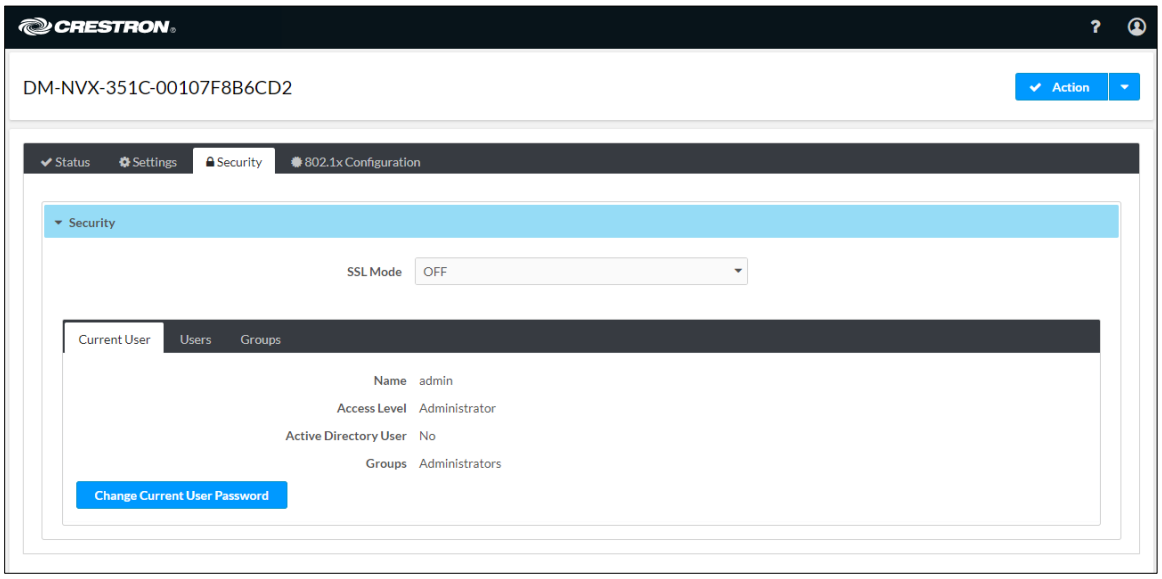
Configure user and group authentication and IEEE 802.1X authentication using the web interface.

Authentication Management

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

To configure authentication management in the web interface, click the **Security** tab. For detailed information, refer to the online help of the web interface.

Security Tab – Authentication Management of Users and Groups

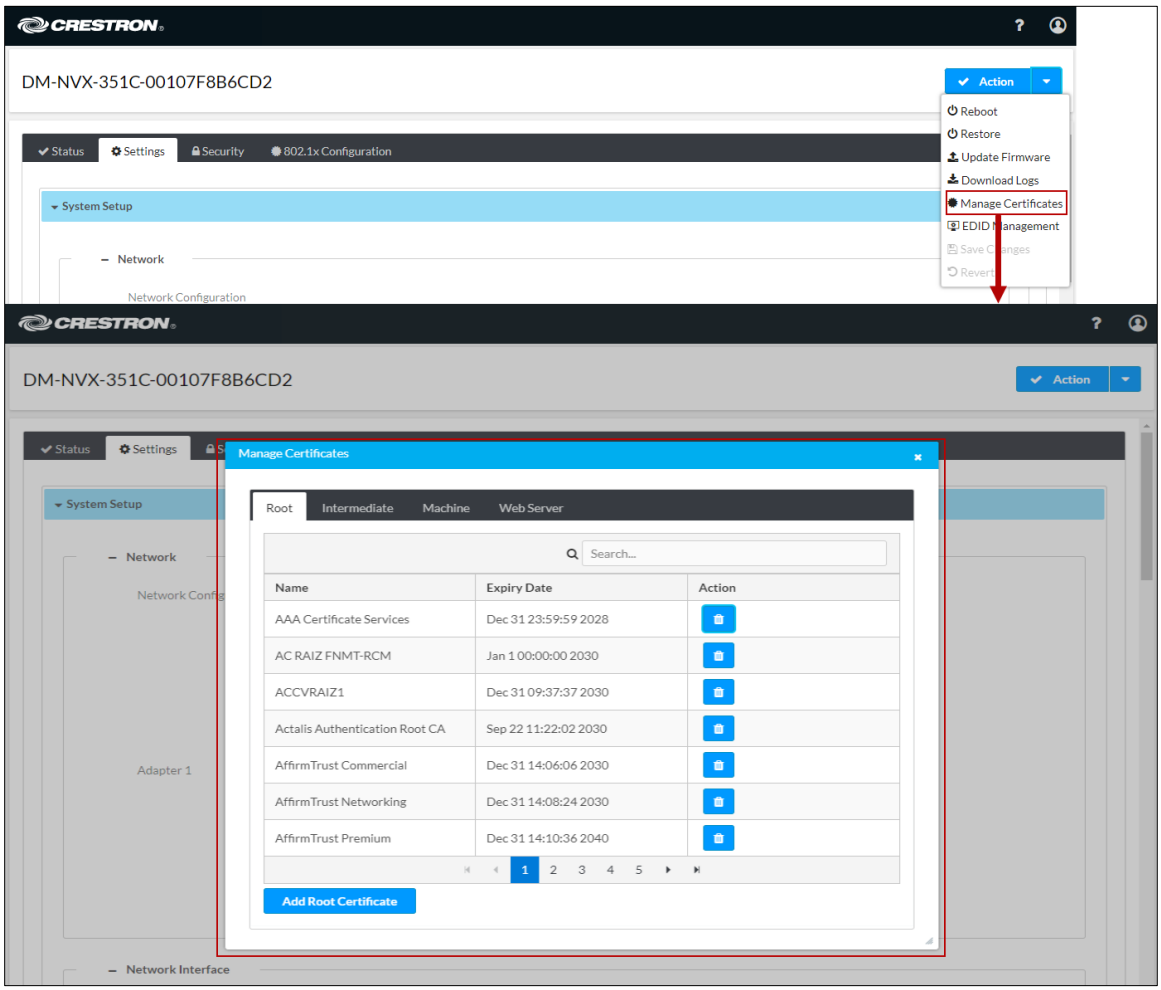


IEEE 802.1X Authentication

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.

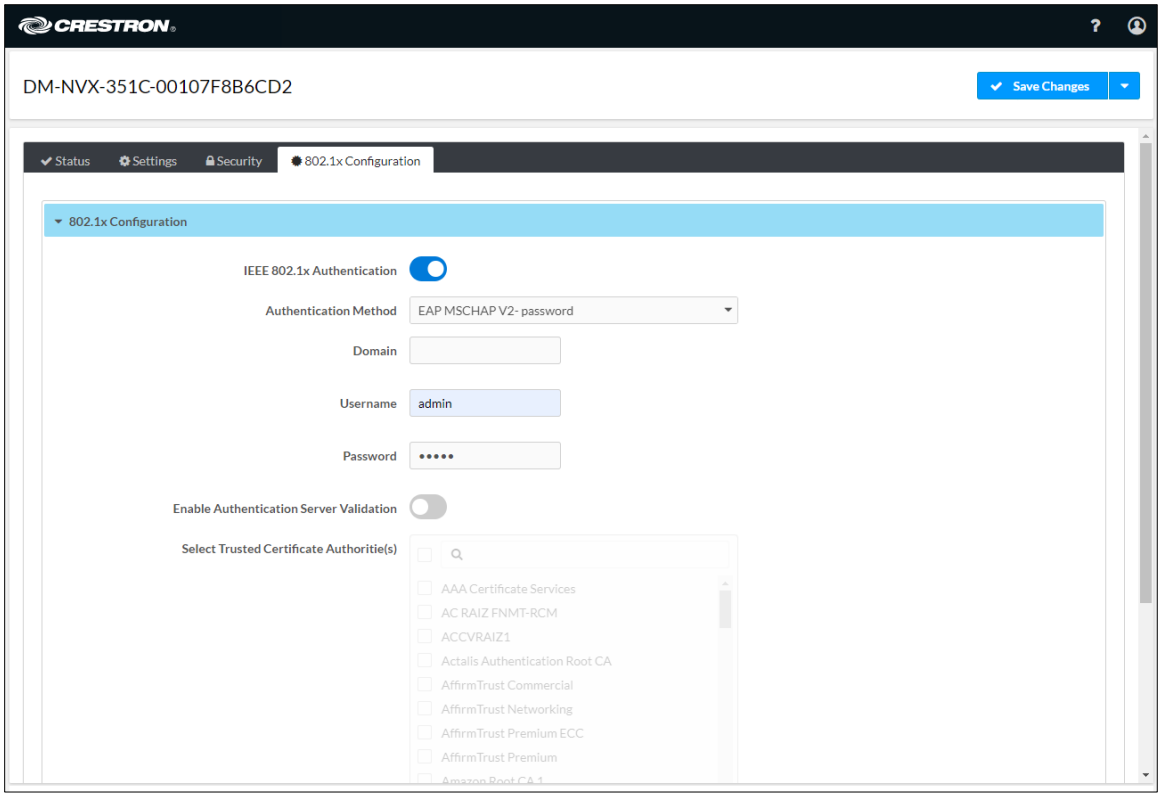
To manage trusted certificate authorities, go to the **Action** menu in the upper-right corner of the web interface and select **Manage Certificates**.

Action Menu - Manage Certificates



To configure IEEE 802.1X authentication in the web interface, click the **802.1X Configuration** tab. For detailed information, refer to the online help of the web interface.

802.1X Authentication Tab



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 by clicking the **Settings** tab and then clicking **System Setup**.
3. In the **Auto Update** section:
   a. If **Auto Update** is disabled, enable the function by setting the toggle switch in the On (right) position. By default, **Auto Update** is enabled.
   b. If **Custom URL** is disabled, enable the function by setting the toggle switch in the On (right) position. By default, **Custom URL** is disabled.
   c. 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.

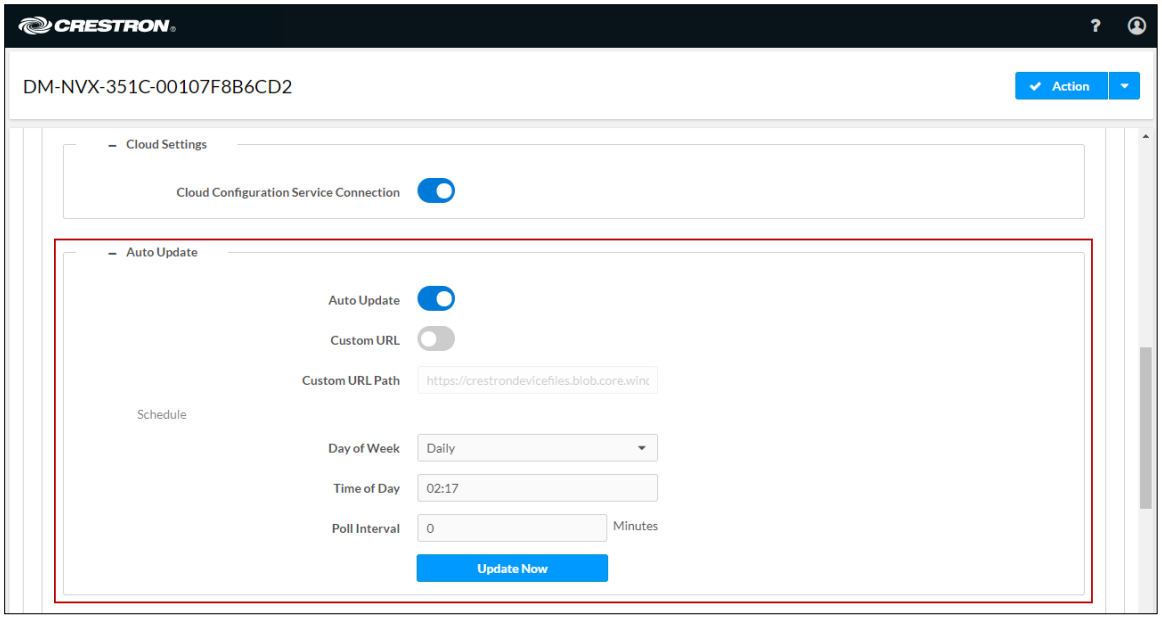
      - *path* is the path to the manifest file
      - *filename* consists of the name and extension (.mft) of the manifest file

   d. 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.
4. Click **Save Changes**.

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

Settings Tab – System Setup, Auto Update



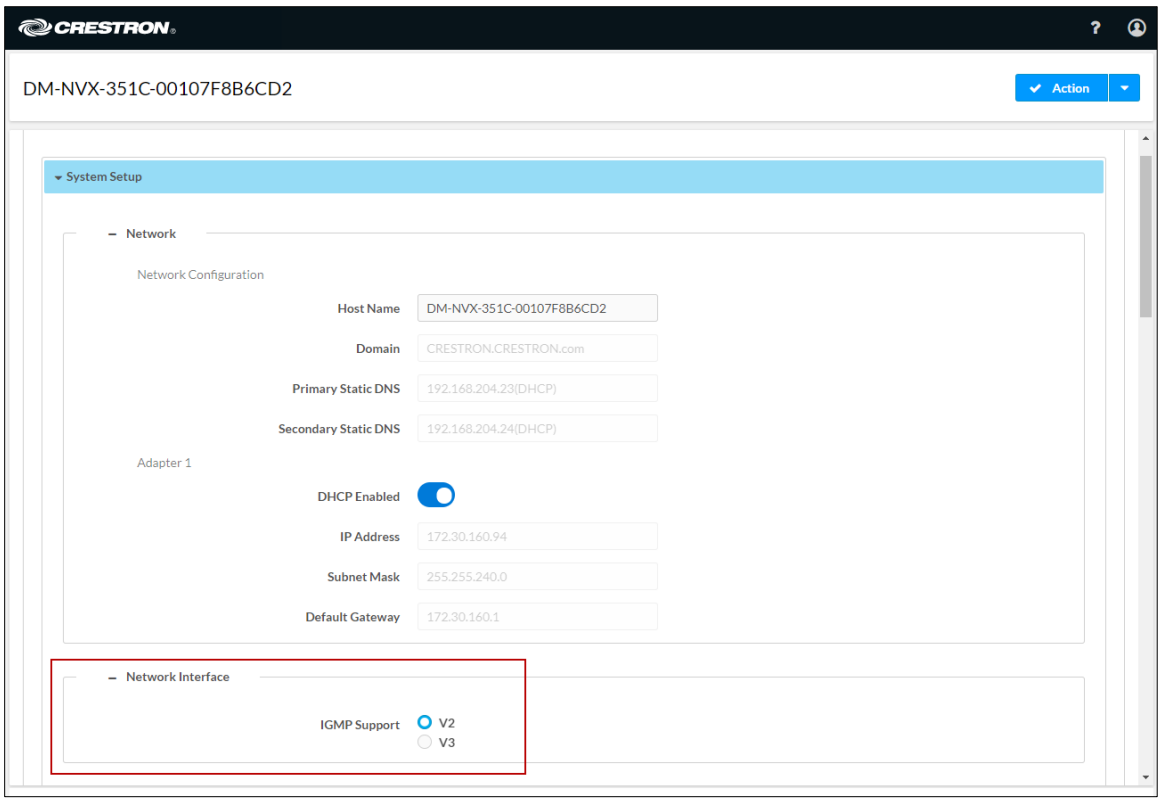
IGMP Snooping

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 desired version can be selected under the **Settings** tab in the **System Setup – Network Interface** section. The default setting is **v2**.

Settings Tab – System Setup, 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 upstream 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
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.
	Crestron HDMI cable is not being used.	Use Crestron HDMI cable only.
	Crestron HDMI cable exceeds the maximum length of 20 ft (6.1 m).	Use 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.
	An incorrect video source is selected.	Switch the video source to the correct input.
The video is intermittent.	The HDMI or Ethernet cable connections are faulty.	Verity that all cables are connected securely.
(Applicable when the DM NVX device functions as a transmitter) A message indicating that the resolution is unsupported appears on the display.	The incorrect EDID is selected.	Select the correct EDID.
	The resolution of the input is not supported.	Change the resolution of the input.
(Applicable when DM NVX device functions as a receiver) A message indicating that the resolution is unsupported appears on the display.	The scaler is not set to a resolution that the display can support.	Change the scaler resolution setting to a resolution that the display can support.
There is no video or audio.	Cable connections are faulty.	Verify that all cables are connected securely.
	The incorrect EDID is selected for the input.	Select the EDID supported by the devices in the signal path.
	The output resolution is not supported by the display.	Change the output resolution to a resolution supported by the display.

(Continued on following page)

DM NVX Encoder/Decoder Troubleshooting (Continued)

PROBLEM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
The analog audio input is not functioning.	The analog audio mode is set to extract audio.	Set the analog audio mode to insert audio.
	An incorrect audio source is selected.	Set the audio source to analog audio.
	Cable connections are faulty.	Verify that all cables are connected securely.
	The audio source is muted.	Verify that the audio source is not muted.
The analog audio output is not functioning.	The analog audio mode is set to insert audio.	Set the analog audio mode to extract audio.
	An incorrect audio source is selected.	Set the audio source to analog audio.
	The audio is multichannel on a DM-NVX-350 or DM-NVX-350C, 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:

- In the **Action** menu located in the upper-right corner of the web interface, click **Restore**.
- From the **Tools** menu in the Crestron Toolbox software, select **Text Console** and issue the **restore** command.
- Power cycle the device 11 times. After the eleventh power cycle, wait until the PWR LED lights amber and then green, 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.

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