INSTRUCTION MANUAL

N4000 SERIES NMX-ATC-N4321D Audio Transceiver

NMX-ATC-N4321D,NMX-ATC-N4321D-C

IMPORTANT SAFETY INSTRUCTIONS

1. READ these instructions.
2. KEEP these instructions.
3. HEED all warnings.
4. FOLLOW all instructions.
5. DO NOT use this apparatus near water.
6. CLEAN ONLY with dry cloth.
7. DO NOT block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. DO NOT install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. DO NOT defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. PROTECT the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. ONLY USE attachments/accessories specified by the manufacturer.
12. UNPLUG this apparatus during lightning storms or when unused for long periods of time.
13. REFER all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. DO NOT expose this apparatus to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the apparatus.
15. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle or disconnect the PoE+ injector.
16. Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
17. DO NOT overload wall outlets or extension cords beyond their rated capacity as this can cause electric shock or fire.
18. Power is supplied via Power Over Ethernet (PoE+), utilizing an AMX certified PoE injector such as the PS-POE-AF-TC PoE Injector (FG423-83) or compatible network switch which is classified as ES1 and PS2 output in accordance with IEC/EN/UL 62368-1.
19. The product is to be connected only to PoE+ networks without routing to the outside plant.

The exclamation point, within an equilateral triangle, is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to persons.

ESD Warning: The icon to the left indicates text regarding potential danger associated with the discharge of static electricity from an outside source (such as human hands) into an integrated circuit, often resulting in damage to the circuit.

WARNING: To reduce the risk of fire or electrical shock, do not expose this apparatus to rain or moisture.

WARNING: No naked flame sources - such as candles - should be placed on the product.

CAUTION: This product contains batteries that are covered under the 2006/66/EC European Directive, which cannot be disposed of with normal household waste. Please dispose of any used batteries properly, following any local regulations. Do not incinerate.

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LIABILITY NOTICE

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AMX WARRANTY AND RETURN POLICY

The AMX Warranty and Return Policy and related documents can be viewed/downloaded at www.amx.com.

ESD WARNING

To avoid ESD (Electrostatic Discharge) damage to sensitive components, make sure you are properly grounded before touching any internal materials.

When working with any equipment manufactured with electronic devices, proper ESD grounding procedures must be followed to make sure people, products, and tools are as free of static charges as possible. Grounding straps, conductive smocks, and conductive work mats are specifically designed for this purpose.

Anyone performing field maintenance on AMX equipment should use an appropriate ESD field service kit complete with at least a dissipative work mat with a ground cord and a UL listed adjustable wrist strap with another ground cord.

WARNING: Do Not Open! Risk of Electrical Shock. Voltages in this equipment are hazardous to life. No user-serviceable parts inside. Refer all servicing to qualified service personnel.

Place the equipment near a main power supply outlet and make sure that you can easily access the power breaker switch.

WARNING: This product is intended to be operated ONLY from the voltages listed on the back panel or the recommended, or included, power supply of the product. Operation from other voltages other than those indicated may cause irreversible damage to the product and void the products warranty. The use of AC Plug Adapters is cautioned because it can allow the product to be plugged into voltages in which the product was not designed to operate. If the product is equipped with a detachable power cord, use only the type provided with your product or by your local distributor and/or retailer. If you are unsure of the correct operational voltage, please contact your local distributor and/or retailer.

FCC AND CANADA EMC COMPLIANCE INFORMATION:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAN ICE-3 (B)/NMB-3(B)

FCC SDOC SUPPLIER'S DECLARATION OF CONFORMITY:

HARMAN Professional, Inc. hereby declares that this equipment is in compliance with the FCC part 15 Subpart B.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Approved under the verification provision of FCC Part 15 as a Class B Digital Device.

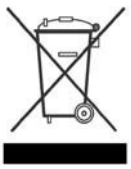
Caution: Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this device.

EU COMPLIANCE INFORMATION:

Hereby, Harman Professional, Inc. declares that the equipment is in compliance with the following: European Union Low Voltage Directive 2014/35/EU; European Union EMC Directive 2014/30/EU; European Union Restriction of Hazardous Substances Recast (RoHS2) Directive 2011/65/EU and as amended by 2015/863.

You may obtain a free copy of the Declaration of Conformity by visiting http://www.amx.com/techcenter/certifications.asp.

WEEE NOTICE:



This appliance is labeled in accordance with European Directive 2012/19/EU concerning waste of electrical and electronic equipment (WEEE). This label indicates that this product should not be disposed of with household waste. It should be deposited at an appropriate facility to enable recovery and recycling.

此标识适用于在中华人民共和国销售的电子信息产品. 标识中间的数字为环保实用期限的年数.

This logo applies to electronic information products sold in the People's Republic of China. The number in the middle of the logo is the number of years of environmental utility.

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Introducing Your New N4321D Device

Product Overview

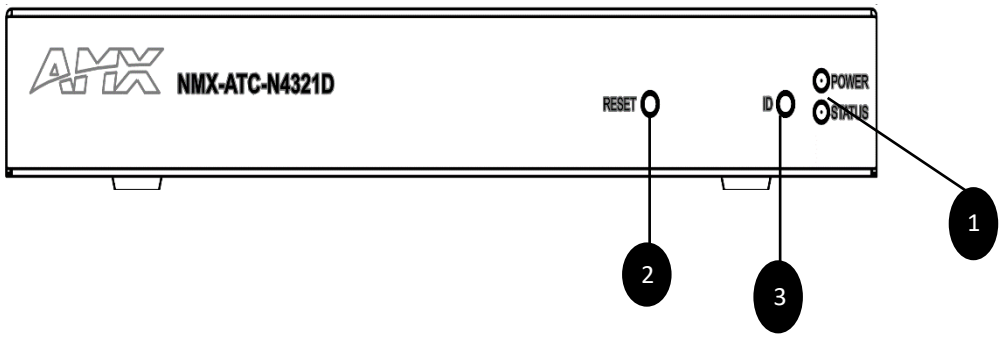
The AMX N4321D Audio-over-IP Transceiver is a solution for connecting independent IP and analog audio networks. With support for Dante, AES67, and PCM audio-over-IP streams as well as balanced and unbalanced analog audio, the N4321D can bridge all the most popular audio networks. Perfect for point-to-point or point-to-multi-point audio delivery, the N4321D provides audio matrix switching and distribution using the same control options as SVSI's Networked AV video switching and distribution solution. Additionally, an open API makes it compatible with any AMX or third-party controller on the market.

Any audio source can be sent to one or more networked audio devices by routing through layer-2/layer-3 switches using standard Cat5e cable. Standard features include Dante, AES67, Analog input/output, Microphone input, phantom power, GPI. Card versions compatible with the N-Series N9206 card cage are available for high-density applications.
Features include:

- Design flexibility allows you to transcode analog audio to Dante, Dante to analog, etc.
- Power over Ethernet (PoE+) eliminates the need for a local power supply and speeds installation. Units can still be powered locally by 12VDC. This allows easy rack-mountable, high-density installations.
- Fast install with Phoenix connectors for power, IR, RS232 serial, and analog audio interfaces.

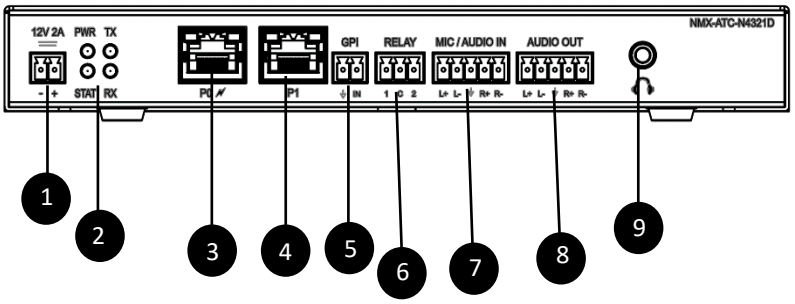
Hardware Overview

Refer to the following figures (front and rear panel drawings of these devices) and the Front and Rear Panel Descriptions table on page 7 and 8 for hardware details.



1) LED Status Indicators
2) Device Reset Button
3) Device ID Discovery Button

FIG. 1 N4321D Front Panel



1) 12VDC Input (not needed with PoE+)
2) Status Indicators
3) RJ45 Auto-Sensing Gigabit Ethernet Switch Port — PoE+
4) RJ45 Auto-Sensing Gigabit Ethernet Switch Port
5) GPI Input Connection
6) Relay Connection
7) Mic/Line Audio In Connection
8) Analog Audio Out Connection
9) 3.5mm Headphone Connection

FIG. 2 N4321D Back Panel

Audio Transceiver Panel Descriptions	
Front Panel	
RESET button	Recessed pushbutton. Press to initiate a "warm restart" which causes the processor to reset, but not lose power. A reset does NOT affect the current settings.
ID button	Recessed pushbutton. Press to send notification out on the network to identify the unit (the notification causes a pop-up dialog in N-Able and N-Command). Press and hold for 30 seconds to initiate a factory restore.
POWER LED	On solid (green) when operating power is supplied (via PoE+ or local power supply). This activity is also shown by the **PWR** LED on the rear panel.
STATUS LED	On flashing (green) when there is software activity. This activity is also shown by the **STAT** LED on the rear panel.
Rear Panel	
+12V 2A	12 Volt DC power input.
PWR LED	Same as **POWER** LED described above.
STAT LED	Same as **STATUS** LED described above.
TX LED	On (green) when the unit is transmitting audio.
RX LED	On (green) when the unit is receiving audio.
P0 POE+	8-wire RJ45 10/100/1000 Mbps 10/100/1000Base-T auto-sensing gigabit Ethernet switch port. Provides both the network connection and the power to the Encoders and Decoders.
P1	8-wire RJ45 10/100/1000 Mbps 10/100/1000Base-T auto-sensing gigabit Ethernet switch port.
GPI	General purpose input
RELAY	Two relay contacts with a common ground
MIC/AUDIO IN	5-pin terminal Phoenix connector which provides user-selectable balanced/unbalanced. The left channel can be used for connecting a MIC and provide 48v phantom power if needed.
AUDIO OUT	5-pin terminal Phoenix connector which provides unbalanced audio output.
HEADPHONE	3.5mm balanced headphone output

Installing and Configuring Your AV Equipment

This chapter provides an installation overview as well as a detailed step-by-step process for installation. If you encounter any problems, refer to the *Troubleshooting* section on page 89 for help.

Installation Overview

The N4321D has multiple configuration and installation options. For basic installation guidelines, see the table below. For more detailed instructions, refer to *Step-by-Step Installation Instructions* on page 12.

Basic Installation Guidelines	
Connections	**Options**
Power	**Power over Ethernet (PoE+):** Connect the unit's P0 port to an active, PoE+-enabled network switch.
	External power supply: If not using PoE for power, connect a 12V regulated power supply (part number N9312) to the unit's two-pin terminal block plug connector labeled +12V 2A.
Network	**PoE+ units:** Using PoE+ to power the unit, you should already have a network connection.
	Externally powered units: If not using PoE+, connect either the P0 or P1 port to the network using the appropriate cable.
	Daisy-chain configuration: Once network connection is established to one unit, you can daisy-chain additional units by connecting Ethernet cables between devices using their P0 and/or P1 ports. Keep in mind that the number of units supported in this configuration is limited by bandwidth (total aggregate streams must be less than 1Gb/s). **NOTE:** *PoE+ power is only supplied to the unit connected directly to the network. All other units in the daisy-chain must have an external power supply.*
Audio	• For audio encoding, connect a line level analog audio source to the **Audio** input terminal block plug connector, or • For audio decoding, connect a line level analog audio source to the **Audio** output terminal block plug connector, or • For DANTE/AES67, use DANTE Controller or DANTE DDM to discovery, route, or configure the devices settings, or • For SVSI Audio, enable the TX and RX stream settings to transmit or receive audio.

Mounting Options

The N4321D units are available in stand-alone and card versions. The stand-alone version can be free standing, surface mounted, wall mounted, or rack mounted. All cards *must be rack mounted* using the N9206 Card Cage (sold separately).

Surface and Wall Mounting

To mount your N4321D stand-alone unit to a flat surface or wall, follow these steps:

1. Remove the four screws from the bottom of the unit and use them to attach the mounting wings (not included in shipment - part number N9101). See Figure 5.
2. Place the unit against the solid surface to which you want it mounted.
3. Using standard hardware, attach the unit through each of the slots of the newly attached mounting wings.
4. Connect the appropriate cables necessary for your application. Refer to the sections *: Connecting Decoders to the Network* on page 14 and *: Connecting Encoders to the Network and Configuring Stream Settings* on page 15 for more information on these connections.

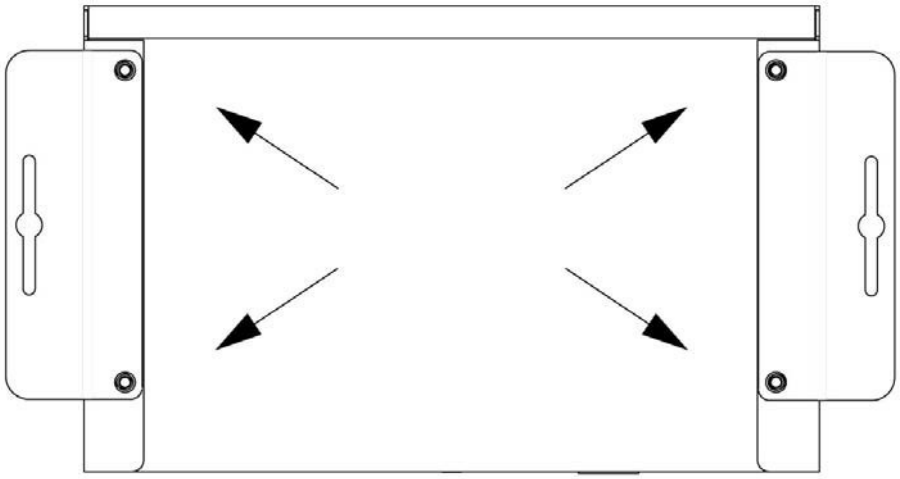


FIG. 5 Installing Mounting Wings

Rack Mounting

NN4321D Series Stand-Alone Units

A Rack Shelf (part number N9102) accommodates up to two stand-alone N4321D, side by side (mix and match).

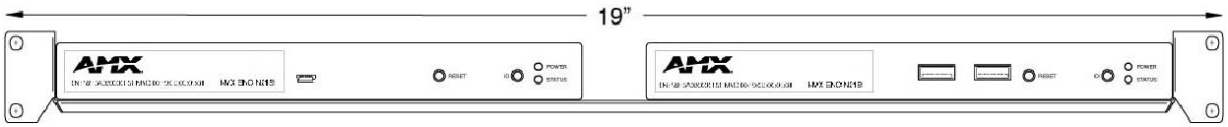


FIG. 6 Rack Mounting Stand-Alone Units

N4321D Series Cards

A Card Cage (part number N9206) accommodates up to six N-Series Encoder/Decoder/Transceiver cards (mix and match). The 12V power supply of the N9206 is the primary power source for the installed cards. If the 12V power supply fails or is unplugged, the cards will power down, detect PoE+ (if provided by switch) and restart normally using PoE+. This usually results in a loss of video for about one to two minutes whole the device boots.

To rack mount N4321D Series cards into the N9206 Card Cage, follow these steps:

1. Gently slide the card into cage slot. Make sure the card is properly aligned with guides. The card's front LED indicators should align with holes in the cage's faceplate. See Figure 7.

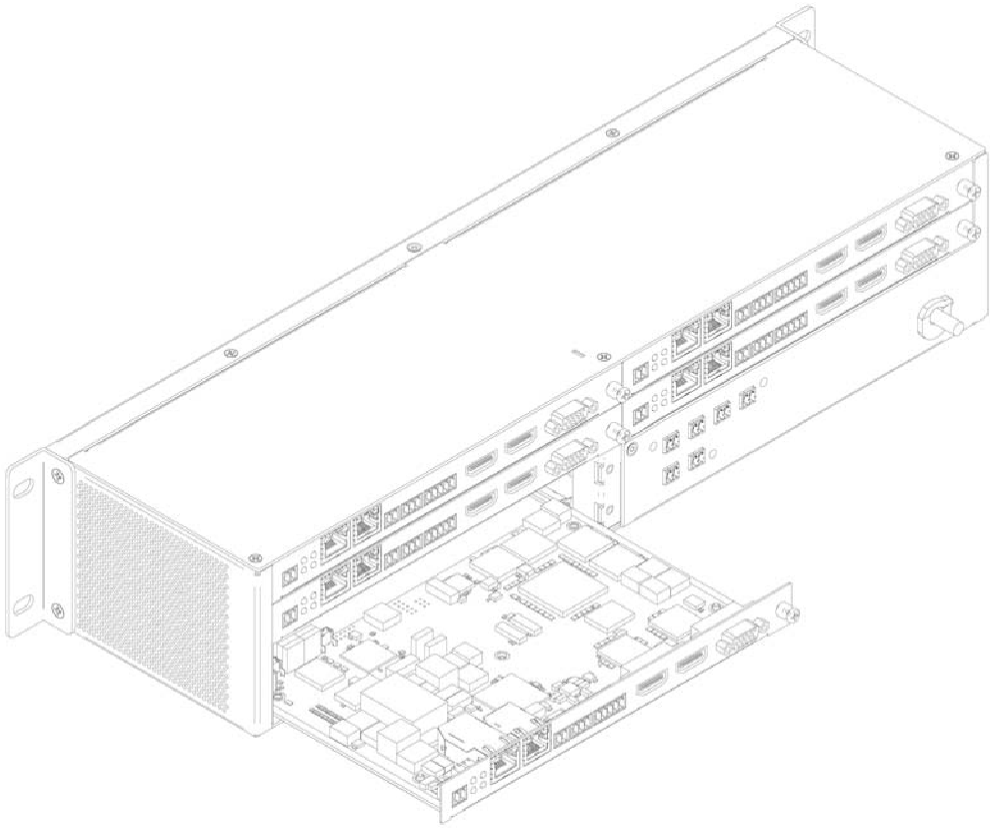


FIG. 7 Rack Mounting Cards

2. Align the thumb screw on back plate before seating card into cage.
3. Firmly seat the card and tighten the thumb screw by hand to secure card placement.
4. Use one of the six Phoenix connector cables (included in shipment with the Encoder/Decoder Card) to connect the card's 12VDC input Phoenix connector to one of the cage's six 12VDC outputs.
5. Repeat these steps until all cards are properly installed. See Figure 8.

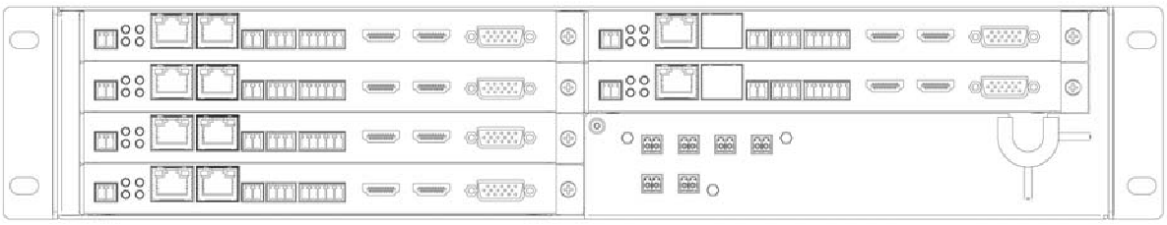


FIG. 8 Fully-Populated Card Cage

6. For proper airflow, cover any unused card slots with faceplate blanks. Blanks are sold separately (part number N9210).
7. Make sure the Card Cage's power cord is plugged in for proper cooling.

CAUTION: *Keep the Card Cage's power cord plugged in at all times so that the internal fans are always running. Not doing so could void the warranty of the cage and all installed cards. Fans are not powered while in backup PoE+ power mode. Please remedy power losses immediately to avoid potential overheating hazards.*

NOTE: *Mounting accessories are sold separately and are compatible with most N-Series devices. Contact a sales representative or visit our website for details.*

Step-by-Step Installation Instructions

This section provides step-by-step guidance for installing and configuring equipment from the N-Series product family on your network. The steps provided here assume the following to be true:

1. *There are switches operational on the network.*
   N-Series equipment can operate on many different brands of networking equipment. The network itself needs to meet certain requirements to be able to support deployment. These instructions assume that you have purchased and installed a pre-configured switch or that your existing equipment meets the following physical and protocol requirements:
   - Layer 2 (with IGMP Multicast Protocol), OR Layer 3 (also known as "multi-layer")
   - Gigabit Ethernet
   - IGMP Snooping
   - IGMP Snooping Querier (which only needs to be enabled on a single switch within the network)
   - Capable of Jumbo Frames (due to frame density)

   NOTE: *To proceed with this installation, the switches must already be successfully connected to your network. If needed, refer to your product's documentation for installation instructions.*

2. *Deployment considerations have been made for the addition of high-speed video.*
   Our Networked AV solutions provide unsurpassed video and audio quality at bandwidths appropriate to any network segment or link. Matrix switches as large as 1200x800 have been constructed on a house network using N-Series equipment. Alternatively, many customers choose to deploy on physically separate networks in order to use low-cost network appliances but keep video traffic separate from data and voice.

3. *N-Able software has been loaded on the computer you are using to configure the equipment.*
   From your host computer, download N-Able (our free setup utility software):
   PC version - http://www.amx.com/products/N-ABLE-PC.asp

   This software is designed to set up and control the equipment during initial deployment, however, it is not always the best solution for production-type or primary user control. Refer to *Control Options* on page 19 for details on the available control options.

NOTE: *For a more detailed requirements list, refer to* *Appendix B: Minimum Network Requirements* on page 93.

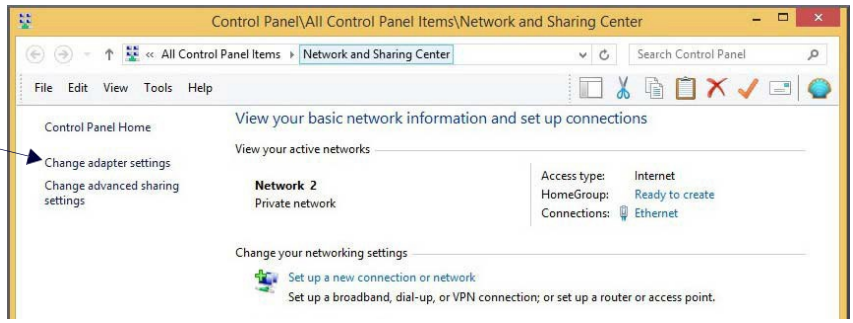
Step 1: Setting Up Your Host Computer

In order to communicate with N-Series products, your devices must be on the same subnet as the host computer. N4321D units are shipped in **DHCP** mode and the IP address will be assigned automatically based on the network DHCP server. If no DHCP server is found, the unit will use **Auto IP** mode with a default IP address of 169.254.xxx.xxx.

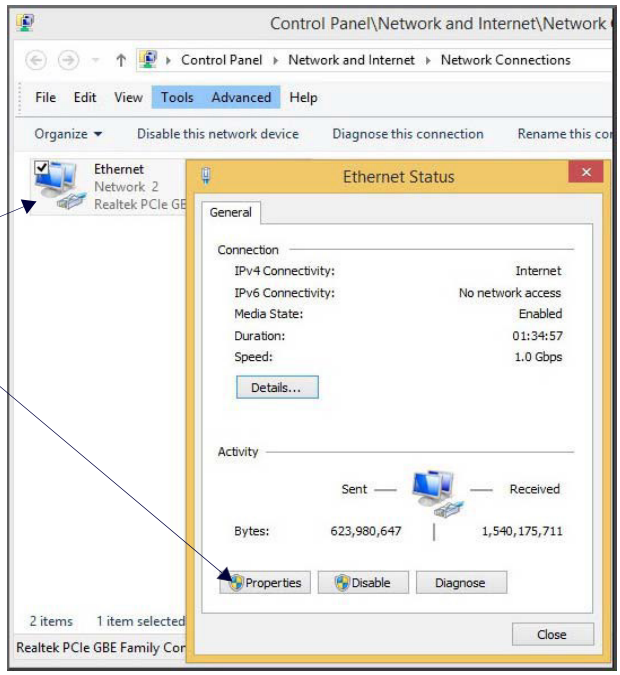
Before beginning installation, you may need to make some changes to the computer running N-Able. These steps show how this can be accomplished in a Microsoft Windows environment.

1. From the **Start** menu, select **Control Panel > Network and Sharing Center**.

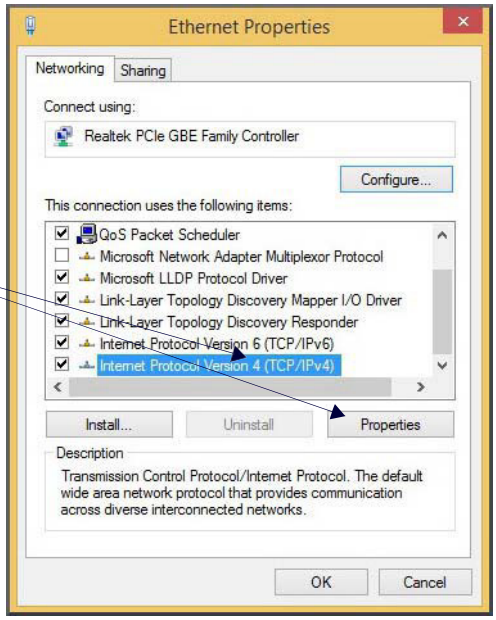
2. Select **Change adapter settings.**



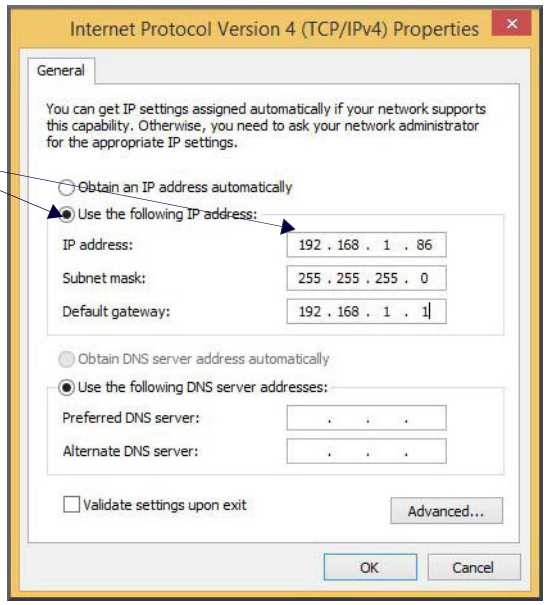
3. Double-click the wiredinterface to your AV network, and then click the **Properties** button.



4. Scroll down in the list to the **Internet Protocol Version 4 (TCP/IPv4)** option. Highlightit and click the **Properties** button.



5. Enable the **Use the following IP address** option, and enter the static IP address provided to you by your network administrator.



NOTE: *If the computer does not need Internet access, you can simply enter a unique 169.254.xxx.xxx IP address with a 255.255.0.0 subnet mask. Contact your network administrator if you are unsure of how to configure the existing network. N-Series units will not self-assign in the 169.254.0.xxx range.*

NOTE: *If the computer has a statically-assigned IP address, click the Advanced button. Then click Add to enter a unique 169.254.xxx.xxx address with a Subnet Mask of 255.255.0.0 and a Default Gateway of 169.254.1.1.*

Step 2: Connecting N4321D to the Network and Configuring Stream Settings

1. Using a Cat-5e cable, connect your N4321D's **P0** port to a PoE+-enabled switch.

NOTE: *In order for the unit to receive PoE+, it must be connected to a switch or other equipment that has a PoE+ PSE port.*

2. In **N-Able**, select the **Unit Management** tab and click the **Auto Discover** button (if the table has not already populated itself with the installed units). See Figure 10.

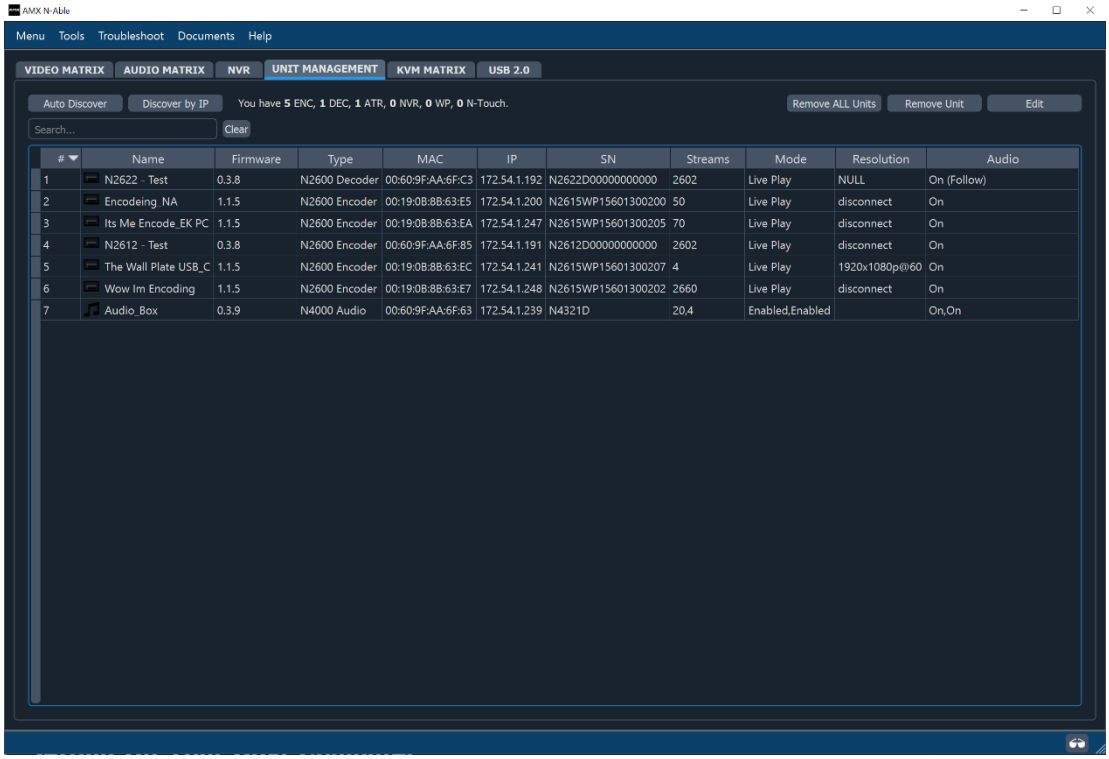


FIG. 10 Unit Management Page

3. Find your ATR in the list. N4321D units are displayed on the following tabs:
   - **Unit Management** tab — N4321D units have **N4000 Audio** listed in their **Type** fields.
   - **Audio Matrix** tab — N4321D units are found on the **SVSI Audio** sub-tab (as shown in Figure 11).

NOTE: *If using multiple N4321Ds in your set up, it is important to plug in and configure one Transceiver at a time. As you add Transceivers to the network, you will need to set them up to use different stream numbers.*

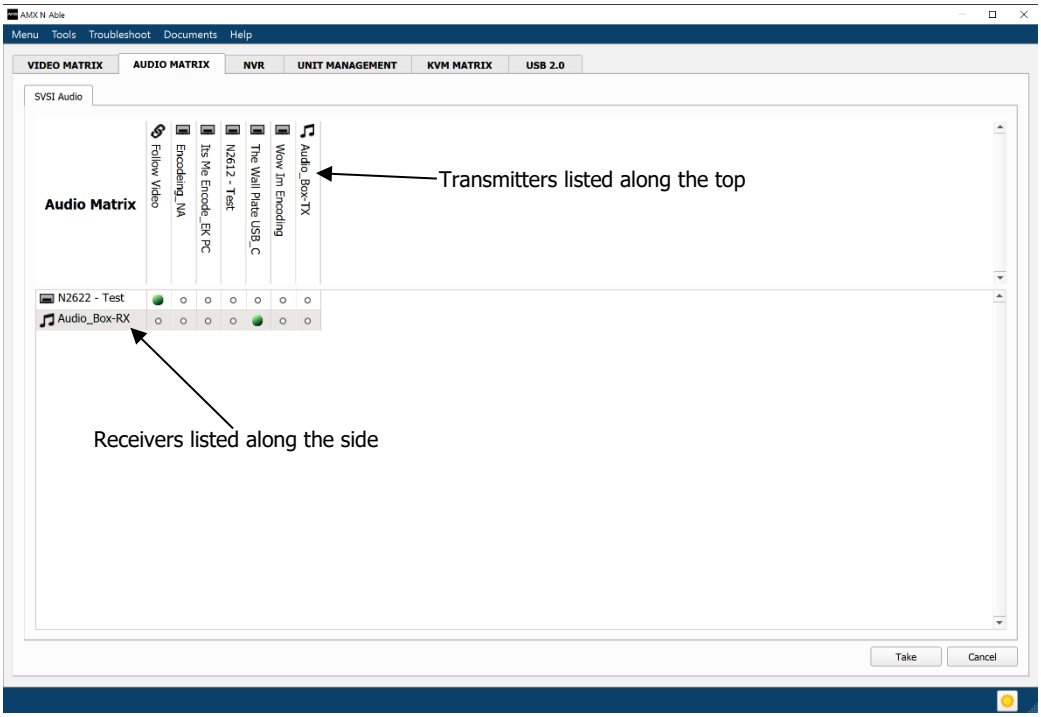


FIG. 11 Audio Matrix Page

4. Double-click the Transcoder's name in the list. The **Login** page is displayed (see Figure 12). If prompted, use the following default login credentials to log in for the first time. These can be changed later on the **Settings** page.
   Default username: **admin**
   Default password: **password**

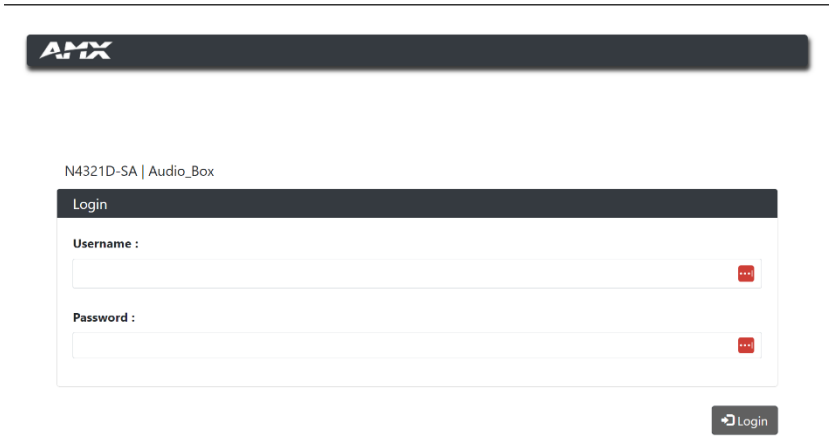


FIG. 12 Login Page

NOTE: *The Login page is only displayed if N-Able's stored username/password does not match the unit's username/password. A default system will match.*

5. The **Audio** page is displayed (see Figure 13).
6. Select **SVSI Audio In** or **SVSI Audio Out** under the Configuration drop down menu
7. Change the **Audio Stream** setting. We recommend setting **Stream** to a number between 2 and 254 (it is *required* that the number be less than 32,512).

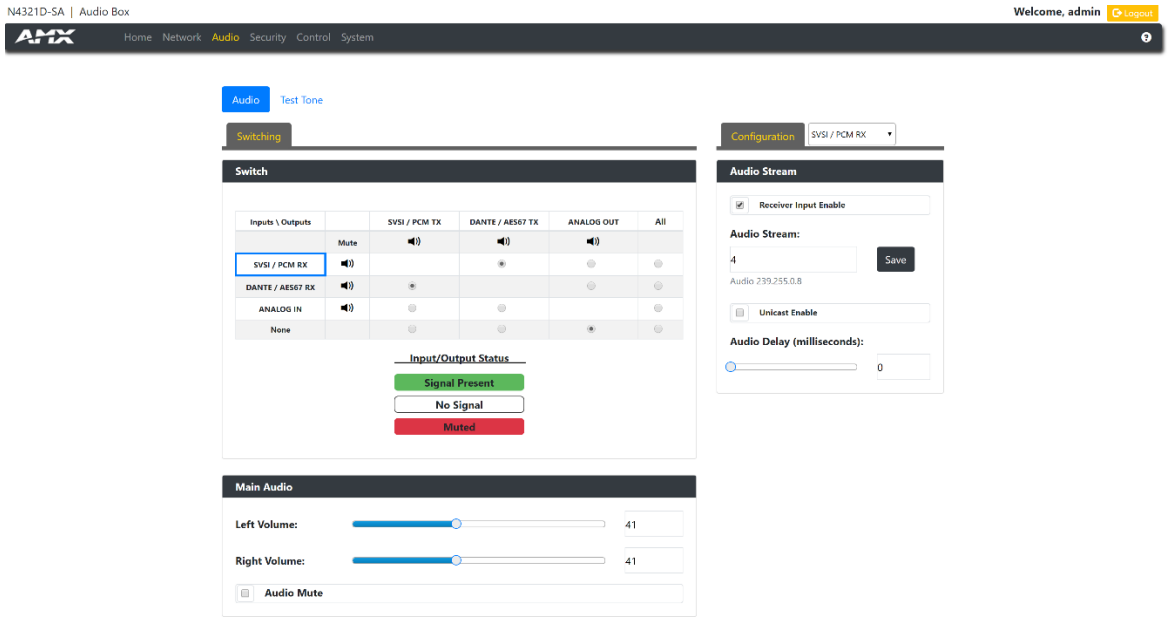


FIG. 13 Changing Stream Setting

8. Repeat these steps until all Transcoders are connected to the network and configured with an appropriate **Stream** number.

NOTE: *Each Transcoders Stream number must be unique to all other Encoders on the network.*

NOTE: *Screen-by-screen descriptions of the web interface options are provided for your reference in the Encoder Configuration Options section on page 23 and the Decoder Configuration Options section on page 39.*

Step 3: Configuring N4321D IP address (if needed)

By default, all audio transceivers are preset to **DHCP** mode. When first connected to the network, an IP address is assigned automatically based on the network DHCP server. If no DHCP server is found, the unit will use **Auto IP** mode (with an IP address pre-configured to 169.254.xxx.xxx with a subnet mask of 255.255.0.0).

How IP Address Changes Affect Unit Control

As discussed previously, N-Able control is dependent upon the host computer being in the same IP address range as the N-Series devices. Therefore, before making any N4321D IP address changes, we recommend having **two statically assigned IP addresses on your computer**.

- Configure the first IP address to be in the range of the default N-Series IP settings (i.e., in the 169.254.xxx.xxx range), AND
- Configure a second IP address in the range of the IP address you are planning to assign to the units (or when using DHCP, an address within the defined range for your network).

Changing IP Addresses

There are two ways to assign new IP addresses to your N4321D units using N-Able:

- **Option 1:** Log in to each unit individually and make the changes on the **Network > IP Setup** page.
- **Option 2:** Export a comma-separated value (CSV) file, make changes to all units in the resulting file, and import the CSV file into N-Able to apply the changes.

Option 1: Assigning IP Addresses Individually (using the Network > IP Setup page)

1. Find the unit you wish to change in the control matrix (either on the **Unit Management** tab or the **Audio Matrix** tab).
2. Double-click the unit and log in.
3. Go to the **Network** page and select **IP Setup** page make IP address changes for that unit either by setting a **STATIC** address or by enabling **DHCP** (see Figure 14).

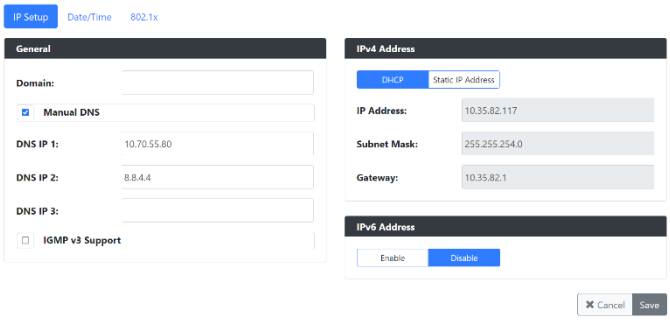


FIG. 14 IP Setup of the Network settings

4. Click the **Save** button.
5. Return to the **Settings** page through the newly configured IP address.

NOTE: *If you lose communication for any reason, factory restore the N2600, and wait one minute. This restores the unit to the original IP address.*

Option 2: Assigning IP Addresses to Multiple Units (using CSV files)

N-Able has the ability to export and import CSV files. Once units are auto-discovered in N-Able, the CSV file can be exported into Excel where parameters such as IP address, subnet mask, gateway, stream number, audio settings, etc. can be configured. Once configured, import the CSV file back into N-Able to assign those parameters to the appropriate devices. Reboot the devices to activate the new settings. This procedure can be used to configure multiple networked AV devices at the same time. It can also provide valuable diagnostics by allowing you to see the last known device configuration as well as scan the network for new devices (regardless of IP configuration).

To configure units using a CSV file, follow these steps:

1. Make sure that you have performed an **Auto Discover** (on the **Unit Management** tab of N-Able) since connecting all of the new units to the network.
2. From the N-Able main menu bar, select **Menu > Export CSV**.
3. Select **Default** on the next screen that opens.
4. Click **Ok** on the pop-up box informing you that a CSV file is about to be generated.
5. Select the location to save the exported settings file.

NOTE: *A CSV file editor (e.g., Microsoft Excel, Notepad etc.) is necessary to proceed.*

6. The folder containing your CSV file displays. Double-click the file to open it.
7. You can use this file to edit the IP mode, IP address, subnet mask, gateway IP address, stream number, etc. Once all changes have been made, save the file.
8. Go back into N-Able and select **Menu > Import CSV**.
9. Browse to your saved CSV file and click **Import**.

Control Options

For the most part, once the initial setup is complete, you will be primarily managing/configuring the Transcoder. To better understand, think of Encoders as radio stations and Decoders as car radios. The Encoders are supplying the streams and, using the Decoders, you can "tune in" to the stream you want. N-Series, N-Control solutions (N-Command and N-Act) provide you with the most flexible management options available, insuring you are getting the most from your digital media system.

Primary Control Options

During initial configuration and setup, the free N-Able setup utility (version 2023.2.6 or higher) is sufficient. However, we do not recommend N-Able for production-level, primary-user control.

N-Command Controllers

These web-based hardware Controllers offer intuitive, powerful management of equipment, content, bandwidth utilization, and AV switching (using a web-based, point-and-click graphical matrix). The N-Command product line also offers:

- Simplified ASCII interface for third-party control via TCP/IP.
- N8002 controllers have leader / follower failover protection.
- Graphical presentation of video network connections.
- Full configuration control: assign fixed IP addresses for each N-Series component, adjust variable bitrate for each video stream, etc.
- Additional software bundles (free with N-Command) allow you to easily create attractive touch panels for N-Series and third-party equipment control, as well as build software design walls of any size. Visit our website for more details on the available N-Command Controllers.

Third-Party Controllers

The N4321D Series is capable of interfacing with third-party control systems such as Crestron, Q-Sys, Extron, Etc. For direct control of N4321D units from any Third-Party Control system, please use the Direct Control API (available on our website).

N-Act | On-Board, Built-In Control

All N-Series Encoders, Decoders, and Transcoders have on-board, built-in control capability via events that can trigger any number of TCP/UDP commands to other IP controllable devices. Included free with all N-Series Encoders/Decoders. **Available later 2023 via firmware update.

Audio Transceiver Configuration Options

This chapter defines N4321D Transcoder configuration options. For ease of navigation, it is organized to reflect the graphical user interface (GUI).
From any main page in the GUI, you can access all other main pages by clicking the links in the top navigation bar. Figure 17 shows the navigation bar and provides hot links to the sections of this chapter which describe each main page.

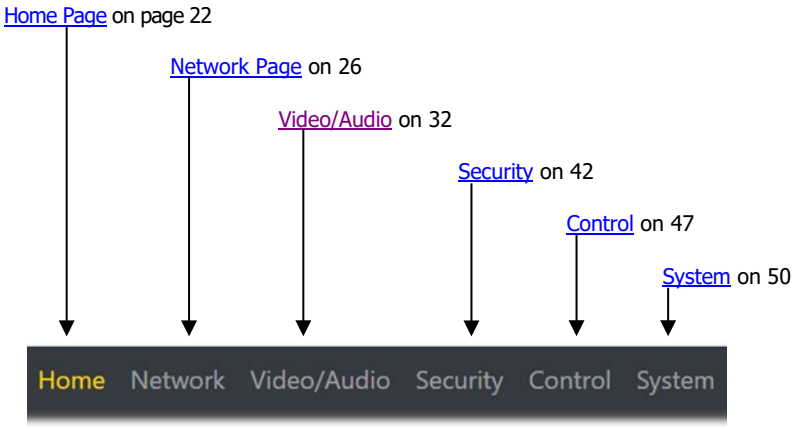


FIG. 17 Section Links

Home Page

Click the **Home** link at the top of any of the main web pages to access the page shown in Figure 18. This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- Stream Setup Settings Section on page 22
- Management Setup Settings on page 23
- General Setup Section on page 25

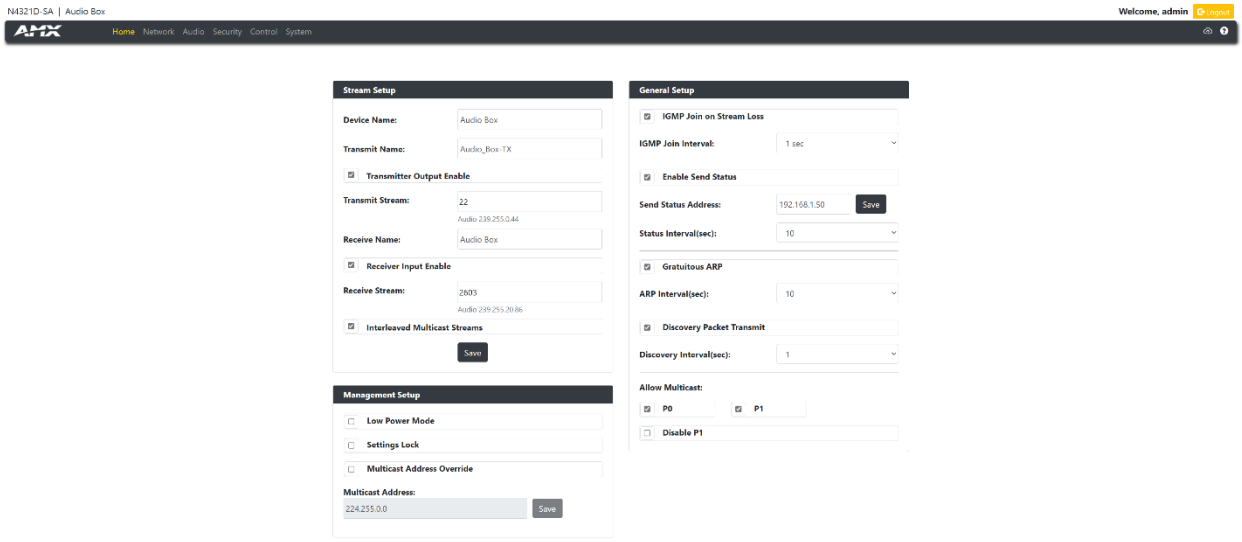


FIG. 18 Settings Page

Stream Setup Section

The **Stream Setup** section of the **Home** page is shown in Figure 19. Options are described in Table 1.

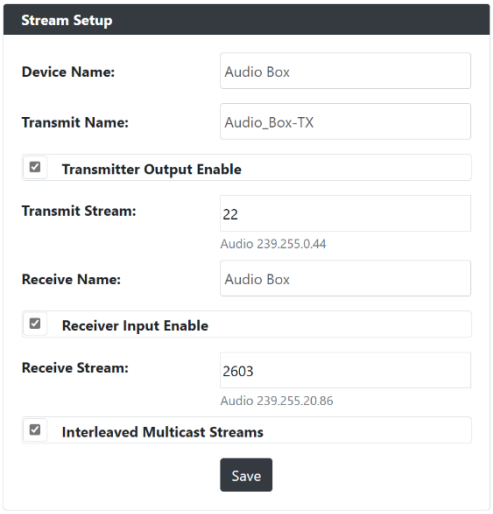


FIG. 19 Device Settings Section

TABLE 1 Home Page: Stream Settings Section

Option	Description	Notes
Device Name	Enter a user-friendly name for the unit.	
Transmit Name	Enter a user-friendly name for the TX stream.	
Transmitter Output Enable	Used to enable the Transmitter function	
Transmit Stream	Stream used used to set the stream ID	
Receive Name	Enter a user-friendly name for the RX stream.	
Receive Input Enable	Used to enable the Receive function	
Receive Stream	Used to set the receive Stream ID	
Interleaved MultiCast Streams	Adjust the Multicast address to use interleaved or Standard	Default is Interleaved enabled
Save button	Click to save settings made in this section.	Only applies Device Name and Stream fields. The other fields are dynamically updated.

Management Setup Settings

The **Management Setup** section of the **Home** page is shown in Figure 20. Options are described in Table 2.

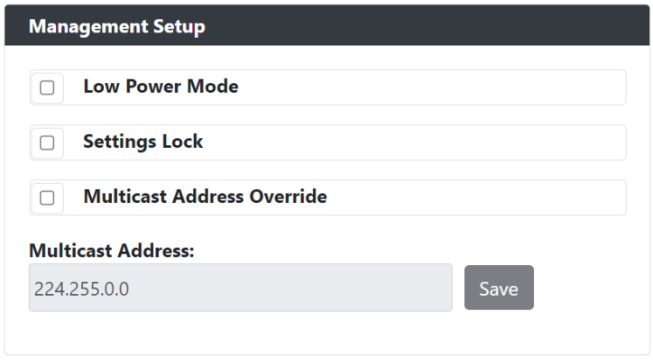


FIG. 20 Management Setup Settings

TABLE 2 Home Page: Management Setup Settings

Option	Description	Notes
Low Power Mode	Enable to reduce the PoE+ consumption of the unit	When in Low Power mode the unit will not TX or RX audio and only respond to a limited number of commands
Settings Lock	Enable to lock the Encoder IP settings and stream number, preventing automated processes (from N-Able or N-Command) from occurring.	
Multicast Address Override	Enable to allow for the first two octets of the multicast address to be changed	Default address is 239.255.xxx.xxx
Multicast Address	Used to change the first octets of the Multicast address	Example should be 239.250.0.0

General Setup Section

The **General Setup** section of the **Home** page is shown in Figure 22. Options are described in Table 4.

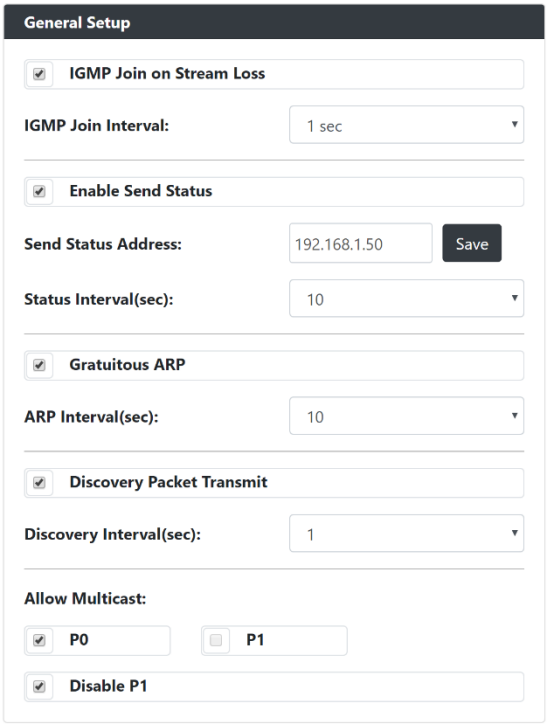


FIG. 22 General Setup Section

TABLE 4 Home Page: General Setup Section

Option	Description	Notes
IGMP Join on Stream Loss	Enables/disables unit to periodically send IGMP join requests when receive stream is lost.	
IGMP Join Interval	Determines how often IGMP join requests are sent.	
Enable Send Status	Enables the encoder to send a periodic status packet to the **Send Status Address** listed.	
Send Status Address	When **Enable Send Status** is enabled, the encoder sends a periodic status packet to the IP address specified here.	
Status Interval (sec)	Determines how often (in seconds) the unit transmits status packets.	
Gratuitous ARP	Enables the encoder to send a periodic address resolution protocol (ARP) packet to the network.	
Arp Interval (sec)	Determines how often (in seconds) the unit transmits gratuitous ARP packets.	
Discovery Packet Transmit	Enables the N-Series multicast discovery service (used to identify units)	For N-Series devices to communicate with each other, their multicast settings must be compatible.
Discovery Interval (sec)	Determines how often (in seconds) the unit transmits discovery packets.	
Allow Multicast P0	When enabled will allow multicast traffic to be sent and received on ethernet port P0.	
Allow Multicast P1	When enabled will allow multicast traffic to be sent and received on ethernet port P1.	
Allow Multicast Disable P1	When enabled will cause the ethernet port P1 to be disabled with no connectivity.	

Network Page

Click the **Network** link at the top of any of the main web pages to access the page shown in Figure 23. This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- IP Setup Settings Section on page 28
- Date/Time Section on page 30
- 802.1x Section on page 31

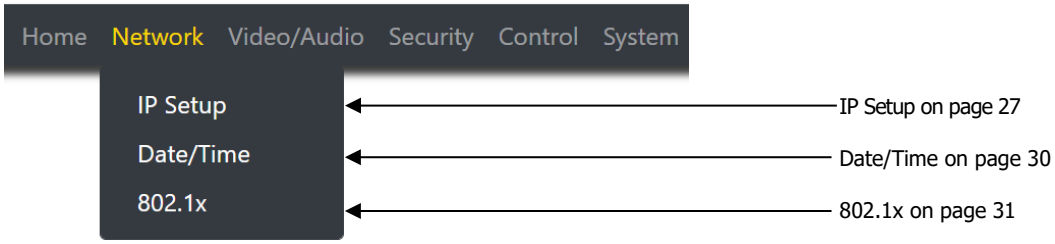


FIG. 23 Network Page

General Section –IP Setup

The **General Section** of the **IP Setup** on the **Network** page is shown in Figure 21. Options are described in Table 3.

FIG. 60 General Section

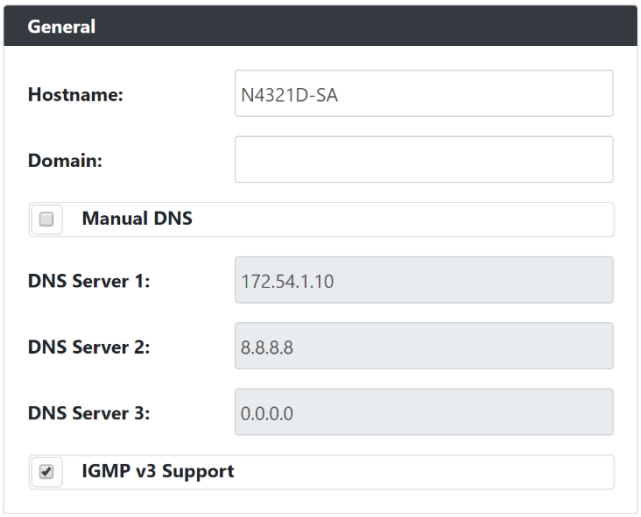


TABLE 5 Network Page: General Section of IP Setup

Option	Description	Notes
Hostname	Type in the Hostname of the network device if needed.	
Domain	Type in the domain name of the network if needed.	
Manual DNS	When enabled will allow for user to statically set DNS server IP.	
DNS IP 1	IP address of a DNS server.	
DNS IP 2	IP address of a DNS server.	
DNS IP 3	IP address of a DNS server.	
IGMP v3 Support	Enable to allow for IGMP v3 support.	
Save	Pressed to save all information on the MWC IP Setup page and apply those settings.	
Cancel	Pressed to discard all settings made on the MWC IP setup page.	

IPv4 Section –IP Setup

The **IPv4** section of the **IP Setup** on the **Network** page is shown in Figure 24. Options are described in Table 6.

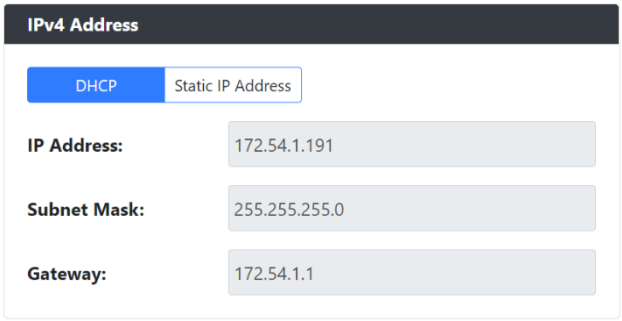


FIG. 24 IPv4 Section

TABLE 6 Network Page: IPv4 Section of IP Setup

Option	Description	Notes
DHCP / Static IP Address	Used to select either DHCP or Static IP Address mode.	
IP Address	View the current IP address of the encoder. When in Static mode, enter an IP address into this field.	
Subnet Mask	View the current subnet mask address of the encoder. When in Static mode, enter a subnet mask address into this field.	
Gateway	View the current gateway address of the encoder. When in Static mode, enter a gateway address into this field.	
Save	Pressed to save all information on the MWC IP Setup page and apply those settings.	
Cancel	Pressed to discard all settings made on the MWC IP setup page.	

IPv6 Section –IP Setup

The **IPv6** section of the **IP Setup** on the **Network** page is shown in Figure 25. Options are described in Table 7.

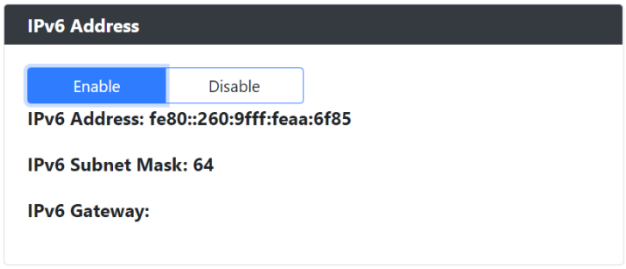


FIG. 25 IPv6 Section

TABLE 7 Network Page: IPv6 Section of IP Setup

Option	Description	Notes
Enable / Disable	When enabled the unit will attempt to obtain a DHCP IPv6 address.	Disabled by default, Requires an IPv6 DHCP server.
IPv6 Address	View the current IPv6 address of the encoder.	
IPv6 Subnet Mask	View the current IPv6 subnet mask address of the encoder.	
IPv6 Gateway	View the current IPv6 gateway address of the encoder.	
Save	Pressed to save all information on the MWC IP Setup page and apply those settings.	
Cancel	Pressed to discard all settings made on the MWC IP setup page.	

Date/Time

The **Date/Time** section of the **Network** page is shown in Figure 26. Options are described in Table 8.

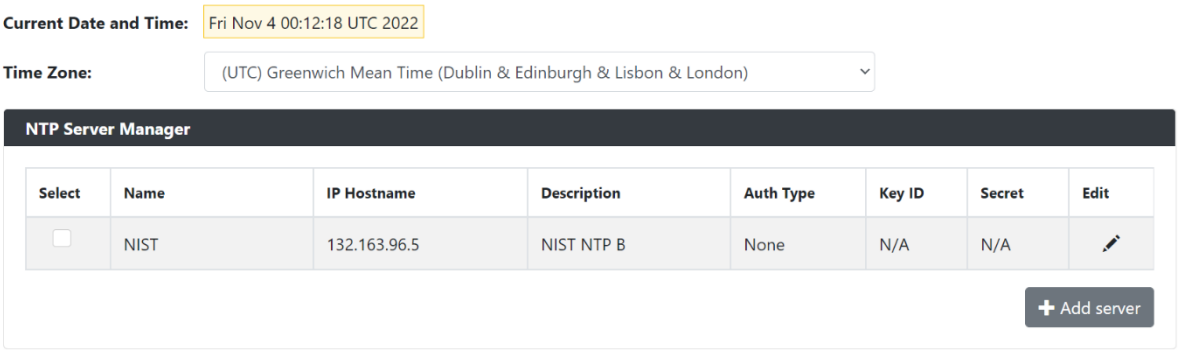


FIG. 26 Date/Time Section

TABLE 8 Network Page: Date/Time

Option	Description	Notes
Current Date and Time	Displays the current date and time of the unit.	
Time Zone	Used to select the offset for the NTPP time.	
Select	Used to select the NTP server connection	
Edit	When selected will allow editing of that name server information.	
Add Server	When selected will open a pop-up allowing to input information for the NTP server	

802.1x

The **802.1x** section of the **Network** page is shown in Figure 27. Options are described in Table 9.

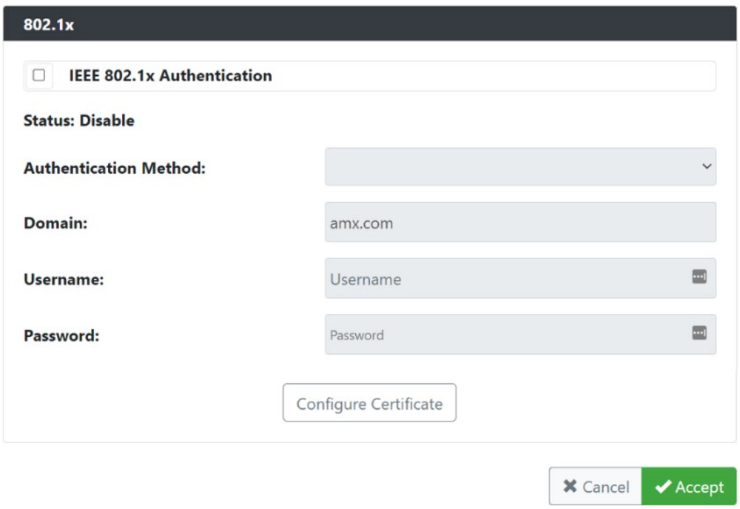


FIG. 27 802.1x Section

TABLE 9 Network Page: 802.1x

Option	Description	Notes
IEEE 802.1x Authentication	When enabled will allow the device to be used with 802.1x network configurations.	
Status	Displays the current port connection as either Disabled, Authorized, or Unauthorized.	
Authentication Method	Select one of the options listed, EAP-TLS Certificate or EAP-MSCHAP V2 Password to connect to the 802.1x server.	
Domain	Type the name of the domain the 802.1x server will be connecting.	
Username	Type the username here to access the 802.1x. Field is used when the Authentication Method is EAP-MSCHAP V2 Password.	
Password	Type the password here to access the 802.1x. Field is used when the Authentication Method is EAP-MSCHAP V2 Password.	
Configure Certificate	When pressed will navigate to the certificate page.	
Accept	Pressed to save all information on the 802.1x page and apply those settings.	
Cancel	Pressed to discard all settings made on the 802.1x page.	

Audio Page

Click the **Video/Audio** link at the top of any of the main web pages to access the page shown in Figure 28. This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- Audio Settings on page 36
- Test Tone Settings on page 41

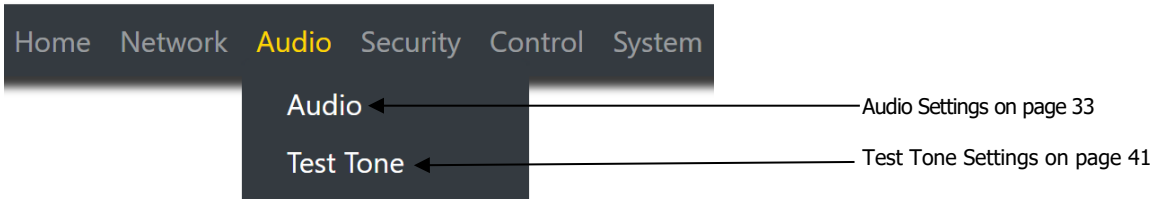


FIG. 28 Audio Page

Main Audio Section – Audio Setup

The **Main Audio** section of the **Audio** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

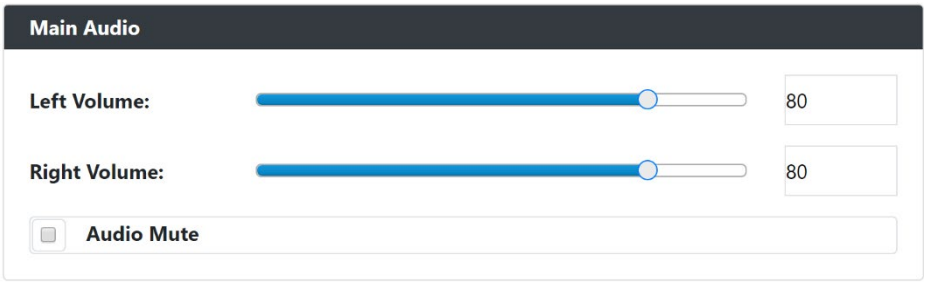


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Left Volume	Volume adjuster used to adjust the volume of the right channel.	
Right Volume	Volume adjuster used to adjust the volume of the right channel.	
Audio Mute	When enabled will cause audio being transmitted from the box to be muted.	

Switch Section – Audio Setup

The **Switch** section of the **Audio** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

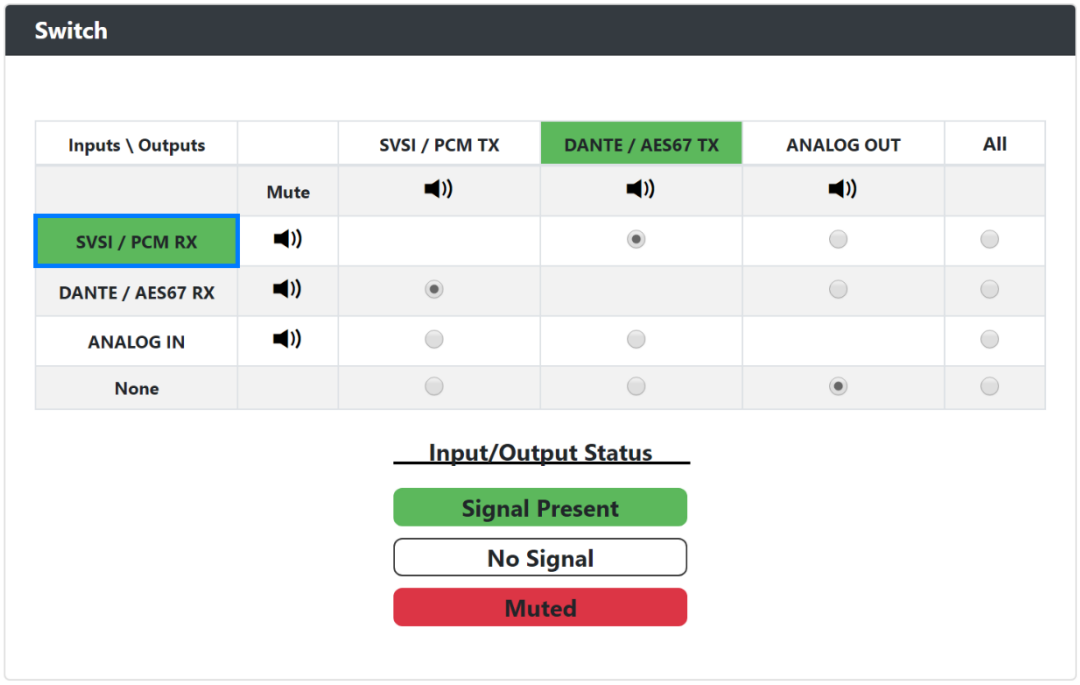


FIG. 33 Switch Section

TABLE 14 Audio Page: Switch Section of Audio Setup

The matrix is used to route the receiving audio signals and transcode the audio to the transmitter signal. When routing any receiving signal to Analog Audio Out will cause the audio to be sent out the 5-pin phoenix as well as the Headphone connector on the device.

Green on a transmitter or receiver signifies there is audio present on that particular transmitter or receiver.

SVSI Audio In Section – Audio Stream Section

The **SVSI Audio In** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

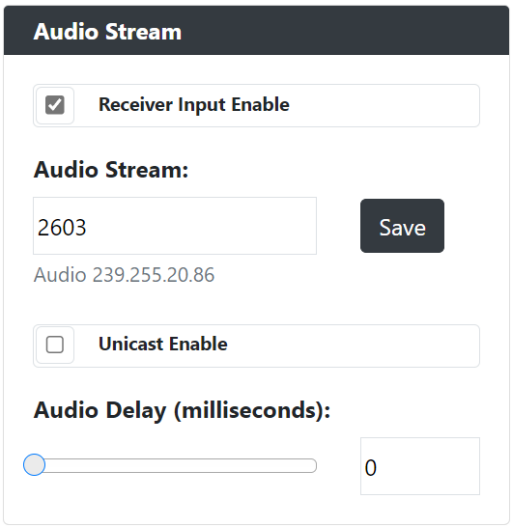


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Receiver Input Enable	Enables the receive stream.	
Audio Stream	View/edit the current transmit stream number.	To better understand this setting, think of Encoders more like a channel on a cable box, rather than a traditional AV Matrix. Each Encoder must have a unique stream number, just like every channel must have a unique channel number (e.g., Food Network and HGTV cannot both be on channel 201).
Save	Click to save settings made in this section.	Only applies Device Name and Stream fields. The other fields are dynamically updated.
Unicast Enable	Enables/disables unicast mode on the receive side.	
Audio Delay	Amount of delay to be added in milliseconds to the stream.	

DANTE Audio In Section – Audio Stream Section

The **DANTE Audio In** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

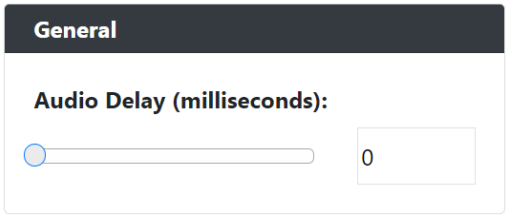


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Audio Delay	The amount of delay to be added in milliseconds to the stream.	

Analog Audio In Section – Audio Stream Section

The **Analog Audio In** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

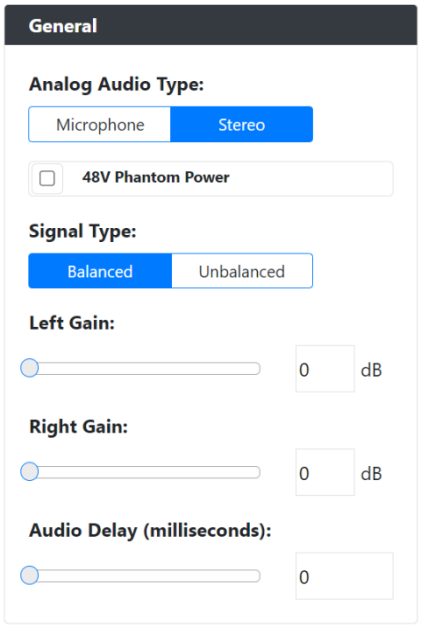


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Analog Audio Type	Specifying the settings for the Analog In connector: Microphone: Stereo:	
48V Phantom Power	When enabled will allow 48V phantom power to be applied to the Left channel on the audio input phoenix connector.	
Signal Type	Type of signal to be applied to the Analog In connector: Balanced: Unbalanced:	
Left Gain	Used to specify the gain on the left channel	
Right Gain	Used to specify the gain on the right channel	

SVSI Audio Out Section – Audio Stream Section

The **SVSI Audio Out** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

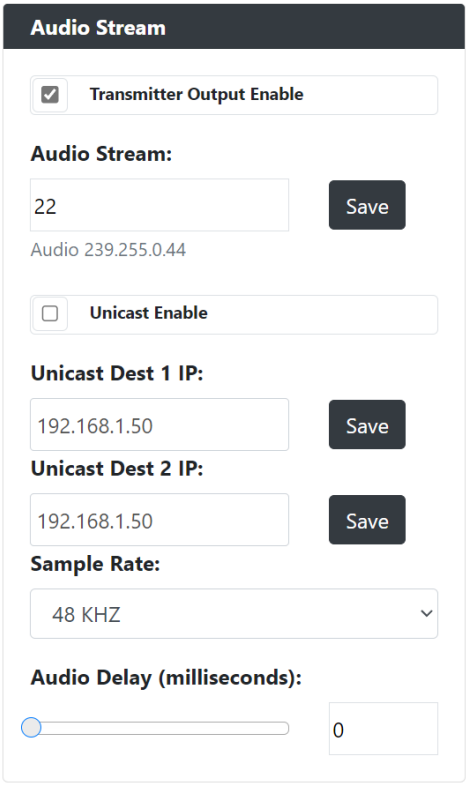


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Transmitter Input Enable	Enables the receive stream.	
Audio Stream	View/edit the current transmit stream number.	To better understand this setting, think of Encoders more like a channel on a cable box, rather than a traditional AV Matrix. Each Encoder must have a unique stream number, just like every channel must have a unique channel number (e.g., Food Network and HGTV cannot both be on channel 201).
Unicast Enable	Enables/disables unicast mode on the receive side.	
Save	Click to save settings made in this section.	Only applies Device Name and Stream fields. The other fields are dynamically updated.
Unicast Dest. 1 IP	IP Address used to send audio to a unitcast device	
Unicast Dest. 2 IP	IP Address used to send audio to a unitcast device	
Sample Rate	Sample rate of the audio	Fixed to 48KHz
Audio Delay	Amount of delay to be added in milliseconds to the stream.	

DANTE Audio Out Section – Audio Stream Section

The **DANTE Audio Out** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

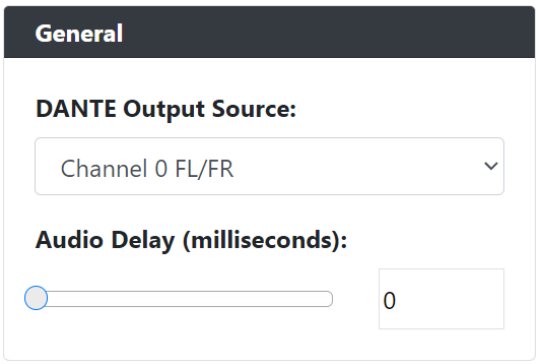


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
DANTE Output Source	Option of what channels to output	Channel 0 (FL/FR) Channel 1 (Center/LFE) Channel 2 (SL/SR) Channel 3 (RL/RR) Downmix
Audio Delay	The amount of delay to be added in milliseconds to the stream.	

Analog Audio Out Section – Audio Stream Section

The **Analog Audio Out** section of the **Configuration** on the **Audio** page is shown in Figure 32. Options are described in Table 13.

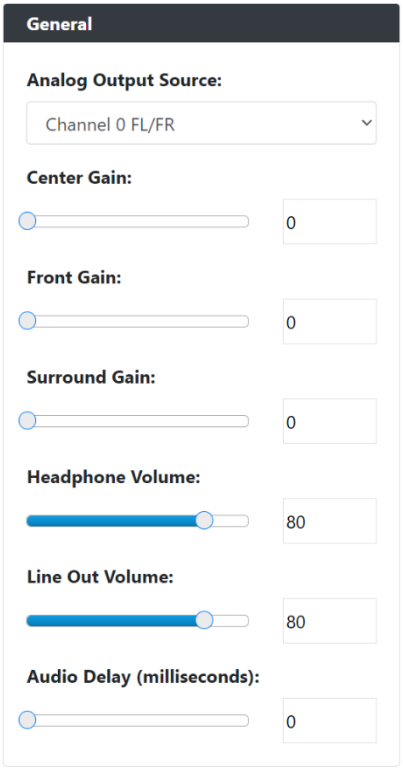


FIG. 32 Audio Section

TABLE 13 Audio Page: Main Audio of Audio Setup

Option	Description	Notes
Analog Output Source	Option of what channels to output	Channel 0 (FL/FR) Channel 1 (Center/LFE) Channel 2 (SL/SR) Channel 3 (RL/RR) Downmix
Center Gain	Used to specify the gain on the Center channel	
Front Gain	Used to specify the gain on the Front channel	
Surround Gain	Used to specify the gain on the Surround channel	
Headphone Volume	Volume that is applied to the Headphone connector.	
Line Out Volume	Volume that is applied to the Line Out Phoenix connector.	
Audio Delay	The amount of delay to be added in milliseconds to the stream.	

Test Tone Section – Test Tone

The **Test Tone** section of the Test Tone page is shown in Figure 32. Options are described in Table 13.

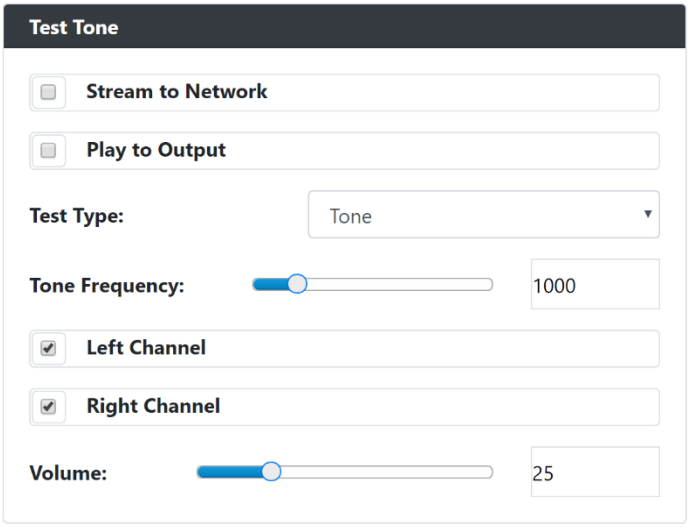


FIG. 32 Test Tone Section

TABLE 13 Test Tone Page: Test Tone setup of the Test Tone

Option	Description	Notes
Stream to Network	When enabled will cause the test tone to be streamed to the network.	
Play to Output	When enabled will cause the test tone to be played out of the Analog Output Phoenix connector.	
Test Type	Type of test being applied: **Tone:** **Pink Noise:** **White Noise:**	
Tone Frequency	Frequency to be applied to the test	
Left Channel	When enabled will cause the tone to be played out of the channel.	
Right Channel	When enabled will cause the tone to be played out of the channel.	
Volume	Volume that is applied to the test tone.	

Security Page

Click the **Security** link at the top of any of the main web pages to access the page shown in Figure 34. This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- General Settings Section on page 43
- Users Settings on page 45
- LDAP Settings on page 46

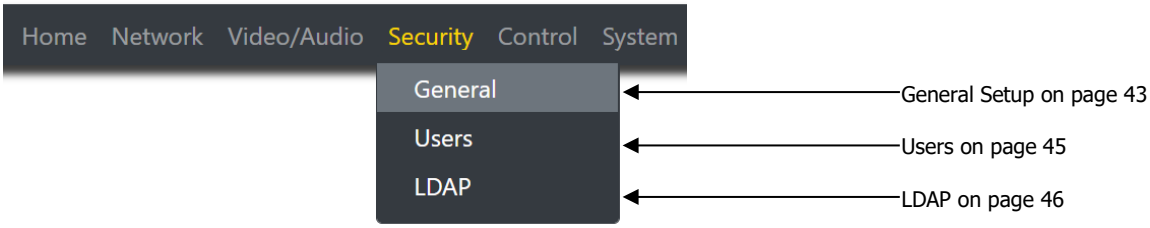


FIG. 34 Security Page

Web Page Section – General Setup

The **Web Page** section of the **General** on the **Security** page is shown in Figure 35. Options are described in Table 15.

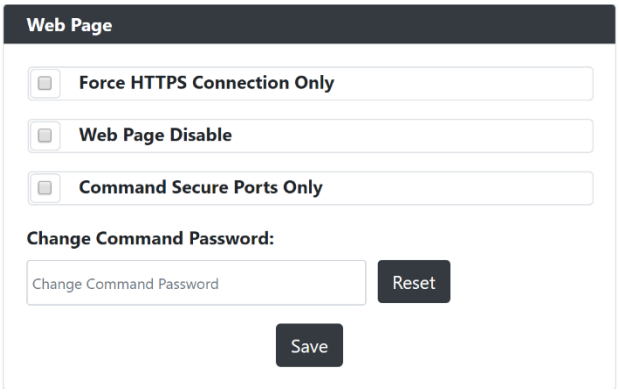


FIG. 35 Web Page Section

TABLE 15 Security Page: Web Page Section of General

Option	Description	Notes
Force HTTPS	When enabled will force the web page access to always be HTTPS	
Web Page Disable	Wen enabled will cause the web pages to fail to load	To enable or disable via API call will need to use secure socket connections.
Command Secure Ports Only	If enabled, commands must be sent using secure sockets (TLS/SSL) and follow the secure command port protocol.	
Change Command Password	Set the default password for command encryption.	When issuing API commands, this password must precede each command in the format: `<password>\r<command>`.
Reset	Click **Reset** to return to default password and settings.	
Save	Pressed to save all information on the Security Setup page and apply those settings.	

Security Certificates Section – General Setup

The **Security Certificates** section of the **General** on the **Security** page is shown in Figure 36. Options are described in Table 16.

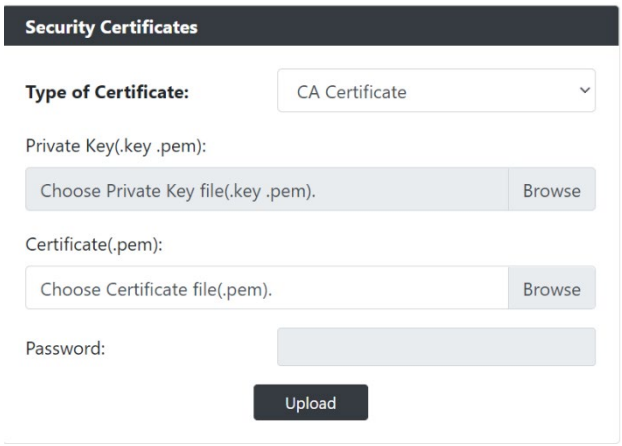


FIG. 36 Security Certificates Section

TABLE 16 Security Page: Security Certificates Section of General

Option	Description	Notes
Type of Certificate	Three options exist for the drop down: CA Certificate Client Certificate Server Certificate	
Private Key	Browse for the Private Key file	
Certificate	Browse for the certificate file	
Password	If required input password for the Private Key or Certificate file	
Upload	Pressed to upload the private key or certificate to the device.	

User Security Details Section – Users Setup

The **Security Certificates** section of the **Users** on the **Security** page is shown in Figure 37. Options are described in Table 17.

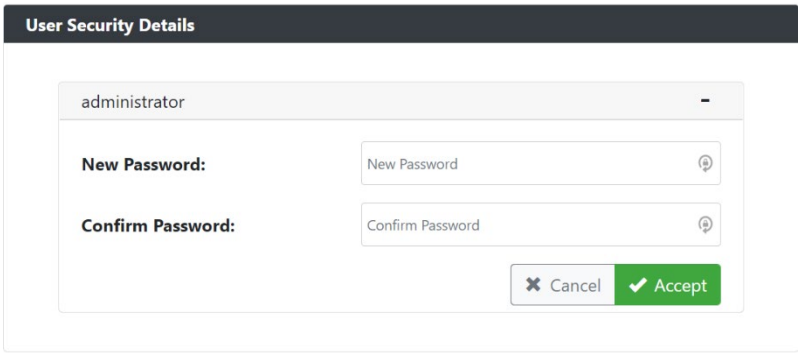


FIG. 37 User Security Details Section

TABLE 17 Security Page: User Security Details Section of Users

Option	Description	Notes
New Password	Input the new password for the Administrator account	
Confirm Password	Input the new password for the Administrator account	
Accept	Press to confirm and apply new password to the user account.	
Cancel	Press to discard changes and retain old password for the user account.	

LDAP Section – LDAP Setup

The **LDAP** section of the **LDAP** on the **Security** page is shown in Figure 38. Options are described in Table 18.

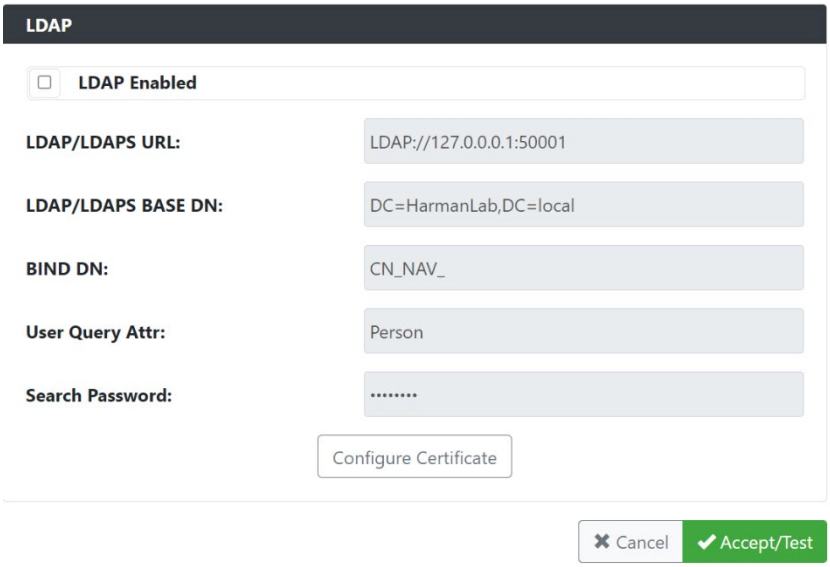


FIG. 38 LDAP Section

TABLE 18 Security Page: LDAP Section of LDAP

Option	Description	Notes
LDAP Enabled	When enabled will allow the device to connect to an LDAP server.	
LDAP/LDAPS URL	Address and port of the LDAP Server	If using LDAP type ldap://<IP>:Port If using LDAPS type ldaps://<IP>:Port
LDAP/LDAPS Base DN	Location of the BIND DN user account with the AD structure	
BIND DN	The binding account being used to form the LDAP connection	
User Query Attr		
Search Password	Password used for the BIND DN account	
Configure Certificate	Pressed will redirect to the certificate management window	
Accept/Test	Press to accept and test the changes to the LDAP settings	
Cancel	Press to discard changes made to LDAP settings	

Control Page

Click the **Control** link at the top of any of the main web pages to access the page shown in Figure 39. This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- External Device Settings on page 48
- N-Act on page 49

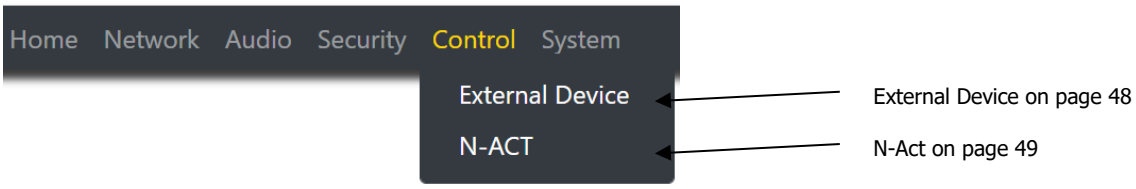


FIG. 39 Control Page

Relay Setting – External Device

The **Relay Settings** section of the **External Device** on the **Control** page is shown in Figure 40. Options are described in Table 19.

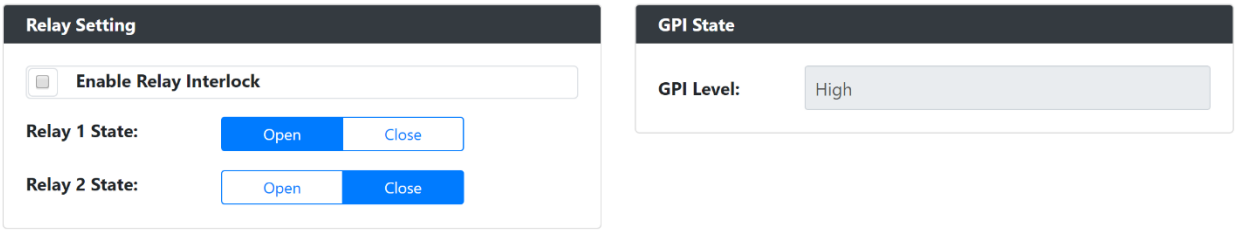


FIG. 40 External Device Section

TABLE 19 Control Page: External Device Settings

Option	Description	Notes
Enable Relay Interlock	When enabled will only allow one relay to ever be open or closed at a time.	Connection will be known as a break before make.
Relay 1 State	Controls to operate the relay: **Open** **Close**	
Relay 2 State	Controls to operate the relay: **Open** **Close**	
GPI Level	Status to show the state of the GPI: **High** **Low**	

N-Act Events – N-Act

The **N-Acts Events** section of the **N-Act** on the **Control** page is shown in Figure 40. Options are described in Table 19.

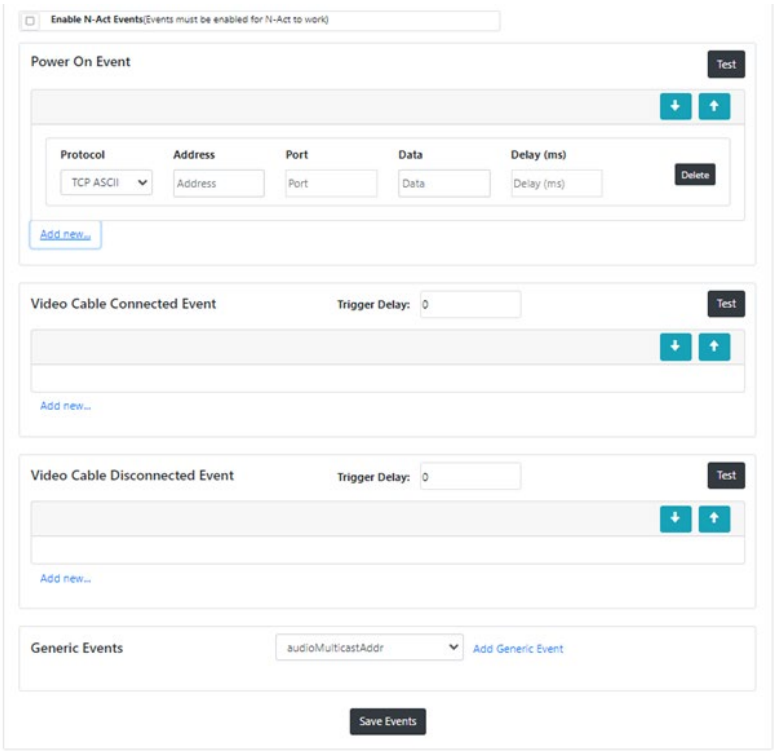


FIG. 40 N-Act Events Section

TABLE 19 Control Page: N-Act Events Settings

Option	Description	Notes
Enable N-Act Events	Used to enable the N-Act events	
Power On Event	Event is triggered once the device is powered on and running	
Video Cable Connected Event	Event is triggered when a hot plug of the video cable is connected	
Video Cable Disconnected Event	Event is triggered when a video cable is disconnected	
Generic Events	List of different parameters that can be triggered based on the selected parameter	Refer to the N-Act documentation for list of events.
Save Events	Used to save the event parameters	Refer to the N-Act documentation for list of events.
Protocol	Drop down containing the different communication protocol formats to send	Refer to the N-Act documentation for list of events.
Address	IP address of the device to send the data	Refer to the N-Act documentation for list of events.
Port	Network port to send the data	Refer to the N-Act documentation for list of events.
Data	Command or payload to send the device being controlled	Refer to the N-Act documentation for list of events.
Delay (ms)	Can be used to delay the commands being sent to the device. Time is in milliseconds	Refer to the N-Act documentation for list of events.
Test	Once a macro of commands is inputted for event the Test button can be used to force the event without triggering the actual event.	
Trigger Delay	Used to create a delay in seconds until the commands are executed once the event is triggered.	
Add new	Used to add a new command to the event the Add new was clicked in	
Up Arrow	Used to move the selected command up in the event	
Down Arrow	Used to move the selected command down in the event	

System Page

Click the **System** link at the top of any of the main web pages to access the page shown in Figure 41 This page is divided into several sections and has links to other dialog boxes for additional configuration options. Refer to the following sections for detailed descriptions:

- Logs Section on page 51
- Status Settings on page 53

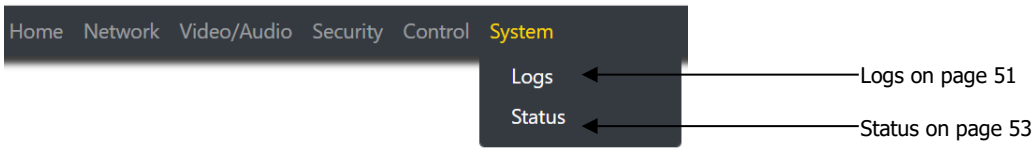


FIG. 41 System Page

Command Log – Log

The **Command Log** section of the **Log** on the **System** page is shown in Figure 42. Options are described in Table 20.

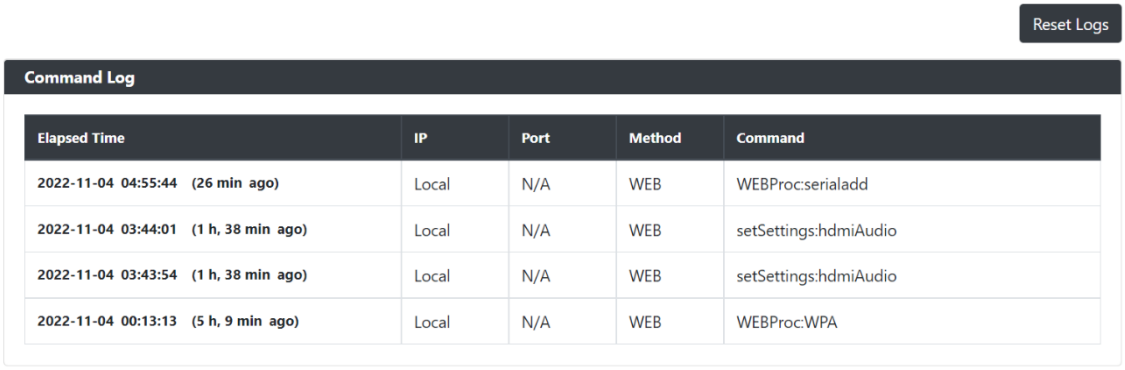


FIG. 42 Command Log Section

TABLE 20 System Page: Command Log Section of Log

Option	Description	Notes
Reset Logs	When pressed will cleat the Command Log history table	

Debug Log – Log

The **Debug Log** section of the **Log** on the **System** page is shown in Figure 43. Options are described in Table 21.

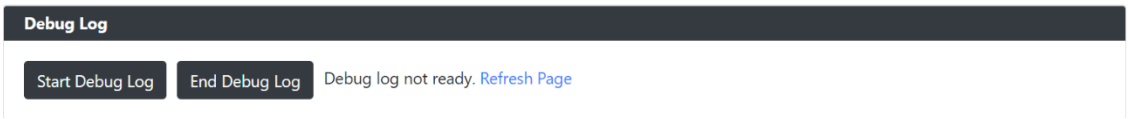


FIG. 43 Debug Log Section

TABLE 21 System Page: Debug Log Section of Log

Option	Description	Notes
Start Debug Log	When pressed will begin enhanced log gathering	Used when troubleshooting an issue with tech support
End Debug Log	When pressed will stop enhanced log gathering	Used when troubleshooting an issue with tech support

Link Layer Discovery Protocol (LLDP) – Status

The **LLDP** section of the **Status** on the **System** page is shown in Figure 44. Options are described in Table 22.

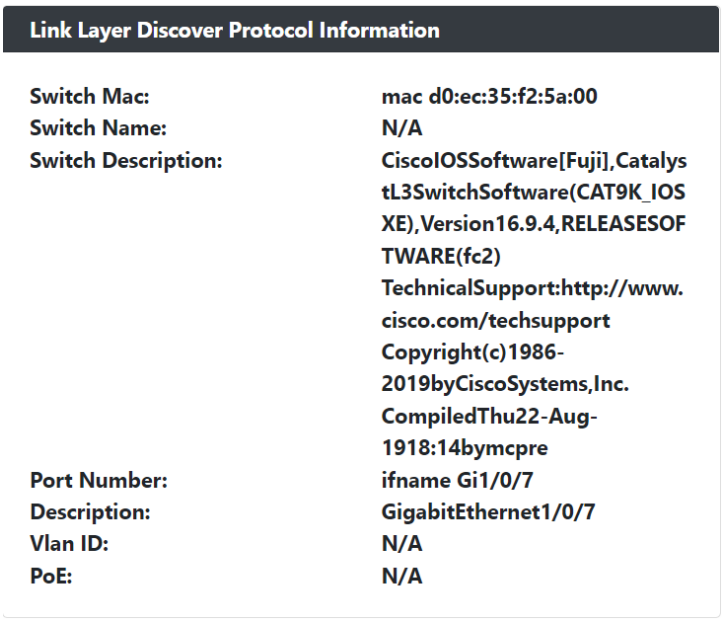


FIG. 44 LLDP Section

TABLE 22 System Page: LLDP Section of Status

Option	Description	Notes
Switch Mac	Mac address of the network switch	
Switch Name	Name of the network switch	
Switch Description	Network description of the switch	
Port Number	Port number the device is connected	
Description	Network port description	
Vlan ID	Vlan of the network device is connected	
PoE	Watts being supplied to the device.	

Software – Status

The **Software** section of the **Status** on the **System** page is shown in Figure 47. Options are described in Table 25.

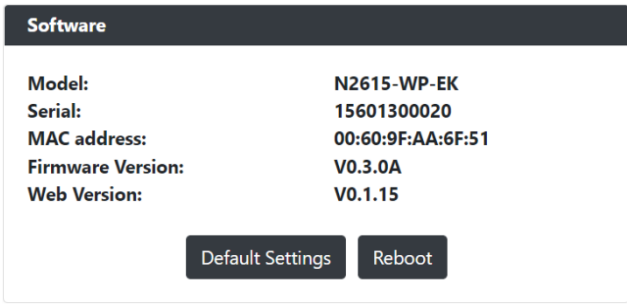


FIG. 47 Current Source Section

TABLE 25 System Page: Current Source of Status

Option	Description	Notes
Model	Displays the model of the N2600 device.	
Serial	Displays the serial number of the Encoder.	
Mac Address	Displays the MAC address of the network interface of the Encoder.	
Firmware Version	Displays the date code for the currently running version of the Encoder internal firmware.	
Web Version	Displays the date code for the currently running version of the web interface.	
Default Settings	Click to restore the device to the original factory settings. This resets everything except the IP address (including name, stream number, serial settings, etc.).	
Reboot	Click to reboot the device (does not affect current configuration).	

Appendix B: Minimum Network Requirements

The following list specifies the minimum network requirements that must be considered when deploying your N-Series equipment. These requirements cover the necessary protocols and features needed to drive N-Series streams.

NOTE: *Specific configuration recommendations are based off the Cisco Catalyst series, however this may vary.*

1. **Managed Network Switch**
2. **Gigabit Ethernet**
3. **Internet Group Management Protocol (IGMP) Version 2**
   - IGMP Snooping
   - IGMP Snooping Querying
     - Network must include at least one IGMP Querier to maintain stream connections. It is recommended to have all capable switches with the querier enabled and allow IGMP auto-elect to determine the Designated Querier (DQ).
     - Query Interval – 30 seconds. This is the interval between sending IGMP general queries.
     - Query Response Interval – 10 seconds. This is the maximum time the system waits for a response to general queries.
     - Last Member Query Interval – 100 milliseconds. This is the interval to wait for a response to a group specific or group- and-source-specific query message.
     - Immediate Leave (also known as Fast Leave, etc. depending on switch manufacturer).
       - Immediate Leave breaks any daisy chaining of multiple units together with a single home run, therefore you will not be able to have both Immediate Leave units and daisy chaining on the same VLAN.

   NOTE: *If Immediate Leave is disabled, set IGMP Robustness to Default 2. Robustness can be adjusted generally from 2-10. The higher the value, the more leave latency is added.*

   - Warnings/Notices
     - There is a known behavior within IGMP that Encoder streams, whether requested across an uplink or not, will be requested by the DQ and will be present on all uplinks between the stream source switch and the DQ.
       - This means that even though you may not be routing a stream to another switch, the DQ's request still puts the stream on the uplink. Therefore, it is important to account for all streams forwarding to the DQ.
       - The presence of a multicast router with PIM-Sparse configured to handle the multicast traffic may eliminate or limit this behavior.
       - N-Series Encoders also support separate VLAN tagging of audio and video streams to allow only certain audio and video streams through an uplink in order to eliminate or limit this behavior.
4. **Jumbo Frames Enabled**

   The N2600 Series Encoders/Decoders produce a frame payload larger than 1500 bytes which requires the switch to have the capacity of handling Jumbo Frames enabled.
5. **TCN Flood Off**

   TCN flood protocol will cause unnecessary backplane and bandwidth usage when adding or removing a device on the network. This can cause stream interruptions as the flooding sweeps through the network.

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