![AMX by HARMAN logo]

DXLINK™ TWISTED PAIR 4K TRANSMITTERS/RECEIVERS

DX-TX-DWP-4K, DX-RX-4K

AV FOR AN IT WORLD®
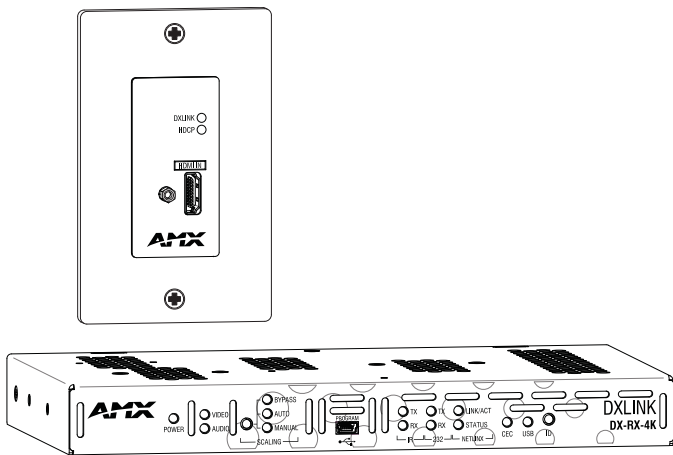
IMPORTANT SAFETY INSTRUCTIONS

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. USE ONLY with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. UNPLUG this apparatus during lightning storms or when unused for long periods of time.
14. 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.
15. 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.
16. To completely disconnect this apparatus from the AC Mains, disconnect the power supply cord plug from the AC receptacle.
17. Where the mains plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.
18. DO NOT overload wall outlets or extension cords beyond their rated capacity as this can cause electric shock or fire.

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.

WARNING: Equipment shall be connected to a MAINS socket outlet with a protective earthing connection.

WARNING: To reduce the risk of electric shock, grounding of the center pin of this plug must be maintained.

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.

EU COMPLIANCE INFORMATION

Eligible to bear the CE mark; Conforms to 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; European Union WEEE (recast) Directive 2012/19/EU; European Union Eco-Design Directive 2009/125/EC; European Union Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Directive 2006/121/EC.

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.

US FCC COMPLIANCE NOTICE – CLASS A

NOTE: *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.*

US 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.

CANADA ICES INFORMATION

ICES (Interference-Causing Equipment Standard): CAN ICES-3 (A)/NMB-3(A)

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UL® and the UL logo are trademarks of UL LLC.

Ethernet® is a registered trademark of the Xerox Corporation.

ENERGY STAR® is a registered trademark of the U.S. Department of Energy and the U.S. Environmental Protection Agency.

Other products mentioned herein may be the trademarks of their respective owners.

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Product Overview and Specifications

Applicability Notice

The information in this manual applies to the DXLink 4K Decor Style Wallplate Transmitter and the DXLink 4K HDMI Receiver Module listed in the table below. In this manual, these products will be referred to as the 4K HDMI Wallplate TX and the 4K RX. When referring to transmitter units, the term Transmitters is used. When referring to receiver units, the term Receivers is used. When referring to physical aspects of these units, the terms Wallplate and Module are used.

DXLink™ Twisted Pair 4K Transmitters and Receivers

Part #	Model Name	Model Number, Description
FG1010-330-BL FG1010-330-WH	DXLink 4K HDMI Decor Style Wallplate Transmitter (US)	DX-TX-DWP-4K, DXLINK 4K HDMI DECOR STYLE WALLPLATE TX (BLACK or WHITE)
FG1010-510	DXLink 4K HDMI Receiver Module	DX-RX-4K, DXLINK 4K HDMI RX

Compatibility Information

- The Transmitters and the Receivers listed above are compatible with a number of other DXLink products (see the section "Product Compatibility Tables" on page 8).
- The 4K HDMI Wallplate TX must use a DXLink power injector when connecting directly to a Receiver; others may cause damage.
- The 4K HDMI Wallplate TX and 4K RX are compatible with Enova DGX 100 Series DXLink Twisted Pair 4K Input and Output Boards (DGX-I-DXL-4K and DGX-O-DXL-4K).
- DXLink Twisted Pair 4K Transmitters and Receivers are compatible with DXLink Twisted Pair equipment (see the "DXLink Compatibility Appendix" on page 89).

Product Notes

The Transmitters and Receivers are designed for transmission of a 4K HDMI signal over twisted pair cable (or a DVI signal via a DVI-to-HDMI cable adapter) up to 262 feet (80 m). Functionality is briefly described below.

4K HDMI Wallplate TX – This wallplate receives a 4K HDMI signal (with or without embedded digital audio) from a source device. The signal(s) is transported over twisted pair cable to an Enova DGX Digital Media Switcher or directly to a DXLink Receiver. If the entire path is 4K-capable (i.e., either the Transmitter is directly connected to the Receiver or the intermediate Input and Output Boards and the final Receiver are 4K-capable), the 4K HDMI Wallplate TX sends 4K format signals downstream. If the entire path is not 4K-capable (e.g., a DXLink Twisted Pair Input Board between the 4K HDMI Wallplate TX and 4K RX), the 4K HDMI Wallplate TX sends only signals supported by all downstream DXLink equipment (see the "DXLink Compatibility Appendix" on page 89).

Both video and audio are transported over twisted pair cable to an Enova DGX Digital Media Switcher or directly to a Receiver. Direct connection to a Receiver requires either PDXL-2 (FG1090-170) or PS-POE-AT-TC (FG423-84).

Per UL – DXLink Wallplate Transmitters are to be used in a Network Environment 0 per IEC TR 62101, and connected only to PoE networks without routing outside the plant. DXLink Wallplate Transmitters are intended to be used only with Listed Information Technology Equipment.

4K RX – The 4K RX receives a 4K HDMI Signal with embedded audio over twisted pair cable from a DXLink Transmitter (or from a DXLink compatible device) and sends the signal on to the destination. The 4K RX supports 4K signals received from upstream devices. The 4K RX features SmartScale® Technology (integrated EDID output scaling) to ensure an appropriate output resolution, plus it supports a Manual (override) option for setting up custom resolutions and a Bypass option. The 4K RX also has IR ports.

In order for audio to be sent out of the analog stereo audio connector on the DX-RX-4K, the audio *must* have originated or be embedded in the HDMI signal on the attached Switcher or Transmitter as a 2 channel signal (either analog stereo or 2 channel L-PCM); Multi-channel (>2 channel) L-PCM formats will pass incomplete audio (only 2 of the multiple channels will be sent). All other audio formats will be muted at the connector.

NOTE: *If a DVI-D signal is used (via a DVI-to-HDMI cable adapter), the advanced audio support from HDMI will not be available.*

NOTE: *These DXLink products support several different modes which are available for system setup and use. Brief explanations of the modes are provided in the section "Quick Reference Tables for Modes" on page 14 along with page references to complete information.*

Product Compatibility Tables

The 4K HDMI Wallplate TX and 4K RX are compatible with the products listed in the three tables following.

NOTE: *DXLink Twisted Pair 4K Transmitters and Receivers are primarily intended for use with 4K signals. These units can, however, be used with DXLink Twisted Pair equipment. If used as part of an installation where a complete 4K signal path does not exist, the equipment described in this manual limits supported signals to the capabilities of the attached DXLink Twisted Pair equipment (see the "DXLink Compatibility Appendix" on page 89).*

Enova DGX 100 Series Digital Media Switchers and DXLink Functions

The following table shows which Enova DGX 100 Series products support specific DXLink functions (for more information, see the *Enova DGX 100 Series Digital Media Switchers Hardware Reference Manual* at www.amx.com).

DXLink Functions in Enova DGX 100 Series Digital Media Switchers		
	DXLink Twisted Pair 4K Input Boards (DGX-I-DXL-4K)	DXLink Twisted Pair 4K Output Boards (DGX-O-DXL-4K)
DXLink Inputs	Up to 8, 16, 32, 64*	–
Power on DXLink Inputs**	Yes	–
DXLink Outputs	–	Up to 8, 16, 32, 64*
Power on DXLink Outputs**	–	Yes

* Inputs and outputs up to 8, 16, 32, or 64 depending on the system (in increments of 4 inputs or 4 outputs per board).

** For power budget information for system planning when using DXLink Transmitters and Receivers with an Enova DGX 100 Series Digital Media Switcher, see page 23.

Solecis 4K Solutions and DXLink Functions

The following table shows which Solecis 4K products support specific DXLink functions (for more information, see the *Solecis Digital Switchers Hardware Reference Manual* at www.amx.com).

DXLink Functions in Solecis 4K Solutions			
	SDX-514M-DX	SDX-414-DX	SDX-814-DX
DXLink Inputs	0	0	0
Power on DXLink Inputs	NA	NA	NA
DXLink Outputs	1	1	1
Power on DXLink Outputs	Yes	No	No

DXLink Transmitter and Receiver Features

NOTE: *Wallplate Transmitters have a limited set of features (i.e., no S/PDIF, IR, or serial ports).*

- **S**upports transport of 4K and UHD format signals
- Incorporates HDMI® technology
- HDCP 1.4 compatible
- Supports resolutions up to 2160p, as well as 3D support (3D and Deep Color)
- Supports HDMI passthrough with embedded digital audio and single link DVI (DVI-to-HDMI cable adapter required)
- Reads the downstream EDID from the sink (Extender Mode)
- Transports video signals over distances up to 262 feet (80 m) via the DXLink connection
- Interruption free content when used in conjunction with a switcher, AMX's exclusive InstaGate Pro® Technology allows audio and video to be switched quickly and easily to every connected display without the difficulties typically associated with HDCP.
- SmartScale® on the Receivers works to automatically recognize any device's supported resolutions and signal type parameters, allowing switching out source and destination devices without manual setup. Also included is the ability to control detailed timing parameters for customized video output formats. (SmartScale is the ability to configure the scaling output by automatically selecting destination defined resolutions.)
- Supports HDMI embedded digital audio
- Standard twisted pair cable saves time and installation effort
- The 232 port (RS-232 serial) supports bidirectional transfer of serial data between Master and RX (Endpoint Mode)
- The IR port supports bidirectional transfer of IR data between Master and RX (Endpoint Mode)
- Power over DXLink (twisted pair cable) support when used with a switcher or with an approved AMX Power over DXLink device (for power budget information when used with an Enova DGX Digital Media Switcher, see page 23)
- A desktop power supply (ENERGY STAR® qualified) is provided per module. The 4K HDMI Wallplate TX receives power from the switcher or can be used with a DXLink power injector (for power budget information, see page 23).
- DXLink modules are compatible with all V Style, versatile mounting options including rack, surface, and pole. The 4K HDMI Wallplate TX mounts in a standard US single-gang box.
- Backed by AMX's 3 year warranty (see www.amx.com)
- 24-hour technical support

NOTE: *Features and specifications described in this document are subject to change without notice.*

Common Applications

DXLink Transmitters and Receivers are designed to send audio and video to a remote display across the room, on the other side of the house, or to a classroom down the hall. The installation's requirements dictate the system setup which generally takes one of the following three forms.

- **Endpoint Mode (Switcher)** – One or more Transmitters and/or Receivers are connected to a 100 Series Enova DGX Digital Media Switcher (see page 21).
- **Endpoint Mode (Standalone)** – A standalone DXLink TX/RX pair* are connected directly to each other but, in addition, the RX is connected to a NetLinx Central Controller via a LAN or directly to the Controller (see page 22).
- **Extender Mode (Standalone)** – A standalone DXLink TX/RX pair* are connected directly to each other as a simple extender solution (see page 23).

* A wallplate in a standalone configuration requires power via a DXLink power injector.

NOTE: *DXLink Twisted Pair 4K Receiver modules can also be setup for standalone communication with Solecis 4K Digital Switchers.*

Transmitters

DXLink 4K HDMI Wallplate TX (DX-TX-DWP-4K) Front View
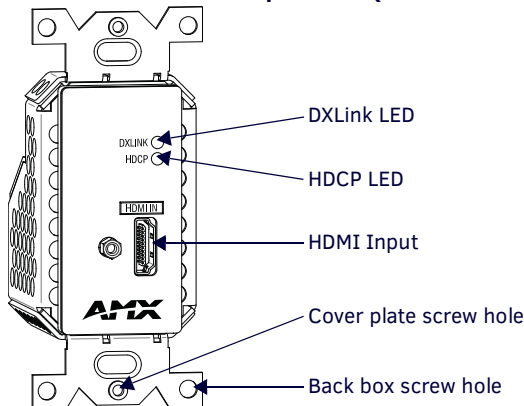
FIG. 1 4K HDMI Wallplate TX front view (before customer provided standard decor style front cover plate is attached)

Components located on front of 4K HDMI Wallplate TX

- **HDMI Input –** HDMI connector (with locking center screw) for digital video and embedded digital audio (supports a DVI-D signal with use of DVI-to-HDMI cable adapter). When more than one audio signal is present, HDMI embedded audio takes precedence over analog audio.
- **DXLink LED –** Indicates when a link is established to a downstream device.
- **HDCP LED –** Indicates that the signal being sent downstream is HDCP-encrypted content (blinks when passing non-HDCP video).

Wallplate Transmitter Rear View

The 4K HDMI Wallplate TX has a DXLink connector and ground screw on the rear of the device.
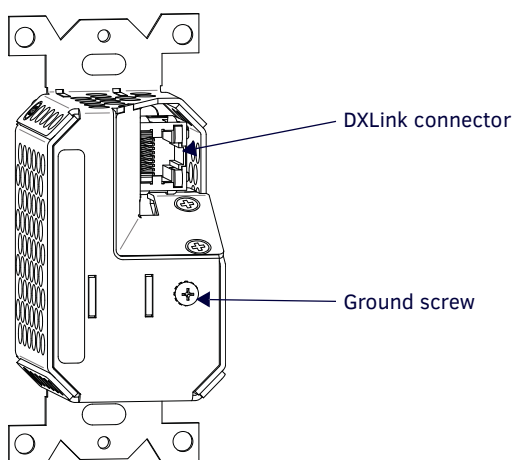
FIG. 2 Rear view of 4K HDMI Wallplate TX

Components located on rear of 4K HDMI Wallplate TX

- **DXLink Output Connector –** DXLink (RJ-45) connectors transport digital video and embedded audio over twisted pair cable to DXLink devices or boards, including digitally transcoded analog video signals. The DXLink path supports HDCP. In addition, Wallplate Transmitters receive power over the DXLink line from an Enova DGX Switcher or power injectors PDXL-2 (FG1090-170) or PS-POE-AT-TC (FG423-84). For pinout and LED information, see page 28.
- **Ground Screw –** The ground screw is used for creating a technical ground for the ungrounded sources/destinations with respect to the DXLink Transmitters/Receivers and switcher (see page 28).

Receivers

NOTE: *If a DVI-D signal is used (via a DVI-to-HDMI cable adapter), the advanced audio support from HDMI will not be available.*

DXLink Receivers Front View
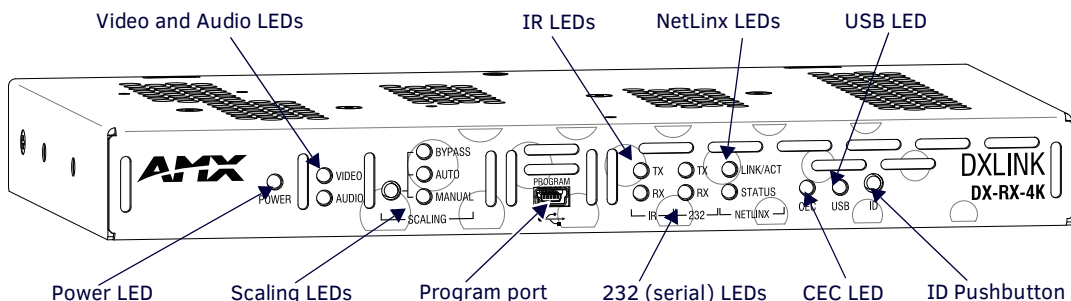
FIG. 3 DXLink Receiver front view (DX-RX-4K shown)

NOTE: *DXLink Receivers have a DIP switch on the bottom; for details, see page 13.*

The following components are located on the front of the Receivers (left to right):

- **Power LED** — Indicates when the Receiver is powered on.
- **Video and Audio LEDs** — Indicate the presence of video and embedded audio signals through the Receiver.
- **Scaling button and LEDs** — Use the Scaling button to select one of the 3 scaling options: Bypass, Auto (default), or Manual. For information on using the Scaling button and options for persisting the Scaling Mode, see page 34.
- **Program port** — This port is a USB mini-B connector.
- **IR LEDs** – RX LEDs indicate active IR communication.
- **232 (RS-232) LEDs** – RX LEDs indicate active serial communication.
- **NetLinx LEDs** – Link/Act LED indicates network communication activity. The Status LED indicates unit status.
- **CEC LED** – CEC is not currently supported.
- **USB LED** – When illuminated, the LED indicates that the USB port connection has been established (for details, see page 14).
- **ID Pushbutton** – Places the Receiver in ID Mode for setting the NetLinx ID (device only) and provides additional functionality, such as placing the device in Static IP Mode or DHCP Mode.

Receiver Module LEDs

DXLink Receiver Indicator LEDs		
LED	**Normal Display**	**Indicates**
Power	Green	Power is applied to the Receiver
Video	Green	A video signal is present through the Receiver
Audio	Green	An embedded audio signal is present through the Receiver
Scaling: – Bypass – Auto – Manual	One LED is green The other two are off	The Receiver is in one of the three modes for scaling • At initial power up, the Receiver defaults to the Auto scaling option* • Pressing the Scaling button cycles the module through the options: Bypass, Auto, and Manual • If Bypass is solid and Auto is flashing, then the RX is trying to read EDID from the sink
IR TX	Red	IR TX active communication
IR RX	Yellow	IR RX active communication
Serial TX	Red	Serial TX active communication
Serial RX	Yellow	Serial RX active communication
NetLinx Link/Act	Green	Active LAN connection to an AMX Network (Blinking = #3 Toggle OFF)

* When the output HDMI cable is disconnected from the Receiver or if no EDID can be found on the destination device, the last used Scaling Mode LED will be ON. In either case, the Receiver will continue to hold its output resolution to the last known preferred resolution until a power cycle or reconnection of a sink with a valid EDID. On power up without a valid EDID, the default preferred output resolution presented will be 3840x2160,30Hz until a different EDID is detected.

NOTE: *For detailed behavior of the NetLinx Link/Act and Status LEDs on the module's front, see page 35. For detailed behavior of the RJ-45 connectors' LEDs on the module's rear, see page 28.*

Receiver Rear View
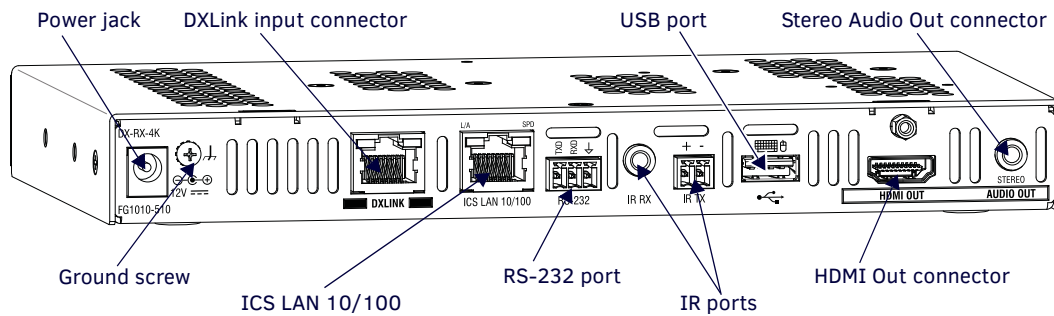
FIG. 4 DXLink Receiver rear view (DX-RX-4K shown)

The following components are located on the rear of Receivers (left to right):

- **Power Jack** – The power receptacle is a 2.1 mm DC jack for connecting power. Power can come from a locally connected DC supply of 12 V. An automatically adjusting universal 110/220 IEC power supply is provided. The power supply is ENERGY STAR® qualified to ensure maximum efficiency and savings.

IMPORTANT: *If desktop power is used to power the Receiver, only the provided desktop power supply should be used and it <u>must not</u> be altered in any way. Remote power can also be provided via a switcher, PDXL-2 (FG1090-170), or PS-POE-AT-TC (FG423-84).*

NOTE: *DXLink Receivers can also be powered through the DXLink connector when attached to a DXLink Output Board in an Enova DGX Switcher. We recommend calculating the power budget for the switcher to maintain the redundancy of its power supplies (see page 23).*

- **Ground Screw** – The ground screw is for creating a technical ground for the ungrounded sources/destinations with respect to the DXLink Transmitters/Receivers and switcher (see page 28).
- **DXLink Input Connector** – DXLink (RJ-45) connectors transport digital video, embedded audio, Ethernet, and bidirectional control over twisted pair cable to DXLink devices or boards, including digitally transcoded analog video signals. The DXLink path supports HDCP and also supports power over the same path from an Enova DGX Switcher or Solecis 5x1 4K Digital Switcher to power the module. For pinout and LED information, see page 28.
- **ICS LAN 10/100 Connecto**r – The ICS LAN 10/100 (RJ-45) connector is for Ethernet 10/100 connectivity (e.g., receiving SEND_COMMAND commands and downloading firmware update files). For pinout and LED information, see page 28.
- **RS-232 Port** – The RS-232 (serial data interface) port is a 3-position screw block which accepts data from the source device and transfers it via the twisted pair cable to the Receiver, which in turn transfers the data to the destination device or the transfer of data can also be made from the destination to the source. In addition to being directly connected to a device, this port can be connected as an independent native NetLinx control port from a networked NetLinx Central Controller.
- **IR RX Port** – The IR RX port is used for IR control. This port is a 3.5 mm stereo jack.
- **IR TX Port** – The IR TX port is used for IR control. This port is a 2-pin mini–Phoenix connector. In addition to being directly connected to a device, this port can be connected as an independent native NetLinx control port from a networked NetLinx Central Controller.
- **USB Port** – The USB-A port on a DXLink Receiver module supports keyboard/mouse. This port is used in conjunction with the USB-B Host port on a DXLink Transmitter module which supports a USB device and connects to the PC. (For USB port information, see page 13.)
- **HDMI Out Connector** – The HDMI Out connector is for digital video and embedded audio. The HDMI connector has a center screw for locking capability. The HDMI connector also supports a DVI-D signal (a DVI-to-HDMI cable adapter is required).
- **Stereo Audio Out Connector** – The Stereo Audio Out connector is a 3.5 mm stereo jack. In order for audio to be sent out of the analog stereo audio connector on the DX-RX-4K, the audio must have originated or be embedded in the HDMI signal on the attached Switcher or Transmitter as a 2 channel signal (either analog stereo or 2 channel L-PCM); Multi-channel (>2 channel) L-PCM formats will pass incomplete audio (only 2 of the multiple channels will be sent). All other audio formats will be muted at the connector.

Common Features/Functionality

This section covers the DIP switches, the USB port, and HDCP compliance.

DIP Switches

The following DIP switch settings do not in any way affect the functionality of the DX-TX-DWP-4K and are not applicable when configuring a DX-RX-4K for use with an Enova DGX in Auto-setup Mode. These settings only apply when the DX-RX-4K is used with a Transmitter that also features DIP switches (see the "DXLink Compatibility Appendix" on page 89) or when used with an Enova DGX in a traditional NetLinx Binding setup (see the "Network Configuration Chapter" on page 37).

TIP: *For easiest access to the DIP switch toggles, we recommend setting them before installation.*

A four-toggle DIP switch is on the bottom of the DXLink Module.

- #1 Toggle is used for enabling/disabling the physical ICS LAN 10/100 port (see page 25).
- #2 Toggle is used for setting Modules to either automatically or manually determine the DXLink Mode (see page 26).
- #3 Toggle is used for enabling/disabling network connectivity of the DXLink Transmitter or Receiver to a connected NetLinx Central Controller (used for IR ports, serial ports, and commands to the DXLink unit); see page 26.
- #4 Toggle is not functional.
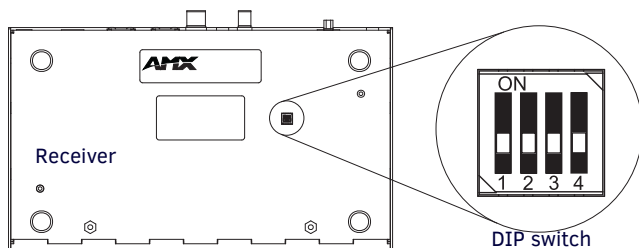
FIG. 5 DIP switch location on DXLink HDMI 4K Receiver Module

For complete information on setting DIP switches (including settings for common scenarios), see the section starting on page 25.

DXLink USB Port

USB port - keyboard/mouse
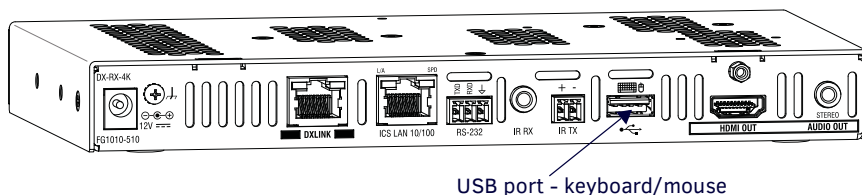
FIG. 6 HDMI 4K RX USB port for keyboard/mouse

The USB-A port on the rear of the Receivers supports passthrough information from the USB Host port on Transmitter modules to an HID (Human Interface Device), which is most commonly a keyboard or mouse.

HID Devices and Windows 8

Windows 8 will not wake up from a DXLink connected keyboard or mouse unless the properties for the HID device are set to allow the device to wake the computer. (Note that even a hot plug of the USB cable will not restore connectivity.)

To set Windows 8 to work with DXLink modules and HID devices:

1. On the PC, go to Start > Control Panel > Device Manager and expand "Keyboards."

2. Right-click the HID Keyboard Device and select Properties.
   The HID Keyboard Device Properties dialog box opens.
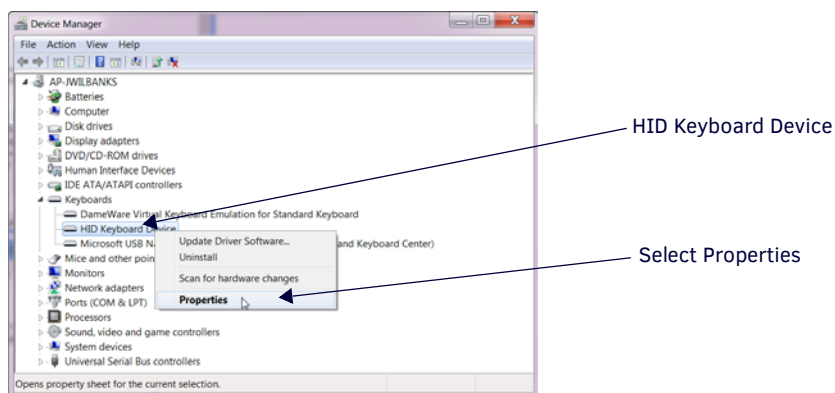
3.   Select the Power Management tab and click "Allow this device to wake the computer."

Select this option
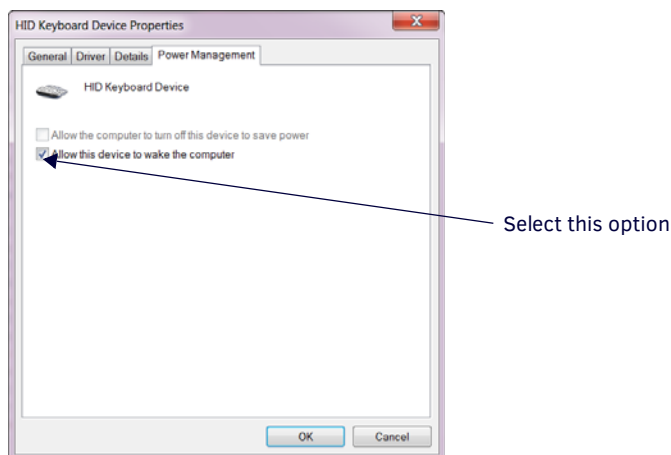
4.   Click OK.

5.   Repeat steps for HID mouse (in the Device Manager dialog box, expand "Mice").

HID Devices

A list is available of HID devices which have been tested and found to be working well with the latest firmware (see "DXLink - HID supported Devices" on the DXLink Receiver's product page at www.amx.com).

USB LED

The USB LED on the front of a Receiver Module monitors the USB port on the rear of the unit. The USB LED illuminates (yellow) when a USB device is detected (the port default is "enabled").

HDCP Compliance

If the source device is sending HDCP-encrypted content and the connected downstream sink is not HDCP compliant, the HDMI output on the Receiver will not send the signal. This does not affect additional displays the source may be routed to, i.e., HDCP compliant displays will still show content from the source device even when the source device is also routed to non-compliant displays.

An orange screen on an output display is the visual cue from DXLink devices that the display device cannot display the HDCP compliant signal from the source.

Quick Reference Tables for Modes

The modes listed in the following three tables are those supported by DXLink Transmitters and Receivers. The Quick Reference Tables are intended to help users navigate the many modes available for system setup and use. For complete information on any of the modes listed, see the relevant sections or chapter referenced at the end of the Descriptions.

Quick Reference Table – Modes for Handling System Architecture	
Mode	**Description**
DXLink Modes	DXLink Modes refer to the type of physical components and how they are connected to make up the system. When Transmitters and Receivers are cabled into a system and powered on, they automatically detect the DXLink Mode they are being used in. 　　**Endpoint Mode:** • When the system is setup to use Transmitters and/or Receivers with an Enova DGX Digital Media Switcher or an applicable Solecis 4K Digital Switcher, the system is in Endpoint Mode (see example on page 21). 　　**Or** • When a TX is directly connected to an RX but, in addition, the RX is connected to a NetLinx Central Controller via a LAN or directly connected to the Controller, the system is in Endpoint Mode (see example on page 22). 　　**Extender Mode:** • When a TX is directly connected to an RX, the system is in Extender Mode (see example on page 23). For further information, reference #2 Toggle DIP switch settings for DXLink Mode (see page 26) and DXLink System SEND_COMMANDs (see page 59).

Quick Reference Table – Modes for Handling Addressing/Networking (DX_RX-4K only)	
Mode	**Description**
IP Addressing Modes	IP Addressing Modes refer to network connection settings. By default, all network connection settings are turned OFF. **Static IP Mode:** • This mode configures the network connection to one stable IP address the device will use continuously. **DHCP Mode**: • This mode configures the network connection to choose a new IP address for each network session. To enable network capability, see "Network Configuration" on page 37.
ID Mode	ID (Identify) Mode refers to the protocol for enabling a user to establish device addresses. This Mode, accessible through NetLinx Studio, places the entire system on hold while it waits for an event from a NetLinx device in the named system (e.g., pressing the ID Pushbutton on the RX). For further information, see "Assign a Device Address (ID Mode)" on page 40.
Master Connection Modes	Master Connection Modes refer to the modes of communication used for connection to the Master as specified via the SET CONNECTION Telnet command. **Auto Mode:** This mode utilizes TCP communication. It looks for a matching System Number and attempts to come online with the first Master it sees with that System Number. **TCP URL Mode:** TCP; the Master is specified via URL. **UDP URL Mode:** UDP; the Master is specified via URL. **NDP Mode (Default):** UDP; utilizes the NDP binding process to assign the DXLink endpoint (the physical device) to a Master (or Virtual Master) via NetLinx Studio. Once bound, communications are conducted via UDP. For further information, see "Master Connection Modes" on page 74.
Auto-setup Mode	In auto-setup mode, endpoints are automatically discovered by and connected to an Enova DGX 100 Series Switcher using a single IP address. For this mode, *all of the following requirements must be met*. If not, the endpoint will no longer reside in auto-setup mode and must be either bound to the integrated Master (see page 37) or reconfigured to meet the requirements. • Endpoint *must* be connected to a DXLink Input or Output Board in an Enova DGX 100 Series Switcher (or Enova DGX 8/16/32/64 with upgraded 100 Series CPU) • Endpoint *must* have IP mode set to DHCP for setup (self-configures to Static IP on private LAN) • Endpoint *must* have the master connection type set to NDP • Endpoint *must* not be bound to a Master via NDP (traditional binding process) **IMPORTANT:** *If auto-setup is being used, Telnet is the only way to access some of the network settings. Also note that some network settings will disable auto-setup.* For additional information on the auto-setup feature, see the *Hardware Reference Manual – Enova DGX 100 Series Digital Media Switchers*.
IR SEND_COMMAND Modes	IR SEND_COMMAND Modes refer to displaying and setting the IR port active system settings as IR, Serial, or Data modes. **GET MODE SEND_COMMAND:** • The GET MODE SEND_COMMAND reveals the active system (IR, Serial, or Data) settings. **SET MODE SEND_COMMAND:** • The SET MODE SEND_COMMAND changes the active system settings. For further information, see "IR SEND_COMMANDs" on page 53.

Quick Reference Table – Modes for Handling Video Processing	
Mode	**Description**
Scaling Modes	Scaling Modes refer to how the system alters or maintains a source device's resolution as it is passed along to the destination device. The Scaling Mode can be set on the Receivers with the Scaling button (see page 34) or with SEND_COMMANDs (see page 49). **Auto Mode (Default):** • Auto Mode (SmartScale®) allows the destination device to choose the resolution it needs. **Manual Mode:** • Manual Mode allows the user to configure the resolution the video will display through a destination device. **Bypass Mode:** • Bypass Mode allows the video signal to display over the destination device without altering the signal's resolution.

DXLink Transmitter and Receiver Specifications

The specifications in the table below apply to the following Transmitters and Receivers:

- FG1010-330-BL – DX-TX-DWP-4K (US), Black
- FG1010-330-WH – DX-TX-DWP-4K (US), White
- FG1010-510 – DX-RX-4K

General Specifications	
Parameter	**Value**
Approvals	CE, UL, cUL, FCC Class A, RoHS, WEEE
AC Power (Module Only)	• 100 to 240 VAC single phase, 50 Hz to 60 HZ • 0.6 A @ 115 VAC max.
DXLink Power	**DXLink Twisted Pair Transmitters (DX-TX-DWP-4K):** Power can be supplied by a DXLink Power sourcing device such as an Enova DGX Digital Media Switcher, PS-POE-AT-TC High Power PoE Injector (FG423-84) or PDXL-2 Power over DXLink Controller (FG1090-170). AMX does *not* support the use of any other power supplies or PoE injectors as these may potentially damage the DXLink equipment. **DXLink Twisted Pair Receiver (DX-RX-4K):** Power can also be supplied by a DXLink Power sourcing device such as an Enova DGX Digital Media Switcher or Solecis 5x1 4K Digital Switcher (SDX-514M-DX), PS-POE-AT-TC High Power PoE Injector (FG423-84), or PDXL-2 Power over DXLink Controller (FG1090-170). AMX does *not* support the use of any other power supplies or PoE injectors as these may potentially damage the DXLink equipment. **Power Budget for Transmitters and Receiver:** When installed in conjunction with the Enova DGX Digital Media Switcher, use the Enova DGX Configuration Tool located at www.amx.com/enova to determine the power requirements of the configuration and whether any of the DXLink Transmitters or Receivers should be powered with the local power supplies or the supported Power over DXLink injector. The configuration tool contains instructions on how to determine power requirements.
Power Consumption, Local 12 V Supplied (max.)	• DX-RX-4K 18.5 W
Power Consumption, Enova DXLink Power Supplied (max.)	• 4K HDMI Wallplate TX 4 W • DX-RX-4K 17.8 W
Thermal Dissipation, Local 12 V Supplied (max.)	• DX-RX-4K 63 BTU/hr.
Thermal Dissipation, Enova DXLink Power Supplied (max.)	• 4K HDMI Wallplate TX 14 BTU/hr. • DX-RX-4K 61 BTU/hr.
Power Connector (Module Only)	2.1 mm DC power jack ⊖—Ⓒ—⊕
Operational Temperature	32° F to 104° F (0° C to 40° C)
Storage Temperature	-22° F to 158° F (-30° C to 70° C)
Operational Humidity	5 to 85% RH (non-condensing)
Storage Humidity	0 to 90% RH (non-condensing)

4K HDMI RX Module - Dimensions
  Depth
  Width
  Height
	5.19 in. (13.18 cm)
	8.75 in. (22.22 cm)
	1.00 in. (2.54 cm)

Module - Weight	Approximately 1.1 lb. (0.50 kg)
Module - Shipping Weight	Approximately 2.2 lb. (1.00 kg)
Modules - Mounting Options	Compatible with all V Style versatile mounting options including rack, surface, or pole (for V Style Mounting kits, see www.amx.com)

4K HDMI Wallplate TX - Dimensions
  Depth
  Width
  Height
	1.75 in. (4.5 cm)
	1.27 in. (3.23 cm)
	4.2 in. (10.67 cm)

4K HDMI Wallplate TX - Weight	Approximately 0.45 lb. (0.2 kg)
4K HDMI Wallplate TX - Shipping Weight	Approximately 1.05 lb. (0.47 kg)
4K HDMI Wallplate TX - Mounting Options	4K HDMI Wallplate TX mounts onto standard single-gang US, UK, or EU back boxes
MTBF	896,000 hrs.
Transport Layer Throughput	10.2 Gbps

General Specifications

Twisted Pair Cable Type	• Shielded Cat6A or Cat7 **NOTE:** *For more details and helpful cabling information, reference the white paper titled "Cabling for Success with DXLink" available at* <u>www.amx.com</u> *or contact your AMX representative.*
Twisted Pair Cable Length	Up to 262 ft. (80 m) for full 4K signal support. Up to 328 ft. (100 m) for 1080p and below. **IMPORTANT:** *DXLink twisted pair cable runs for DXLink equipment shall only be run within a common building. "Common building" is defined as: Where the walls of the structure(s) are physically connected and the structure(s) share a single ground reference.*
Modules - Airflow	Convection (openings on top of case)
Transmitters and Receiver Inter-compatibility	All DXLink Transmitters can connect directly to DXLink Receivers. All Wallplate Transmitters require either PDXL-2 (FG1090-170) or PS-POE-AT-TC (FG423-84) to do so.
Other AMX Equipment	
AMX Products Compatible with DXLink Transmitters	• DX-RX-4K • DGX-I-DXL-4K **NOTE:** *DXLink Twisted Pair 4K Transmitters are also compatible with DXLink Twisted Pair equipment (see the "DXLink Compatibility Appendix" on page 89).*
AMX Products Compatible with DXLink Receivers	• 4K HDMI Wallplate TX • DGX-O-DXL-4K • SDX-414-DX • SDX-514M-DX • SDX-814-DX **NOTE:** *DXLink Twisted Pair 4K Transmitters are also compatible with DXLink Twisted Pair equipment (see the "DXLink Compatibility Appendix" on page 89).*
Included Accessories	Desktop power supply (ENERGY STAR® qualified): 1 per module **IMPORTANT:** <u>*Only*</u> *the provided desktop power supply should be used, and it* <u>*must not*</u> *be altered in any way.*
Compatible / Optional Equipment	• CC-NIRC NetLinx Emitter Cable (FG10-000-11) • IR03 External IR Receiver Module (FG-IR03) • PDXL-2 (FG1090-170) • PS-POE-AT-TC (FG423-84)

COMPATIBILITY NOTE: *DXLink Twisted Pair 4K Transmitters and Receivers are compatible with other DXLink Twisted Pair 4K products (see the Compatible AMX Products listed in the table above). Wallplate Transmitters require an approved DXLink power injector (see table above) when connecting directly to a Receiver. AMX does not support the use of power supplies other than the one provided or power injectors other than those listed as they may potentially damage DXLink equipment. For compatibility between DXLink Twisted Pair 4K and DXLink Twisted Pair equipment, see the "DXLink Compatibility Appendix" on page 89.*

NetLinx and Control Specifications

Parameter	Value
ICS LAN / Ethernet Port (Module Only)	• TCP/IP port (ICS LAN 10/100) • RJ-45
Serial (Module Only)	• Bidirectional RS-232 • Standard NetLinx baud rate 1200 to 115K • Parity support: Odd/Even/None • 3.5 mm pluggable Phoenix terminal block
IR Control (Module Only)	• Port for use with IR03 Receiver (optional accessory FG-IR03) • Port for use with CC-NIRC Emitter (optional accessory FG10-000-11)
Advanced Configuration Interface	USB mini-B connector (Program port)
ID Pushbutton	• Toggle between DHCP and static IP addressing • Places system in NetLinx Device ID assignment mode • Reset the factory default settings • Restore the factory firmware image

USB (HID) Keyboard and Mouse Specifications

Parameter	Value
DX-RX-4K	• (1) USB Type A connector ("Device") • Connect a keyboard and mouse and send commands to a PC connected to a DXLink Transmitter with compatible USB connector. **NOTE:** *A list of HID devices which have been tested and found to be working well with the latest firmware is available (see "DXLink - HID supported Devices" on the DXLink Receiver's product page at www.amx.com).*

HDMI Specifications – Transmitters and Receivers

Parameter	Value
Compatible Formats	HDMI, HDCP, DVI (DVI requires conversion cable)
Signal Type Support	HDMI, DVI-D (Single Link with a DVI-to-HDMI cable adapter), DisplayPort++ (input only with HDMI cable adapter)
Video Data Rate (max.)	8.91 Gbps
Video Pixel Clock (max.)	297 MHz
Progressive Resolution Support	480p up to 4096x2160p,60Hz* * Y/Cb/Cr 4:2:0 and 4K Scaler in Bypass **NOTE:** *See full list of formats on page 82.*
Interlaced Resolution Support	480i, 576i, 1080i (including but not limited to those resolutions listed on page 83 and page 86)
Deep Color Support	24 bit, 30 bit*, 36 bit* * Only supported when the Receiver scaler is in Bypass mode using CTA-861 formats and the resolution is 1080p,60 or less.
Color Space Support	RGB 4:4:4 YCbCr 4:4:4, 4:2:2, and 4:2:0 • Input signal support for YCbCr 4:4:4 and 4:2:2; output color-space is converted to RGB 4:4:4. 4:2:0 only supported at 2160p 50/60Hz with 4K RX Scaler in Bypass.
3D Format Support	Yes (HDMI Primary Formats) • Frame Packing 1080p up to 24 Hz • Frame Packing 720p up to 50/60 Hz • Frame Packing 1080i up to 50/60 Hz • Top-Bottom 1080p up to 24 Hz • Top-Bottom 720p up to 50/60 Hz • Side-by-Side Half 1080i up to 50/60 Hz **NOTE:** *Scaler on the corresponding output board or Receiver must be set to Bypass mode.*
4K Format Support	• 3840x2160p@24/25/30 Hz • 4096x2160p@24/25/30 Hz • 3840x2160p@60 Hz, 4:2:0* • 4096x2160p@60 Hz, 4:2:0* * Supported by DX-RX-4K when in Bypass scaling mode. **NOTE:** *See full list of formats on page 82.*
Audio Format Support	• Dolby TrueHD, Dolby Digital, DTS-HD Master Audio, DTS, 2 CH L-PCM, 6 CH L-PCM, 8 CH L-PCM (Dolby Digital and DTS support up to 48 kHz, 5.1 channels)
Audio Resolution	16 bit to 24 bit
Audio Sample Rate	32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
Local Audio Support	RX extraction
HDCP Support	Yes • Supports AMX HDCP InstaGate Pro® Technology. • When used with Enova DGX switchers, the key support is up to 16 sinks per output, independent of the source device. • When used as a single point-to-point solution, key support is defined by the source device.
CEC support	CEC is not currently supported

NOTE: *Interlaced and progressive video are supported into the Transmitter; progressive is only supported out of the Receiver unless in non-scaling Bypass mode.*

HDMI Specifications – Transmitters only

Parameter	Value
Input Signal Type	• HDMI • DVI-D (Single Link with a DVI-to-HDMI cable adapter) • DisplayPort ++ (input only with HDMI cable adapter)
DDC/EDID Support	• The HDMI EDID in point to point mode is passed up from the sink device. • For the EDID list, see the specifications in the "Enova DGX DXLink Twisted Pair 4K Boards" chapter in the *Hardware Reference Manual – Enova DGX 100 Series Digital Medial Switchers*.
Input Voltage (nominal)	1.0 Vpp differential
Input Re-clocking (CDR)	Yes
Input Equalization	Yes, adaptive
Input Connector	HDMI Type A female
Propagation Delay (typical)	5 µs

HDMI Specifications – Receivers only

Parameter	Value
Output Signal Type	• HDMI • DVI-D (Single Link with a DVI-to-HDMI cable adapter)
Output Scaling	SmartScale®, Manual Configuration, Bypass
SmartScale® Output Resolution Support	All resolutions between 480p and 3840x2160,30Hz via automatic SmartScale® query of the display's preferred EDID detailed timing definition
Output Voltage (nominal)	1.0 Vpp differential
Output Re-clocking	Yes
+5 V DDC Pin Output	50 mA when using DXLink power, 500 mA when using local 12 V supply
+5 V USB Output	150 mA when using DXLink power, 500 mA when using local 12 V supply
Output Rise Time / Fall Time	425 ps typical (20% to 80%)
Output Connector	HDMI Type A female
Propagation Delay (typical)	25 ms when scaling; 5 µs when in Bypass mode
HDMI Audio Synchronization	• Video formats @60Hz frame rate: In Scaling Mode, audio lags video by 37ms typ. (30 to 45ms). • Video formats @30Hz frame rate: In Scaling Mode, audio lags video by 28ms typ. (20 to 36ms). • In Bypass Mode, audio lags video by 36ms.

Local Audio Specifications

Parameter	Value
DX-RX-4K	
Output Signal Types	Stereo analog
Analog Output Level (max.)	+2 dBu, unbalanced; >= 3 kohm load
Analog Output Frequency Response	<+0 dB to -0.5 dB, 20 Hz to 20 kHz
Analog Audio Output THD+N	<0.03%, 1 kHz, -10 dBu to +2 dBu
Analog Audio Out SNR	>85 dB, 20 Hz to 20 kHz, Vin = +2 dBu
Audio Synchronization	Video formats @ 60 Hz frame rate: In Scaling mode, audio leads video by 11 ms typical (3 ms to 19 ms). In Bypass mode, audio lags video by 14 ms.
Connector	3.5 mm mini-stereo jack (analog stereo)

AMX reserves the right to modify its products and their specifications without notice.

Installation and Setup

Site Recommendations

When placing DXLink Transmitters and Receivers in an installation, follow the recommendations and precautions in this section to reduce potential setup and operation hazards.

Environment

❑ Choose a clean, dust free, (preferably) air-conditioned location.

❑ Avoid areas with direct sunlight, heat sources, or high levels of EMI (Electromagnetic Interference).

DXLink Module Accessibility

Make sure the front of each module is accessible, so that you can monitor the LED indicators. Leaving adequate clearance at the rear will also allow for easier cabling and service.

Power

The power source's electrical outlet should be installed near the module, easily accessible, and properly grounded. Power should come from a building branch circuit. To avoid an overload, note the power consumption rating of all the equipment connected to the circuit breaker before applying power.

General Hazard Precautions

These recommendations address potential hazards that are common to all installations.

IMPORTANT: *DXLink twisted pair cable runs for DXLink equipment shall only be run within a common building. "Common building" is defined as: Where the walls of the structure(s) are physically connected and the structure(s) share a single ground reference.*

Elevated Operating Temperature

The maximum rated ambient temperature is 104° F (40° C) for DXLink Transmitters and Receivers. All equipment should be installed in an environment compatible with the manufacturer's maximum rated ambient temperature. In a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the ambient room temperature.

CAUTION: *To protect the equipment from overheating, do not operate in an area that exceeds 104° F (40° C) and follow the clearance recommendation below for adequate airflow.*

Airflow Restriction

The modules are designed to adequately dissipate the heat they produce under normal operating conditions; however, this design is defeated when high heat producing equipment is placed directly above or below the modules.

CAUTION: *To prevent overheating, avoid placing high heat producing equipment directly above or below the modules. We recommend allowing plenty of clearance above the vent holes on top of the modules. Do not place anything directly on top of the modules that would restrict airflow through the vent holes on top.*

Reliable Earthing (Grounding)

Reliable earthing of rack-mounted equipment should be maintained. If not using a direct connection to the branch circuit (e.g., plugging into a power strip), pay particular attention to supply connections (not applicable when power is supplied from an Enova DGX Digital Media Switcher or Solecis 5x1 4K Digital Switcher via a DXLink line).

Unpacking Tips

❑ Before fully unpacking the Transmitters and Receivers, inspect the shipping box(es) for any signs of damage. If a box is partially crushed or any sides have been broken open, notify the shipping agency immediately and contact your AMX representative (see the warranty at www.amx.com).

❑ Once unpacking is complete, closely check the physical condition of the units.

❑ Collect all documentation.

NOTE: *Please save the original shipping container and packing materials. AMX is not responsible for damage caused by insufficient packing during return shipment to the factory. Shipping boxes are available; for details, contact your AMX representative.*

Setup Information

IMPORTANT: *The setup information in this manual applies to TXs and RXs in an Enova DGX 100 Series system with the auto-setup feature disabled. When the auto-setup feature for an Enova DGX 100 Series Switcher is enabled (the default), DXLink equipment is automatically discovered and connected to the switcher using a private network hosted by the integrated Master (for complete information, see the "Hardware Reference Manual – Enova DGX 100 Series Digital Media Switchers").*

Setup Requirements

- A PC with NetLinx Studio v4.0 or later installed.
- An understanding of which DXLink Mode the system will be used in (see below and page 23).
- An understanding of the DIP switch settings (see page 27).
- When used with an Enova DGX Digital Media Switcher the system's power requirements must be determined (see page 23).
- When used with a Solecis 4K Digital Switcher – consult the switcher's Hardware Reference Manual at www.amx.com.

IMPORTANT: *We recommend that DXLink equipment be installed by a technician with knowledge of networks and experience with NetLinx Studio and its Telnet interface. NetLinx experience should include changing device addresses, binding devices, updating firmware, etc.*

The remainder of the "Setup Information" section covers information for system setup, power budget planning, network loop concerns, binding to an integrated Master, DIP switch settings, mounting options, chassis grounding, cable requirements and recommendations (including RJ-45 pinouts and LED behavior).

The specific installation's requirements dictate the system setup, which generally takes one of the following three forms.

- Endpoint Mode (Switcher) – One or more TXs and/or RXs connected to a switcher containing a Master (see below).
- Endpoint Mode (Standalone) – Standalone DXLink TX/RX pair connected directly to each other but, in addition, the RX is connected to a NetLinx Central Controller via a LAN or directly to the Controller (see page 22).
- Extender Mode (Standalone) – Standalone DXLink TX/RX connected directly as a simple extender solution (see page 23).

Endpoint Mode (Switcher): Example of Typical System Setup

The primary function of the Transmitters and Receivers is to work with compatible DXLink equipment as an endpoint solution for transmission of HDMI over twisted pair cable (or DVI-D signals with the use of a DVI-to-HDMI cable adapter).

The Transmitter receives an HDMI signal with a digital audio signal embedded with the HDMI signal from a source device. Both the video and embedded audio are transmitted over twisted pair cable to the RJ-45 connector on the DXLink Input Board. The HDMI signal is then routed through any (or all) of the connectors on one or more output boards.

When the HDMI signal is routed through a DXLink Output connector to a Receiver, the Receiver sends the HDMI signal with embedded audio on to the destination device. The audio can also be output on the Receiver's stereo audio port.

In systems where DXLink Transmitters and Receivers are used in conjunction with a switcher (e.g., Enova DGX 800), the cable runs from a Transmitter to a DXLink Input Board and from a DXLink Output Board to a Receiver can each be up to 262 feet (80 m).
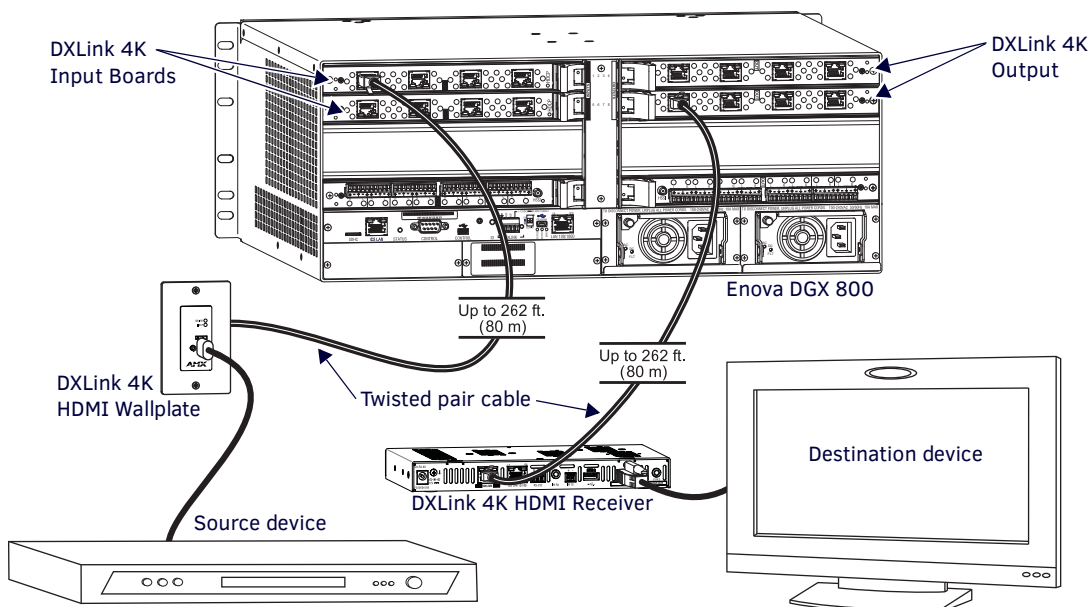
FIG. 7 Endpoint Mode (Switcher) setup with Enova DGX 800

TIP: *For systems with special requirements – Before installing in the final location, place the equipment close together, so that the destination monitor and a PC for control can be seen simultaneously if adjustments are necessary. Scaling adjustments can be made using SEND_COMMANDs (see page 47). For Enova DGX 100 Series Switchers, scaling can also be adjusted via the System Configuration interface (see the switcher's manual).*

CAUTION: *Be careful not to create a network (Ethernet) loop. To avoid doing so, see page 24.*

Options for System Setup with Enova DGX DXLink Boards

The following table contains options for using DXLink Transmitters and Receivers in conjunction with DXLink Twisted Pair Input and Output Boards in an Enova DGX 100 Series Digital Media Switcher.

System Setup Options – Enova DGX DXLink Boards with DXLink 4K Transmitters/Receivers			
Transmitter	**Input Board**	**Output Board**	**Receiver**
DX-TX-DWP-4K ➡	DXLink Twisted Pair 4K ➡	DXLink Twisted Pair 4K ➡	DX-RX-4K
DX-TX-DWP-4K ➡	DXLink Twisted Pair 4K ➡	Any board ➡	Not applicable
Not Applicable	Any board ➡	DXLink Twisted Pair 4K ➡	DX-RX-4K

Functions of DXLink Transmitters and Receivers

The diagram in FIG. 8 shows the functions of DXLink Transmitters and Receivers. The example descriptions contain the device HDCP key count when used in conjunction with DXLink Boards in an Enova DGX Digital Media Switcher and when using a Transmitter and Receiver as a standalone pair.
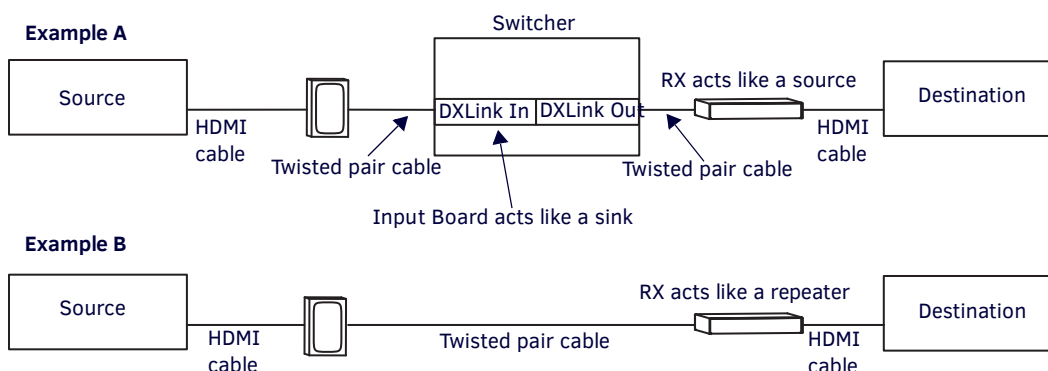
Example A: When a Receiver acts like a source, its key does not count. Source device sees 1 key (Input Board).
Example B: When the Receiver is part of a standalone pair, its key does not count. Source device sees 1 key (Destination).

FIG. 8 Repeater and source functions of TX Wallplates and RX Modules

Endpoint Mode (Standalone): Example of Typical System Setup

A standalone DXLink TX/RX pair are connected directly to each other but, in addition, the RX is connected to a NetLinx Central Controller via a LAN or directly to the Controller.
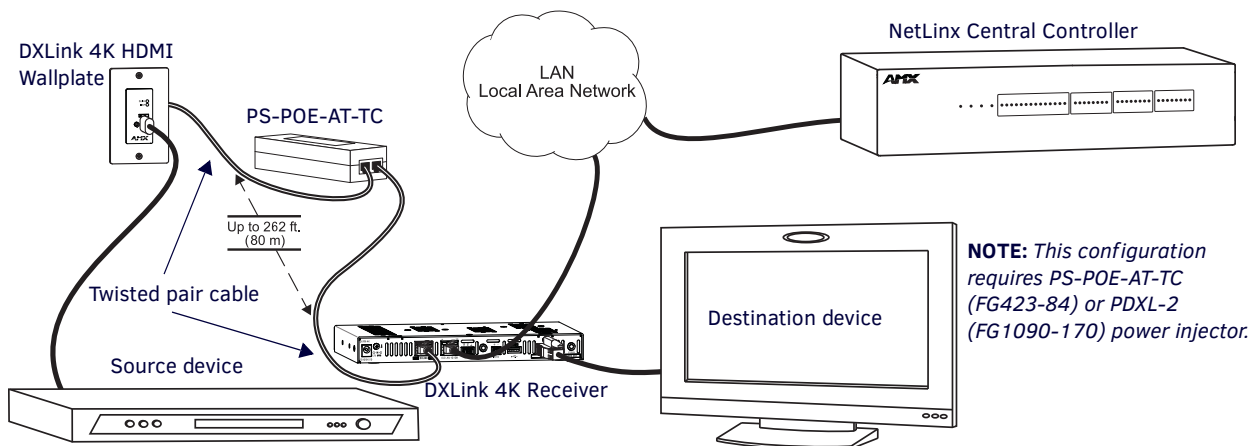
FIG. 9 Endpoint Mode (Standalone) with NetLinx Central Controller

Extender Mode (Standalone): Example of Typical System Setup

A Transmitter and Receiver standalone pair can also work together as an extender solution for transmission of HDMI over twisted pair cable up to 262 feet (80 m). The standalone setup supports DVI-D signals with the use of a DVI-to-HDMI cable adapter.

In systems with a Wallplate Transmitter, power can be provided to the units via the DXLink line by connecting a DXLink power injector to the Wallplate and using either the desktop power supply or another DXLink power injector with the Receiver.

NOTE: *This configuration requires PS-POE-AT-TC (FG423-84) or PDXL-2 (FG1090-170) power injector.*
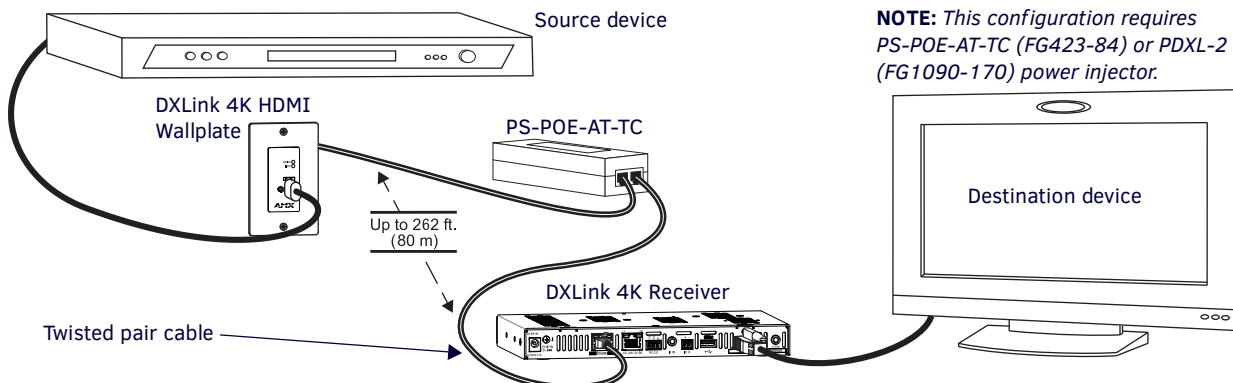
FIG. 10 Extender Mode (Standalone) system

Important Power Considerations for Enova DGX Systems

- **Local power** – Local power (the desktop power supply) always takes precedence over power via the DXLink line from the switcher. However, if a locally powered unit is connected to a switcher and the local power is lost (i.e., unplugged or turned off), the unit will power down and then automatically power back up using power from the switcher via the DXLink connection (increasing the overall power draw on the switcher). When local power is restored, it automatically replaces the power over the DXLink line.
- **DXLink power** – When modules are being powered by an Enova DGX DXLink board, PDXL-2, or PS-POE-AT-TC (using power via the DXLink line), to maintain the switcher's power redundancy, we recommend that you:
  - Determine the power budget based on the Input/Output boards used and the quantity of powered endpoints (modules); see below.
  - Do *not* use the local DC power jack on the module (even if the local power adapter is turned off).

Power Budget Planning for System Setup with an Enova DGX

Before installing an Enova DGX Digital Media Switcher and connecting any required DXLink Transmitters and Receivers, the total power draw for the system should be calculated in order to maintain the redundancy of the power supplies in the enclosure. (Each Enova DGX enclosure ships with two mutually-redundant power supplies.)

IMPORTANT: *If you do not plan to draw power from the Enova DGX enclosure's power supplies, you <u>must</u> power the DXLink Transmitters and Receivers with local power (desktop power supply) or remote power (DXLink power injector), which always overrides power from the switcher. If that power source is turned off, the DXLink Transmitters and Receivers will reboot and then start drawing power from the switcher.*

Power Budget Calculation

Calculating the power budget helps determine how many DXLink Transmitters and Receivers can be powered through the Enova DGX Digital Media Switcher while maintaining power redundancy if one of the power supplies should fail. The *Enova DGX Configuration Tool* is used to determine the switcher's power budget. Simply enter the types of boards and the number of DXLink Transmitters and Receivers to be powered through the switcher, and the calculator shows the resulting power draw. The *Enova DGX Configuration Tool* is at www.amx.com/enova.

If more DXLink units are required than the switcher can support while maintaining redundancy, any DXLink Modules can be powered using the provided desktop power supplies or DXLink Power Injectors: PDXL-2 (FG1090-170) or PS-POE-AT-TC (FG423-84).

Wallplate Transmitters *must* be included in the power calculations unless they are being powered by a DXLink power injector (*must* be AMX approved).

IMPORTANT: *AMX does not support the use of any power supplies other than the provided ones or power injectors other than the ones approved as they may potentially damage the DXLink equipment.*

DXLink-compatible Power Injectors

The only approved power injectors for DXLink hardware are: the PDXL-2 (FG1090-170) which can provide power for up to two devices (e.g., DXLink Transmitter and Receiver in Standalone setup) or the PS-POE-AT-TC (FG423-84) which can provide power for one device.

Foregoing Power Supply Redundancy

Depending on particular Enova DGX input and output board configurations, operating over the redundant power supply level may be necessary on a permanent basis for some installations. While foregoing the benefits associated with a redundant power supply should be understood, operating without redundancy is in no way detrimental to the system, as long as both power supplies are operational. In this case, necessary power will be pulled evenly from both supplies. However, the loss of one power supply will result in the system being non-operational from a normal "non-redundant" system capability perspective.

In the Event of a Power Supply Failure

If an Enova DGX power supply fails, check the table below to determine which condition* applies and any actions that may be required:

System	Condition	Result/Required Action
Enova DGX 800/1600	Within power budget	The system will continue to run; okay to leave it powered until the failed power supply is replaced.
	Over power budget	The system will continue to run; however, we do not recommend leaving it powered until the failed power supply is replaced, unless enough DXLink Transmitter or Receiver Modules are removed (or otherwise powered) to bring the system's power budget within its maximum limit. (Another option is to remove some of the input and/or output boards.)
Enova DGX 3200	Within power budget	The system will continue to run; okay to leave it powered until the failed power supply is replaced.
	Over power budget	The remaining power supply will turn off. If enough DXLink Transmitters or Receivers are removed (or otherwise powered) to bring the system's power budget within its maximum limit, the system will be able to run until the failed power supply is replaced. (You can also remove some input and/or output boards.)

In all of the situations above, the power supply should be replaced as soon as possible to restore power redundancy to the system or to allow the system to become fully operational again. Unless the Enova DGX Digital Media Switcher has exceeded its power budget, it should operate normally with a failed power supply.

* The over power budget condition does not apply to Enova DGX 6400 Switchers (which have four power supplies).

For additional information on power supplies and power supply troubleshooting for an Enova DGX Switcher, see the *Hardware Reference Manual – Enova DGX 100 Series Digital Media Switchers* at www.amx.com. For power supply replacement information, contact technical support (see page 63).

Avoiding Network (Ethernet) Loops

CAUTION: Be careful not to create a network (Ethernet) loop.

Only one connection to a Public LAN is permitted within a switching system with DXLink support. *Network loops must be avoided*.

Example

In the example in FIG. 11, a network loop was created when the Enova DGX 1600 was connected to a Public LAN and one of its DXLink 4K Receivers was connected to the same LAN. The DXLink 4K Receiver *must* be disconnected from the LAN. *Remember to avoid network loops.*

NOTE: *A network loop is created when an enclosure and one or more devices within the system are connected to a common Public LAN (or when two DXLink Modules are connected to the same network as a standalone pair).*
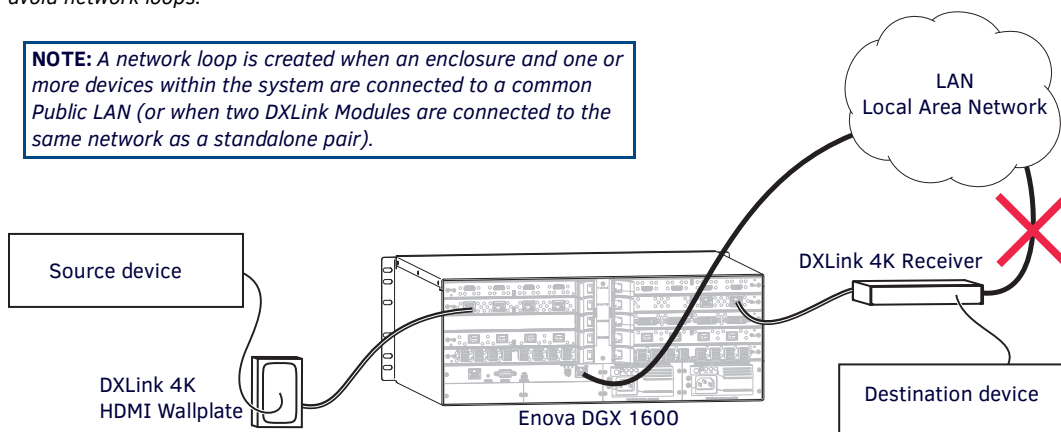
FIG. 11 Avoid network loops

NetLinx Binding of DXLink Receiver Modules with an Enova DGX Switcher

IMPORTANT: *The information in this section does not pertain to the 4K HDMI Wallplate TX as the device does not communicate with or receive control from NetLinx Studio.*

NOTE: *If a DXLink module has been configured for auto-setup mode and then auto-setup mode has been disabled, the unit may take longer to appear in NetLinx Studio than expected (1-2 minutes).*

DXLink Modules *must* have their DIP switch toggles set before they will display as part of an Enova DGX system in NetLinx Studio (v4.0 or later is required). DIP switch information, including settings for common scenarios, is on the next three pages.

In NetLinx Studio, the DXLink Modules can be bound to the integrated Master by right-clicking on the device and selecting Network Bind/Unbind Device. This is considered the traditional method of binding. Auto-setup information (which does not require binding) is available in the *Hardware Reference Manual – Enova DGX 100 Series Digital Media Switchers*.

To bind DXLink Modules to Enova DGX integrated Master:

1. Verify the following:
    a. Verify that an Ethernet/RJ-45 cable is connected from the Enova DGX Switcher's integrated Master to the network (e.g., from the switcher's LAN 100/1000 port to a LAN).
    b. Verify that the target Module is connected via its DXLink connector to a DXLink Input or Output Board on the switcher.
    c. Verify that the switcher is powered on.
2. Launch NetLinx Studio and open the OnLine Tree.
3. Bind the target Module to the integrated Master:
    a. Select and right-click the Module.
    b. From the context sensitive menu, select Network Bind/Unbind Device (be sure the check box is selected).
    c. Click OK.

DIP Switch Location

TIP: *For easiest access to the DIP switch toggles, we recommend setting them before installation.*

DIP switch toggles for enabling/disabling special DXLink Module functionality are located on the bottom of the Receiver Module (FIG. 12).

NOTE: *DIP switch settings are read only on reboot. After the settings are read, any adjustments of the toggles will not be implemented and will not affect the system.*
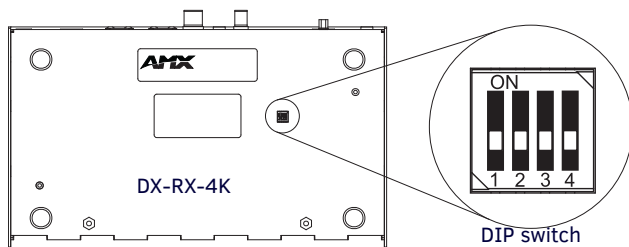
FIG. 12 DIP switch on bottom of Receiver Module

Setting DIP Switch #1 to Enable/Disable Access to ICS LAN 10/100 Port

The #1 Toggle is used for enabling/disabling network activity over the physical ICS LAN 10/100 port, which allows Ethernet passthrough. It does not affect network activity over DXLink. (For SEND_COMMANDs to disable/enable ICS LAN functionality, see page 59.)

NOTE: *Toggle settings do not apply to the 4K HDMI Wallplate TX.*

TIP: *Common setup scenarios and their DIP switch settings are provided in a table on page 27.*

#1 Toggle Settings

*   **OFF** (default) – When the #1 Toggle is set to OFF, network activity over the ICS LAN 10/100 port is disabled.
*   **ON** – When the #1 Toggle is set to ON, network activity over the ICS LAN 10/100 port is enabled.

When a DXLink Module is connected to a DXLink input or output on an Enova DGX Digital Media Switcher or Solecis 4K Digital Switcher, the switcher provides a network connection allowing the device to appear in the online tree in NetLinx Studio (#3 Toggle *must* be set to ON). For connecting a DXLink Module to other equipment using the ICS LAN 10/100 port, the #1 Toggle *must* be set to ON.

CAUTION: *Because the DXLink connection carries network activity passed from the switcher, do not connect the ICS LAN 10/100 port on a DXLink Module to the same LAN as the switcher because a network loop will result (see page 24).*

Setting DIP Switch #2 to Set the DXLink Mode

#2 Toggle can be set to automatically or manually select the DXLink Mode (to either Extender or Endpoint) for a given DXLink Module. Default state for #2 Toggle (OFF) is auto selection of DXLink Mode based on connection to another device. When it's ON, the default is Endpoint Mode (used for Master controlled serial/IR data transfer).

NOTE: *Toggle settings do not apply to the 4K HDMI Wallplate TX.*

TIP: *Common setup scenarios and their DIP switch settings are provided in a table on page 27.*

#2 Toggle Settings

- OFF (default) – When #2 Toggle is set to OFF, the DXLink Module will auto-discover* what type of DXLink equipment it is connected to and will automatically self-configure to be in one of two DXLink Modes based on the connection:
  - Extender Mode – This mode is automatically selected when a TX and RX are connected directly to each other (a standalone pair). The Transmitter and Receiver act like a simple extender, and serial and IR data is passed through them.
  - Endpoint Mode – This mode is automatically selected when a Module is connected directly to a DXLink port on a switcher. Serial and IR operations are handled by the host providing control of endpoints. The Master's programming specifies where IR and serial commands are sent (this is handled independently from the routing of the video signals).

* Any time the DXLink connection is re-established or power is cycled on a module, the auto-discovery process will take place, as long as the #2 Toggle remains in the OFF position.

- ON – When #2 Toggle is set to ON, the auto-discover feature is disabled and the Module can be manually set to either Endpoint Mode (default) or Extender Mode. In Endpoint Mode, when the Module is connected to a switcher or a separate NetLinx Master**, IR and serial operation are only handled via the host.

** When standalone Modules require IR and/or Serial control by a separate NetLinx Master, then they need to be in Endpoint Mode. Only one *must* be connected via the ICS LAN 10/100 port to the Master or to a LAN with the Master on it. This requires #1 Toggle to be ON to enable the ICS LAN port. #2 Toggle needs to be ON to place the Modules in Endpoint Mode (if needed), and #3 Toggle needs to be ON to enable network connectivity.

NOTE: *On either setting, the DXLink Mode may be set via SEND_COMMANDs (see page 59). When #2 Toggle is set to the OFF position, the auto-discovery process will overwrite the DXLink Mode setting. However, when the #2 Toggle is set to the ON position, auto-discovery is disabled and the mode set by SEND_COMMANDs will persist (i.e., the DXLink Mode setting cannot be overwritten).*

Setting DIP Switch #3 for Network Connectivity

The #3 Toggle is used for enabling/disabling network connectivity (IP addressing) of the DXLink Module. If enabled, it allows the Module to be configured to connect to a NetLinx Central Controller (used for controlling the Module and allowing Ethernet traffic).

NOTE: *Toggle settings do not apply to the 4K HDMI Wallplate TX.*

TIP: *Common setup scenarios and their DIP switch settings are provided in a table on the next page.*

#3 Toggle Settings

- OFF (default) – When the #3 Toggle is set to OFF, the DXLink Module will not try to connect to the network and will not acquire an IP address.
- ON – When the #3 Toggle is set to ON, the Module will attempt to connect to the network via DHCP or static IP, depending on how the unit has been set up (see page 34). Modules will not display in NetLinx Studio and will not accept commands or queries unless the #3 Toggle is ON.

NOTE: *After the #3 Toggle is set to ON, a network connection is established, and the NetLinx Studio screen is refreshed, Modules display in the OnLine Tree as Unbound NDP (Network Detect Proxy) Devices. To facilitate IRL and KIT file transfers, they can be bound to the integrated NetLinx Master in a switcher or to another NetLinx Master. A Virtual NetLinx Master can also be used for file transfers.*

Scenarios / DIP Switch Settings Table

The table below contains the most common scenarios for setting up DXLink Modules as a standalone pair or with other equipment. **Find the scenario in the table that you want to use and then set the DIP switches accordingly.** A detailed explanation of functions for each toggle is provided on previous pages.

NOTE: *Toggle settings do not apply to the 4K HDMI Wallplate TX.*

TIP: *Each toggle's ON position is toward the connectors on the rear of the DXLink Modules (see page 25).*

Common Scenarios	DIP Switch Toggle Settings			
Standalone Setup – TX/RX pair direct connection	**1**	**2**	**3**	**4**
AV signals only (plus serial/IR passthrough)	OFF	OFF	OFF	OFF
AV with Ethernet passthrough to networked device* (plus serial/IR passthrough)	ON	OFF	OFF	OFF
AV with NetLinx control of TX/RX unit and serial/IR ports**	ON	ON	ON	OFF
AV with NetLinx control of TX/RX unit and serial/IR ports, plus Ethernet passthrough to networked device*	ON	ON	ON	OFF
Switcher Setup – TX/RX with Enova DGX/Solecis 4K Switcher	**1**	**2**	**3**	**4**
AV signals only	OFF	OFF	OFF	OFF
AV with Ethernet passthrough to networked device*	ON	OFF	OFF	OFF
AV with NetLinx control of TX/RX unit and serial/IR ports	OFF	OFF	ON	OFF
AV with NetLinx control of TX/RX unit and serial/IR ports, plus Ethernet passthrough to networked device*	ON	OFF	ON	OFF

* Connect the ICS LAN 10/100 port of the DXLink unit to the network device (e.g., laptop, IP controlled projector, AMX ICSLan EXB Device). In a standalone setup, connect the ICS LAN 10/100 port of the other DXLink unit to the network.
** In a standalone setup using NetLinx control of the DXLink serial/IR ports, only one of the DXLink units should be connected to the network (the unit with #1 Toggle enabled).

IMPORTANT: *When connecting a Receiver Module in a standalone pair setup to a Master (or Virtual Master) for upgrade purposes, #1 and #3 Toggles <u>must</u> be ON. #2 is only required on each module if serial and/or IR control is required from the Master.*

Mounting Options for Modules (Rack Trays and Mounting Brackets)

CAUTION: *To prevent overheating, avoid placing high heat producing equipment directly above or below the modules. We recommend allowing plenty of clearance above the vent holes on top of the modules. Do not place anything directly on top of the modules that would restrict airflow through the vent holes on top.*

The DXLink 4K HDMI Receiver Module is classified as a V Style module, which has optional V Style mounting hardware. These versatile mounting options include rack trays and mounting brackets for desktops, under desks, on walls, and on poles. For details on V Style Mounting Kit options, see www.amx.com.
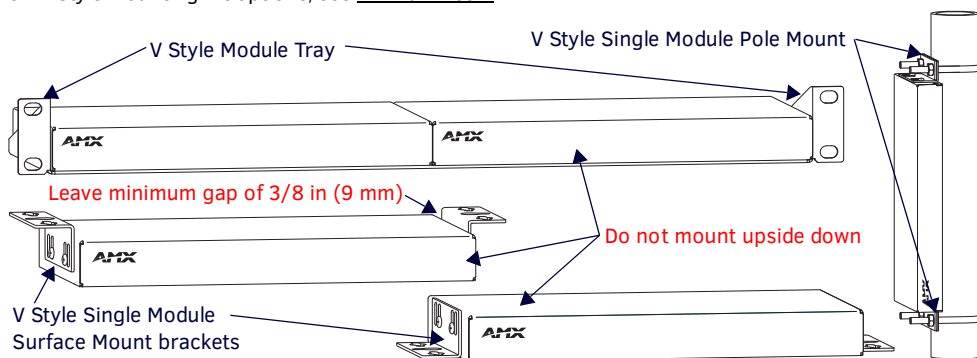
FIG. 13 V Style mounting hardware

IMPORTANT: *When mounting under a surface, the module should be mounted upright and lowered in the slots to provide an airflow gap between the surface and the vent holes. If not using V Style brackets, be sure to leave a gap between the top of the unit and the surface for heat to escape.*

Mounting Options for Wallplates

The DXLink 4K HDMI Wallplate TX mounts in a standard US single-gang back box. Standard decor style cover plates are customer provided to allow matching the individual decor of an environment or matching other standard decor covers in a room/area

IMPORTANT: *Be sure to measure the back box and any other components used to mount the Wallplate prior to installation/ construction to ensure the unit fits (e.g., some mud rings do not work unless their corners are modified).*

DXLink Transmitter and Receiver Ground Wire Attachment

Attaching ground wires to DXLink Transmitters and Receivers is only required when instructed to do so by Technical Support or an electrical technician. For instructions on attaching a ground wire, see page 87.

Important Twisted Pair Cabling Requirements and Recommendations

The following requirements and recommendations apply to cabling DXLink (RJ-45) connectors:

- DXLink cable runs require shielded category cable (STP) of Cat6a or Cat7.
- DXLink twisted pair cable runs for DXLink equipment shall only be run within a common building.*
- DXLink delivers 10.2 Gb/s throughput over shielded category cable. Based on this bandwidth requirement, we recommend following industry standard practices designed for 10 Gigabit Ethernet when designing and installing the cable infrastructure.
- The cables should be no longer than necessary to reach the end-points. We recommend terminating the cable to the actual distance required rather than leaving any excess cable in a service loop.
- For complete cable specifications, see page 17.

NOTE: *DXLink Twisted Pair 4K cable runs include support for up to two (2) patch cables of up to 5 meters in length each, provided that the total end-to-end cable length does not exceed 80 meters and all cables and couplers/patch panels used in the run meet the minimum cable requirements (e.g., from DX-TX-DWP-4K to 5m patch cable, 70m cable run, 5m patch cable to DX-RX-4K using shielded Cat6A or better for each cable length).*

For more details and helpful cabling information, reference the white paper titled "Cabling for Success with DXLink" available at www.amx.com or contact your AMX representative.

* "Common building" is defined as: Where the walls of the structure(s) are physically connected and the structure(s) share a single ground reference.

Twisted Pair Cable Pinouts

The pinout in FIG. 14 is for twisted pair cable that connects to the ICS LAN 10/100 connector (on modules only) or to the DXLink connector on all Transmitters and Receivers. Use either the T568A or T568B pinout specification for termination of the twisted pair cable used between the units in a standalone setup or between Transmitters and Receivers and an enclosure in a full system.

T568A

8. Brown
7. Brown/White
6. Orange
5. Blue/White
4. Blue
3. Orange/White
2. Green
1. Green/White

Up to 80 m

T568B

8. Brown
7. Brown/White
6. Green
5. Blue/White
4. Blue
3. Green/White
2. Orange
1. Orange/White

Up to 80 m
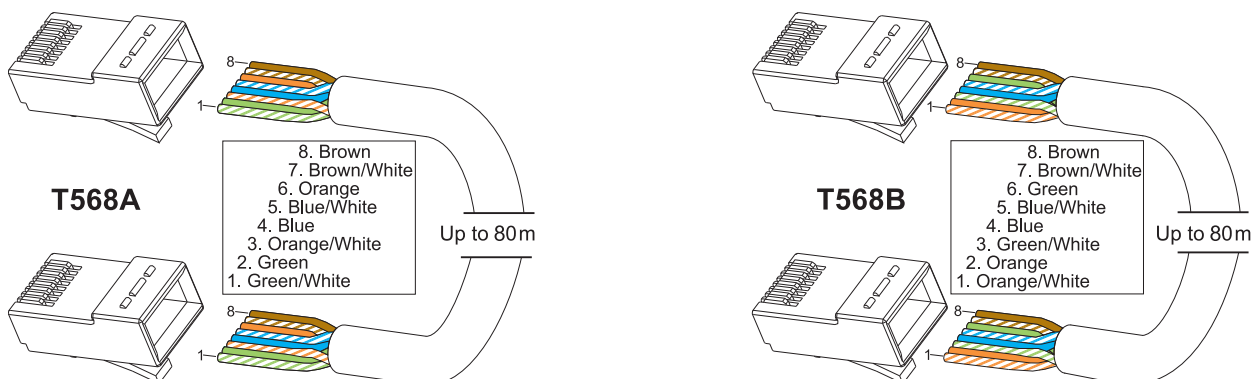
FIG. 14 Twisted pair cable pinouts for Ethernet connectors

In a typical installation, the cables should be stretched to their full length between Transmitters and Receivers and the enclosure or between units in a standalone system. Service loops or coils of the cable may reduce the overall cable performance and should be minimized whenever possible.

RJ-45 LEDs

ICS LAN 10/100 Connector LEDs (DXLink Modules only)

The following information applies to the LEDs on the ICS LAN 10/100 connector on DXLink modules (FIG. 15). Note that #1 Toggle *must* be set to ON or ICS LAN functionality will not be provided.

Green LED

Yellow LED
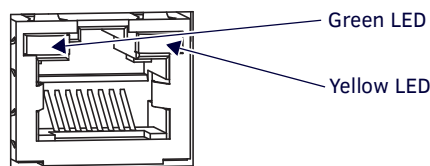
**ICS LAN 10/100 LEDs
(Modules only)**

FIG. 15 Module ICS LAN 10/100 connector LEDs

- Link/Activity (L/A) Green LED:
  - On – Link status is active (when the Ethernet cable is connected and terminated correctly)
  - Off – Link status is not active
- Speed Status (SPD) Yellow LED:
  - On – Speed status is 100 Mbps
  - Off – Speed status is 10 Mbps

DXLink Connector LEDs

The following information applies to the LEDs located on the DXLink (RJ-45) connectors on the rear of DXLink units.

- Yellow:
  - On – Authenticated HDCP (handshaking has occurred successfully)
  - Flashing – Video active; no HDCP
  - Off – No Video
- Green:
  - On – DXLink connection established (Endpoint Mode between TX/RX and switcher; Extender Mode between TX and RX)
  - Off – DXLink connection not established

The LEDs in FIG. 16 provide information for the DXLink connector.

NOTE: *If the RJ-45 connector is upside down compared to the one in FIG. 16, the yellow LED will be on the right and the green LED on the left.*
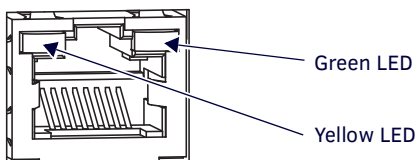
FIG. 16 DXLink (RJ-45) LED

The DXLink and HDCP LEDs on the front of the 4K HDMI Wallplate TX (shown below) indicate details about the wallplate's connection and signal status.

- **DXLink LED –** ON indicates connection to downstream device; OFF indicates lack of connection
- **HDCP LED –** ON indicates presence of HDCP encrypted content on source signal; OFF indicates non-HDCP content
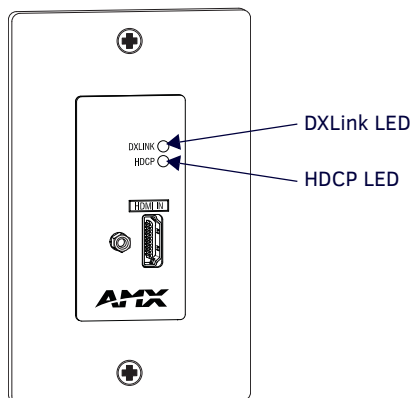
FIG. 17 DXLink and HDCP LEDs on the front of the 4K HDMI Wallplate TX

Wallplate Transmitters – Attaching Signal/Transport Cables

To attach signal and transport cables to a Wallplate Transmitter:

1. Install standard US single-gang back box.
2. Attach a twisted pair cable from the DXLink Input Board on the switcher to the DXLink (RJ-45) connector on the rear of the unit.
3. Attach unit to the back box with four screws through the large screw holes.
4. Check LEDs for normal display (see the table below).
5. Attach standard decor style front cover plate (customer provided) to the unit.
6. Attach the HDMI cable from the source device to the HDMI In connector.
7. Check LEDs for normal display (see the table below).

4K HDMI Wallplate TX – Indicator LEDs

The 4K HDMI Wallplate TX receives power from a switcher through the DXLink (RJ-45) connection to a DXLink Input Board in the switcher. It can also receive power via either PDXL-2 (FG1090-170) or PS-POE-AT-TC (FG423-84).

4K HDMI Wallplate TX Indicator LEDs		
LEDs	**Normal Display**	**Indicates**
DXLink	ON	DXLink connection is established
HDCP	Solid or Blinking	Solid: Present signal is HDCP encrypted Blinking: Present signal is not HDCP encrypted

IMPORTANT: *If the indicator LEDs do not respond with a normal display as stated in the table above, check all of the connections before contacting technical support (see page 63).*

Receiver Modules – Attaching Signal and Control Cables

IMPORTANT: *Before attaching cables, be sure to set DIP switch's toggles if necessary (see page 27).*

IMPORTANT: *Do <u>not</u> use the RJ-45 connector labeled "DXLink" for connecting to a standard Ethernet Network.*

NOTE: *Power, IR, and RS-232 ports are covered in their own sections.*

To attach signal, transport, and control cables to a DXLink Receiver:
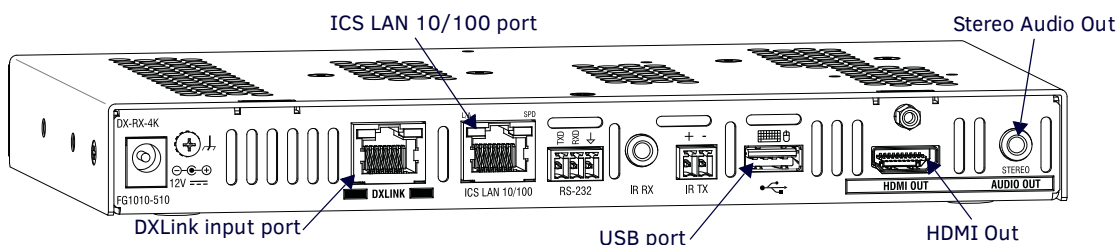
FIG. 18 Attach signal and control cables to the Receiver (DX-RX shown)

1. DXLink (input) connector – Attach a twisted pair cable from the switcher (or DXLink Transmitter) to the DXLink connector on the Receiver.
2. HDMI Out connector – Attach the HDMI cable that goes to the destination device.*
3. ICS LAN 10/100 connector (optional) – Attach a twisted pair cable from this connector to a LAN. (For NetLinx programming information, see page 47.)
4. USB port (optional) – Connect to a hub using a USB-A cable; connect keyboard and mouse to the hub. (This port is for sending keyboard / mouse commands to a PC.) For USB port information, see page 13. For USB SEND_COMMAND information, see page 57.
5. Stereo Audio Out connector (optional) – Plug the audio cable (that goes to the audio destination) into the stereo audio jack. For audio precedence information, see page 29. For information on audio SEND_COMMANDs (including enabling the analog audio format), see page 52.

* DVI cable can be used (via a DVI-to-HDMI cable adapter); however, the advanced audio support from HDMI will not be available.

NOTE: *The ID Pushbutton places the Receiver in ID Mode for setting the NetLinx ID (device only) and provides additional functionality, such as placing the device in Static IP Mode or DHCP Mode. For information, see page 40.*

TIP: *If scaling adjustments are necessary, use SEND_COMMANDs (see page 47). If connected to an Enova DGX output, consult the switcher's manual for scaling options.*

Receiver Modules – Applying Power

IMPORTANT: *If desktop power is used to power the Receiver, only the provided desktop power supply should be used and it <u>must not</u> be altered in any way. Remote power can only be provided via the switcher, PDXL-2 (FG1090-170), or PS-POE-AT-TC (FG423-84).*

IMPORTANT: *The "Important Power Considerations for Enova DGX Systems" also apply to the Receiver (see page 23).*

To apply power to the Receiver:

1. Plug the cord from the desktop power supply (provided) into the power jack on rear of the Receiver (2.1 mm DC jack local power).
2. Plug the desktop power supply into an AC external power source.

   The Power LED on the front of the Receiver illuminates a constant green, which indicates a ready state. Some of the additional LEDs will also turn a turn a constant green. For normal LED display, see the table below.

IMPORTANT: *If any Receivers are being powered through an Enova DGX, we recommend determining the power budget to maintain power redundancy for the system (see page 23).*

Receiver Modules – Indicator LEDs

The LED indicators are listed in the table as they appear on the front of the Receiver from left to right.

Receiver LED	Normal Display	Indicates
Power	Green	Power is applied to the Receiver
Video	Green	A video signal is present through the Receiver
Audio	Green	An embedded audio signal is present through the Receiver

Scaling:
  – Bypass
  – Auto
  – Manual
	One LED is green
	The other two are off
		Receiver is in one of the three modes for scaling
		• At initial power up, the Receiver defaults to the Auto scaling option*
		• Press the Scaling button to turn on the Bypass option or the Manual option

IR TX	Red	IR TX active communication
IR RX	Yellow	IR RX active communication
Serial TX	Red	Serial TX active communication
Serial RX	Yellow	Serial RX active communication
NetLinx Link/Act	Green	Active LAN connection to an AMX Network (Blinking = #3 Toggle OFF)
NetLinx Status	Green	LAN connection is active

* When the output cable is disconnected from the Receiver or if no EDID can be found on the destination device, the last used Scaling Mode LED will be ON. In either case, the Receiver will continue to hold its output resolution to the last known preferred resolution until a power cycle or reconnection of a sink with a valid EDID. On power up without a valid EDID, the default preferred output resolution presented will be 3840x2160,30Hz until a different EDID is detected.

Receiver Modules – LED Troubleshooting

If the indicator LEDs for the modules do not respond with a normal display as stated in the table above:

❑ Check all power connections.
❑ Check the "Detailed NetLinx (Link/Act and Status) LED Behavior" section on page 35.
❑ Try the suggestions in the "Troubleshooting" chapter (see page 61).

For information on restoring the module's default settings on power up, see page 41.

Serial Data Transfer and IR Flow Control

IMPORTANT: *The information in this section does not pertain to the 4K HDMI Wallplate TX as the device does not use serial or IR communication (for information on DXLink Transmitters that are compatible with the DXLink Twisted Pair 4K HDMI Receiver, see the "DXLink Compatibility Appendix" on page 89).*

The illustration in FIG. 19 shows the bidirectional serial data transfer and IR flow control when DXLink Modules are used in Endpoint Mode with an Enova Digital Media Switcher. The switcher has an integrated NetLinx Central Control Processor which provides native AMX control at each remote location fed by a DXLink Transmitter or Receiver. Control is sent over twisted pair cable (via the DXLink ports).
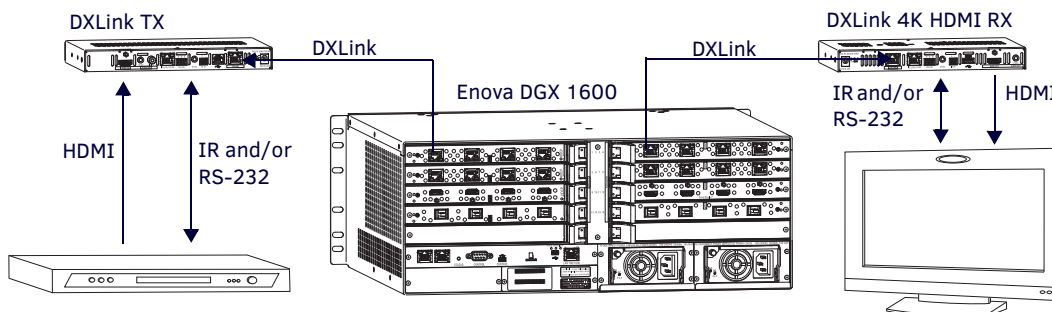
FIG. 19 Serial data transfer and IR flow control

Optional: Wiring DXLink Modules for Serial Data Transfer

The RS-232 (serial) ports are the 3-position screw terminal blocks on the rear of the modules next to the ICS LAN 10/100 connector. Wire these ports to supply serial data along with the associated video and audio signals from a source device (over the twisted pair cable between the Transmitter Module and the Receiver Module) to a destination device or vice versa from the Receiver Module to the Transmitter Module. In addition to being directly connected to a device, this port can be connected as an independent native NetLinx control port from a networked NetLinx Central Controller.

IMPORTANT: *For serial strings to pass through a standalone TX and RX pair (in Extender Mode) without a NetLinx Master acting as the host, DIP switch #2 Toggle <u>must</u> be set to OFF on each Module.*

The RS-232 port labels are relative to the data flow. On the Transmitter Module, data enters the system at the RX label and leaves the system at the TX label on the Receiver Module (FIG. 20). The flow is reversed from Receiver Module to Transmitter Module.

NOTE: *On all Modules, the RS-232 connector pinout is "TX - RX - Ground."*

To wire the RS-232 (serial) connectors on DXLink Modules for data transfer:

1. Wire the RS-232 connectors on Modules according to the pinout directly above the connector.

RS-232 (serial) connector pinout

FIG. 20 Wire RS-232 ports for serial data transfer

2. Use the command RXON to enable this port on Transmitter and Receiver Modules (complete Serial SEND_COMMAND programming information is available on page 56).

Serial Control – Endpoint Mode and SEND_COMMANDs

In Endpoint Mode (Modules connected to a switcher), serial operations are handled by the host providing control of the endpoints. The Master's programming specifies where the serial commands are sent (this is handled independently from the routing of the video signals). For additional information on Endpoint Mode, see page 21. For Serial SEND_COMMANDs, see page 56.

Optional: IR Control on DXLink Modules

IMPORTANT: *The information in this section does not pertain to the 4K HDMI Wallplate TX as the device does not use serial or IR communication (for information on DXLink Transmitters that are compatible with the DXLink Twisted Pair 4K HDMI Receiver, see the "DXLink Compatibility Appendix" on page 89).*

For additional information on the IR03 and CC-NIRC, which are required for IR control, see the units' product pages at www.amx.com (IR03 and CC-NIRC are not included with Modules). A compatible remote control unit can also be used with the system. In addition to being directly connected to a device, IR ports can be connected as independent native NetLinx control ports from networked NetLinx Central Controllers.

IMPORTANT: *When a Transmitter and Receiver are used as a standalone pair, IR control is passed through directly in Extender Mode when #2 Toggle is set to OFF (default). When #2 Toggle is set to ON, the Master handles the IR control. When a Transmitter and Receiver are connected to a switcher, they default to Endpoint mode and the integrated Master handles the SEND_COMMANDs.*

The IR Receiver is connected to the IR RX port on the Transmitter Module, and the IR Emitter is connected to the IR TX port on the Receiver Module, or the connections can be reversed.

IR03 External IR Receiver Module (not included)

FIG. 21 IR Receiver cable (FG-IR03)

To connect an IR Receiver to a DXLink Module:

1. Connect the jack on the IR03 External IR Receiver Module cable (FG-IR03) to the IR RX port on the Module.
2. Run the cable and attach the IR receiver bud so that it has a clear line-of-sight with the intended remote control device.

CC-NIRC NetLinx IR Emitter Cable (not included)

FIG. 22 IR Emitter cable (FG10-000-11)

To connect an IR Emitter to a DXLink Module:

1. Connect the Phoenix connector on the CC-NIRC NetLinx IR Emitter cable (FG10-000-11) to the IR TX port on the Module.
2. Run the other end of the IR Emitter cable to the display device and locate the IR window.
3. Attach the IR Emitter bud over the device's IR sensor by removing the cover on the reverse side of the Emitter and sticking the bud directly over the IR window.

IMPORTANT: *For systems that include a switcher – when installation of the IR Receiver and IR Emitter is complete, load the appropriate driver (for instructions, see page 43) and program the IR remote according to the product's documentation.*

IR Control – Endpoint Mode and SEND_COMMANDs

In Endpoint Mode (Modules connected to a switcher), IR operations are handled by the host providing control of the endpoints. The Master's programming specifies where the IR commands are sent (this is handled independently from the routing of the video signals). For additional information on Endpoint Mode, see page 21. For IR SEND_COMMANDs, see page 53.

ID Pushbutton Functions

The ID Pushbutton is located on the right front of the Receiver Module.

The ID Pushbutton can be used to perform four types of initial configuration settings:

- Toggle between DHCP and static IP addressing
- Assign a device address
- Reset the factory default settings
- Restore the factory firmware image

The functions performed depend on when and for how long the ID Pushbutton is pressed and held. For complete ID Pushbutton information, see page 40.

NOTE: *ID Pushbutton functions can also be implemented using Telnet commands (see page 67).*

Receiver Module Scaling Button and Scaling Modes

The Scaling button is located on the front of the Receiver Module. Pressing the Scaling button cycles the Module through the three scaling options: Bypass, Auto, and Manual.

- Bypass Mode – allows the video signal to display over the destination device without altering the signal's resolution.
- Auto Mode (default) – allows the destination device to choose the resolution it needs (this mode is AMX's SmartScale® Technology in action).
- Manual Mode – allows the user to configure the resolution that the video will display through a destination device.

Selecting a Scaling Mode results in the Module maintaining or altering the source device's resolution as it is passed along to the destination device.

The Scaling Mode can be set on the Receiver with the Scaling button (see instructions below) or with SEND_COMMANDs (see page 49).

To set the scaling option (mode):

1. Press the Scaling button on the Receiver once or twice until the LED for the desired scaling option illuminates solid green.

Bypass Mode

Bypass Mode allows the video signal to display over the destination device without altering the signal's resolution.

NOTE: *Interlaced and progressive video are supported into Transmitters; progressive is only supported out of Receivers unless in Bypass mode, which is non-scaling.*

Auto Mode

At initial power up, the Receiver defaults to the Auto scaling option.

NOTE: *When the output cable is disconnected from the Receiver or if no EDID can be found on the destination device, the last used Scaling Mode LED will be ON. In either case, the Receiver will continue to hold its output resolution to the last known preferred resolution until a power cycle or reconnection of a sink with a valid EDID. On power up without a valid EDID, the default preferred output resolution presented will be 3840x2160,30Hz until a different EDID is detected.*

Manual Mode

Manual Mode allows the user to configure the resolution that the video will display through a destination device. Manual Mode defaults to 1280x1024p,60Hz. This default resolution can be changed in two ways:

- Use the SEND_COMMAND VIDOUT_RES_REF to set the resolution and refresh rate (for details, see page 49).
- When used as a direct output of an Enova DGX DXLink Output Board, use DGX Configuration Software to set and persist the Manual scaling resolution for the connector on the DXLink Output Board; the DXLink Output Board sends the scaling resolution data to the Receiver.

NOTE: *The scaling mode (and the aspect ratio) can also be set on the DXLink Output Board using DGX Configuration Software. The data is persisted on the board and sent to the Receiver.*

Persistence of Scaling Options

The Receiver defaults to "Auto" when power is cycled. The scaling option can be persisted using one of the following methods:

- Using the SEND_COMMAND: PERSISTAV (for details, see page 59).
- Using DGX Configuration Software to set and persist the scaling option for the connector on the DXLink Output Board on the Enova DGX Digital Media Switcher; the DXLink Output Board sends the scaling option data to the Receiver.

Detailed NetLinx (Link/Act and Status) LED Behavior

The tables below provide detailed descriptions of all blink patterns for the NetLinx Link/Act and Status LEDs on the front of the Receiver Modules.

NOTE: *"Light show" refers to the back-and-forth scanning pattern of the LEDs on DXLink Modules.*

Module Operational State as Indicated by LEDs

To determine the operational state (normal boot) of a DXLink Module by its LEDs, check both the Link/Act and Status LED columns.

NetLinx LED Behavior and Operational States		
Link/Act LED	Status LED	Module Operational State
ON if connected to a system with an integrated Master. Blink OFF with data.	Follow Master's instruction for Blink Message if online with Master, otherwise ON.	Normal Online with Master (rest)
OFF	ON	Normal Boot (DHCP found) **NOTE:** *This state continues from the time an IP address is obtained until the device is online with the Master.*
Fast blink, then normal operation.	ON	Normal Boot (DHCP, no server) **NOTE:** *This state continues until a valid IP address is obtained.*
OFF during light show, then normal operation (OFF until connected to Master).	Fast blink (continues only during light show), then ON until first blink from Master.	Normal Boot (Static IP) **NOTE:** *This state continues until the device finishes its light show.*

ID Pushbutton Boot State and LED Behavior

To monitor the ID Pushbutton boot state of a DXLink Module by its LEDs, check both the Link/Act and Status LED columns.

ID Pushbutton Boot and NetLinx LED Behavior		
ID Pushbutton Boot States	Link/Act LED	Status LED
Boot with ID Pushbutton held down.	Slow blink (1 Hz)	Slow blink (1 Hz)
ID Pushbutton held down long enough for reset to default parameters.	Fast blink until ID Pushbutton is released, then OFF	Fast blink until ID Pushbutton is released, then OFF
ID Pushbutton held down long enough for reset to default firmware image.	Solid ON, transitions to OFF once the unit completes writing to flash and is ready to reboot.	Solid ON, transitions to OFF once the unit completes writing to flash and is ready to reboot.
In Auto ID mode.	Normal	Blink (2 Hz)
ID Pushbutton held down long enough to accept new ID.	2 blinks, then normal	2 blinks, then normal
After boot: ID Pushbutton held down, but not long enough for IP mode change.	Slow blink (1 Hz)	Slow blink (1 Hz)
After boot: ID Pushbutton held down long enough for IP mode change.	Fast blink, then OFF	Fast blink, then OFF

Downloading Firmware State and LED Behavior

To monitor the state of a DXLink Module by its LEDs when downloading firmware, check both the Link/Act and Status LED columns.

NetLinx LED Behavior when Downloading Firmware		
Downloading Firmware	Link/Act LED	Status LED
Downloading firmware to flash due to an upgrade via NetLinx Studio.	Fast blink, alternating with Status LED	Fast blink, alternating with Link/Act LED

DXLink 4K TX/RX in a Multiple-Stage Switching System

When switching systems with DXLink Technology support (e.g., Enova DGX 100 Series Digital Media Switchers) are connected via their DXLink ports, DXLink Transmitters and Receivers can be used to extend the video and audio transport.

IMPORTANT: *This section does not refer to the linking of enclosures from CPU to CPU, which is <u>not</u> supported in Enova DGX 100 Series Digital Media Switchers.*

In an installation with DXLink equipment in a multiple-stage switching system, the following apply:

- Network loops *must* be avoided (see page 24). The DXLink line's Ethernet functionality is disabled between the enclosures; therefore, no IR, serial, or Ethernet communication can be passed between them.
- When two switching systems with DXLink support are connected via their DXLink ports, only video and audio will be passed through the DXLink connection.
- When a DXLink input or output on one switching system determines that it is connected to a DXLink input or output on another switching system, the DXLink port will automatically disable all Ethernet, power, and control on that connection port so that the only things passed down the DXLink line are the video and audio signals.
- When connecting switching systems via DXLink ports, AMX recommends no more than three switcher throughputs (see the "Example" below).

Example

This example shows how DXLink 4K Transmitters and Receivers can be used in a system where switchers are connected via their DXLink ports.

The signal path through three switchers could be: source device $\rightarrow$ **DXLink 4K HDMI Wallplate TX** $\rightarrow$ <u>Enova DGX 6400</u>, DXLink 4K input (out a DXLink 4K output) $\rightarrow$ <u>Enova DGX 800</u>, DXLink 4K input (out a DXLink 4K output) $\rightarrow$ <u>Enova DGX 1600</u>, DXLink 4K input (out a DXLink 4K output) $\rightarrow$ **DXLink 4K HDMI Receiver** $\rightarrow$ display device as an HDMI signal.

Network Configuration

Overview

IMPORTANT: *The information in this Chapter does not pertain to the 4K HDMI Wallplate TX as the device does not provide TCP/IP communication to a network, does not have an IP address to configure, and does not require resettable factory settings.*

IMPORTANT: *If DXLink Modules are connected to an Enova DGX 100 Series Switcher using auto-setup, see the "Hardware Reference Manual – Enova DGX 100 Series Digital Medial Switchers" for network configuration information.*

NOTE: *If a DXLink Module has been configured for auto-setup mode and then auto-setup mode has been disabled, the unit may take longer to appear in NetLinx Studio than expected (1-2 minutes).*

DXLink Modules support two IP Addressing Modes: Static IP and DHCP (with link-local fallback*).

To avoid having a large system consume numerous IP addresses, Modules default to disabling the network connection functionality. Therefore, the #3 Toggle must be set to ON before the Module can establish a network connection (see page 26).

When #3 Toggle is ON, DXLink Modules are automatically placed in DHCP Mode, but they can be configured for either of the IP Addressing Modes via two methods:

- The front-panel ID Pushbutton (see page 40)
- Telnet commands (see page 67)

* "Link-local fallback" is a method by which an IP host, as a fallback from DHCP, can derive a local network-unique IP address by negotiating with the other IP hosts on the same network. Link-local can also be used in its own right as the primary method of IP address allocation. For details, see "DHCP Mode" below.

Static IP Mode – Default Parameters

IMPORTANT: *Static IP Mode will not function until the #3 Toggle on the DIP switch is set to ON (see page 26). The #3 Toggle <u>must</u> be ON before the device is accessible via SEND_COMMANDs.*

Default Parameters for Static IP Mode	
Address	192.168.1.2
Netmask	255.255.255.0
Gateway	192.168.1.1
DNS1	192.168.1.1
DNS2	192.168.1.1
DNS3	192.168.1.1

DHCP Mode

IMPORTANT: *DHCP Mode will not function until the #3 Toggle on the DIP switch is set to ON (see page 26). The #3 Toggle must be ON before the device is accessible via SEND_COMMANDs.*

DHCP Mode requires a connection to a network with a DHCP server located on it. This connection can be either indirect or direct.

- **Indirect connection** – In the case of an Enova DGX Digital Media Switcher or a Solecis 4K Digital Switcher (Endpoint Mode) that is connected to a DHCP server device, the DHCP connection can be propagated through the system's DXLink layer. First you must complete the following:
  - Set the #3 Toggle to ON to enable the network connectivity.
- **Direct connection** – In the case of a standalone pair (Extender Mode), to place a DXLink Module in DHCP Mode you must complete the following:
  - Set the #1 Toggle to ON to enable access to the physical ICS LAN 10/100 port.
  - Set the #3 Toggle to ON to enable network connectivity (DHCP).
  - Connect the ICS LAN 10/100 port to a network where a DHCP server is located.

When in DHCP Mode (default setting), the Module will attempt to get a DHCP lease (consisting of IP address, gateway, and other network parameters). Should the attempt fail, the Module will then configure itself for a link-local address.

- DXLink Modules utilize a modified link-local addressing procedure. The first address to be tried is a known address in the link-local space: 169.254.2.2. That address will be probed, and if unclaimed will be used by the DXLink Module.
- If 169.254.2.2 is already claimed, the DXLink Module will choose a random address within the 169.254.x.x link-local address space (again probing to ensure that it is unclaimed).

A Module operating with a link-local address will periodically re-try DHCP and re-assign the IP to a valid DHCP grant if successful. At any time, if the Module determines that its IP address has changed, it will disconnect from the Master (if necessary, depending on the connection state) and then reconnect to the Master.

TCP/IP Address Configuration

DXLink Modules support IPV4 network addresses, gateway addresses, DNS server addresses, and network names. They also support NDP (NetLinx Discovery Protocol) capabilities as well as IP discovery via NetLinx Studio.

NOTE: *NDP is a device discovery method used by NetLinx Masters. With NDP Beacon enabled, the Master will transmit NDP Beacons for AMX's proprietary device discovery.*

Telnet IP Configuration Commands

The SET IP and GET IP Telnet commands listed in the tables in Appendix B (which start on page 68) can be sent directly to the Module via a Telnet terminal session. These commands can be used for initial network configuration of DXLink Modules.

- The default Telnet port is 23.
- Telnet is enabled by default.
- A value of 0 disables the telnet server.*

For details, see "Appendix B – Telnet (Terminal) Commands" on page 67. The appendix also includes a section on "Master Connection Modes" on page 74.

* If you set the Telnet port to "0" to disable it, you will need to perform a factory reset using the ID Pushbutton to re-enable it (see page 41).

External Master Versions

If the DXLink Module is bound to an external Master, we recommend using the versions listed in the table below, which can be found on the product's page at www.amx.com.

External Master Versions	
Master	**Minimum Version**
NX x200	v1.3.106
NI-x00/64 NI-x100 NI-x101	v4.1.404
Enova DGX 100 Series (NX Master)	v1.3.106
Enova DGX 8/16/32/64 (NX Master)	v1.3.106
Enova DGX 8/16/32 (NI Master)	v4.2.395
Enova DVX Product Line	v4.8.316
Enova DVX-2100HD (only)	v4.1.404

Offline Recovery Mechanism

Offline Recovery Mechanism – A recovery mechanism for DXLink Modules in the rare occurrence that these units move from online to offline status for an extended period of time.

The recovery mechanism monitors the ICSP connection between the DXLink Module and the Master and is not armed until the Module is brought online. Entering an offline state triggers an internal timer in the Module which, after 5 continuous minutes in the offline state, in turn triggers the recovery mechanism to issue a full reboot command to the Module. During this time the Module reboots and all functions (including video and audio delivery) are disabled while the reboot occurs. This process takes up to 45 seconds to complete.

This functionality is intended to be a safety net for the rare occasions when a Module falls offline and remains there for a long enough period of time that the likelihood of the Module coming back online on its own diminishes. The reboot is intended to restart the Module and allow it another opportunity to connect with the Master it is bound to. Once a Module reboots, the recovery mechanism will not become armed again until the Module reaches an online state with a Master. Although highly unlikely, the recovery mechanism also monitors the Module's processor and provides a self-recovery mechanism if the device enters an unstable processing condition.

Factory Default Parameters

Factory Default Parameters	
Parameter	**Value**
MAC Address	As set in factory
Serial Number	As set in factory
Ethernet Mode	Auto (i.e., speed, duplex, both, auto)
IP Addressing Mode	DHCP
IP Address (for static mode)	192.168.1.2
Netmask (for static mode)	255.255.255.0
Gateway (for static mode)	192.168.1.1
DNS1 (for static mode)	192.168.1.1
DNS2 (for static mode)	192.168.1.1
DNS3 (for static mode)	192.168.1.1
DNS Domain	amx.com
Hostname	Model (e.g., DX-RX-4K); after factory reset, model with last 7 digits of serial #
Master Connection Mode	NDP - For details, see page 14.
Master URL (for TCP and UDP URL modes)	"" (blank)
Master Connection Port Number (for TCP and UDP URL modes)	1319
Friendly-Name	"" (blank) **NOTE:** *If the Friendly Name is non-blank, both Friendly Name and Location are concatenated to make NDPSTRING2, otherwise NDPSTRING2 is generated from the unit's serial number.*
Location	"" (blank)
Stored MAC Address of Master (for NDP binding)	00:00:00:00:00:00
ICSP Device Number	0 (0 = receive dynamic device number from Master)
System Number	0
Telnet Port	23 A value of 0 disables the Telnet server. Telnet is enabled by default.
SET BAUD	9600, N, 8, 1
CTOF Time	5 (0.5 seconds)
CTON Time	5 (0.5 seconds)
VIDOUT_ASPECT_RATIO	MAINTAIN
VIDOUT_RES_REF	1280x1024,60 (for Manual Mode)
AUDOUT_FORMAT	All

Using the ID Pushbutton

The ID Pushbutton is located on the right front of DXLink Modules.
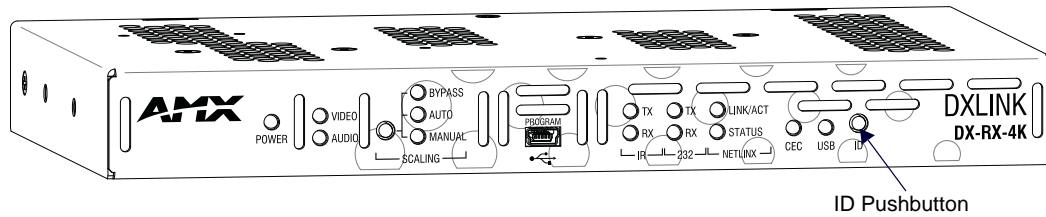

ID Pushbutton

FIG. 23 ID Pushbutton on Module (DX-RX-4K shown)

The ID Pushbutton can be used to perform four types of initial configuration settings:
- Toggle between DHCP and static IP addressing (see below)
- Assign a device address (page 40)
- Reset the unit to its factory default settings, which affects the parameters but not the firmware version (see page 41)
- Restore the unit to its factory firmware image, which affects both the firmware version and the parameters (see page 42)

The functions performed depend on when and for how long the ID Pushbutton is pressed and held. ID Pushbutton functions can also be implemented using Telnet commands (see page 67).

TIP: *To monitor the ID Pushbutton boot state of a Module by its NetLinx LED behavior, see page 42.*

Toggling Between IP Addressing Modes: DHCP and Static IP

DXLink Modules support both DHCP and static IP addresses. When the #3 Toggle is ON (see page 26), the Modules automatically use DHCP with link-local fallback. However, you can use a static IP address which can be set via a Telnet command (SET IP), or you can use the factory default static IP address. The default static IP address can be recalled at any time by resetting the unit to its factory default configuration (see page 41). The default dynamic (DHCP) address is 169.254.2.2.

The ID Pushbutton can be used to toggle between the DHCP and Static IP Modes.

To toggle between DHCP and Static IP Modes:

1. Once the Module has booted up, press and hold the ID Pushbutton until the Control/NetLinx LEDs toggle back and forth in unison approximately 10 times.
2. Release when it starts to blink faster.
   - When the Pushbutton is released, the Module toggles either from static to dynamic (DHCP) IP addressing or vice versa and remains in that mode until the ID Pushbutton is used to set it again or a factory reset is performed.
   - The Module automatically reboots to complete the process.

Assign a Device Address (ID Mode)

The ID Pushbutton can be used in conjunction with the ID (Identify) Mode feature in NetLinx Studio. A momentary press of the ID Pushbutton assigns a device address to the Module (which *must* be bound to the Master). The device *must* first be placed in ID Mode in NetLinx Studio or the momentary press will be ignored.

NOTE: *The latest version of NetLinx Studio is available to download and install from www.amx.com. Refer to the NetLinx Studio online help for instructions on using the application.*

To set the device address on a Module:

1. Check to be sure #3 Toggle on the bottom of the Module is set to ON.
2. In NetLinx Studio's OnLine Tree, select the Master to which the Module is bound.
3. From the Diagnostic menu, select Device Addressing.
   The Device Addressing dialog box opens.
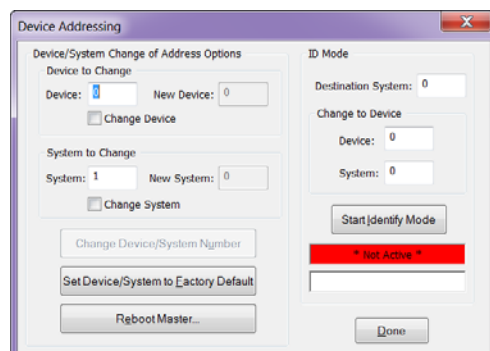
4. In the ID Mode section, enter the Device and System numbers that you want assigned to the device in the appropriate text boxes.

5. Click Start Identify Mode to place the named system in ID Mode.

   The button changes to "Cancel Identify Mode" (click to cancel ID Mode).
   The text box below the button displays a "Waiting...Press Cancel to Quit" message.

NOTE: *When in ID Mode, the entire system is put on hold while it waits for an event from any NetLinx device in the named system (e.g., pressing the ID Pushbutton on the Receiver). The device that generates the first event is the device that will be "identified."*

6. Briefly press and release the ID Pushbutton on the Module.

   The Module will exhibit the following behavior:

   - Respond with an ID Mode address response.
   - Report its old address offline.
   - Report its new address online.

   The OnLine Tree will refresh to display the new device address for the Module.

NOTE: *NetLinx Studio (v4.0 or later) provides the ability to auto-increment IP Addresses and Hostnames as well as Device and System Numbers. Refer to the NetLinx Studio online help for details.*

Reset the Factory Default Settings

During power up – if the ID Pushbutton is held until the Control/NetLinx LEDs toggle back and forth in unison approximately 10 times, then released when the faster blinking starts, the Module will reset to its factory default settings, which affect the parameters but not the firmware version.

Factory Parameters*

- Default static IP address of 192.168.1.2
- Default dynamic (DHCP) address of 169.254.2.2
- Default device number of 0
- NDP mode (see page 74)
- Unbound state
- No IRL files

* For a complete list of factory parameters, see the table on page 39.

IMPORTANT: *If a Module is receiving power from a switcher, disconnect the DXLink connector on the module and reattach to apply power.*

To reset a Module to its factory default settings:

1. Press and hold the ID Pushbutton while plugging in the power connector. Start counting when the NetLinx LEDs begin to flash in unison, not when the power connector is inserted.

   - Once the Module has started booting up, both NetLinx LEDs flash in unison at the rate of once per second.
   - After 10 flashes at that rate, the LEDs will blink in unison at a faster rate.

NOTE: *A press-and-hold of the ID Pushbutton at power up will prevent the Module from attempting to come online until the ID Pushbutton is released. The Module will only attempt to come online if you release the Pushbutton prior to the faster blink rate.*

2. At the point that the blink rate increases, release the ID Pushbutton.

   The Module will automatically reboot to complete the process.

TIP: *In the following procedure – if you start a press and hold sequence with the ID Pushbutton and then decide not to change the settings, before you release the ID Pushbutton remove power from the unit to abort the procedure (remember, power can be applied via the external power supply or over DXLink, so one or both sources of power may need to be removed).*

Restore the Factory Firmware Image and Factory Default Parameters

During power up – if the ID Pushbutton is held until the Control/NetLinx LEDs toggle back and forth in unison approximately 30 times (10 slow, 20 fast) and then released when they go solid, the module's factory firmware image will be restored. This procedure affects both the firmware version and the parameters.

IMPORTANT: *If the Module is receiving power from a switcher, on the module disconnect the RJ-45 cable from the DXLink connector before starting the instructions below.*

To restore the Module to its factory default firmware image:

1. Press and hold the ID Pushbutton while plugging in the power connector (if the power source is a switcher, plug in the RJ-45 connector into the DXLink port instead). Start counting when the NetLinx LEDs begin to flash in unison, not when the power connector is inserted.
   - After the LEDs complete the following sequence, release the ID Pushbutton:
   - Once the Module has started booting up, all LEDs flash in unison at the rate of once per second.
   - After 10 flashes at that rate, the LEDs will blink in unison at a faster rate.
   - After 10 seconds of flashing at the increased rate, all LEDs go to solid on.
2. Upon release of the ID Pushbutton, the Module executes the following actions:
   a. Restores itself to its factory firmware image.
   b. Resets to factory default parameters*:
      - Deletes all IRL files stored on the device.
      - Resets to the default static IP address of 192.168.1.2 and default DHCP address of 169.254.2.2.
      - Resets to the default device number of 0 (when bound to a Master, receives a dynamic device number from the Master).
      - Resets to NDP mode and being unbound.
3. Once all actions in Step 3 are completed, the LEDs all turn off, indicating the Module is ready to reboot.
   The Module automatically reboots to complete the process.

* For a complete list of factory parameters, see the table on page 39.

ID Pushbutton Boot State and LED Behavior

To monitor the ID Pushbutton boot state of a Module by its LEDs, check both the Link/Act and Status LED columns.

ID Pushbutton Boot and NetLinx LED Behavior		
ID Pushbutton Boot States	**Link/Act LED**	**Status LED**
Boot with ID Pushbutton held down	Slow blink (1 Hz)	Slow blink (1 Hz)
ID Pushbutton held down long enough for reset to default parameters	Fast blink until ID Pushbutton is released, then OFF	Fast blink until ID Pushbutton is released, then OFF
ID Pushbutton held down long enough for reset to default firmware image	Solid ON, transitions to OFF once the unit completes writing to flash and is ready to reboot	Solid ON, transitions to OFF once the unit completes writing to flash and is ready to reboot
In Auto ID mode	Normal	Blink (2 Hz)
ID Pushbutton held down long enough to accept new ID	2 blinks, then normal	2 blinks, then normal
After boot: ID Pushbutton held down, but not long enough for IP mode change	Slow blink (1 Hz)	Slow blink (1 Hz)
After boot: ID Pushbutton held down long enough for IP mode change	Fast blink, then OFF	Fast blink, then OFF

IRL File Transfers

Overview

IMPORTANT: *The information in this Chapter does not pertain to any of the 4K HDMI Wallplate TX as the device does not provide IR communication ports.*

The NetLinx Studio software application (available for free download from www.amx.com) provides the ability to transfer IR Library files to NetLinx devices such as DXLink Modules.

When a DXLink Module is being used in conjunction with a switcher, the switcher's integrated Master is used for the IRL file transfer. FIG. 24 shows a Receiver Module bound to the integrated Master in an Enova DGX 1600 in NetLinx Studio's OnLine Tree. Follow the instructions on the top of page 43 to prepare for IRL file transfer and the instructions on page 44 for the actual transfer.
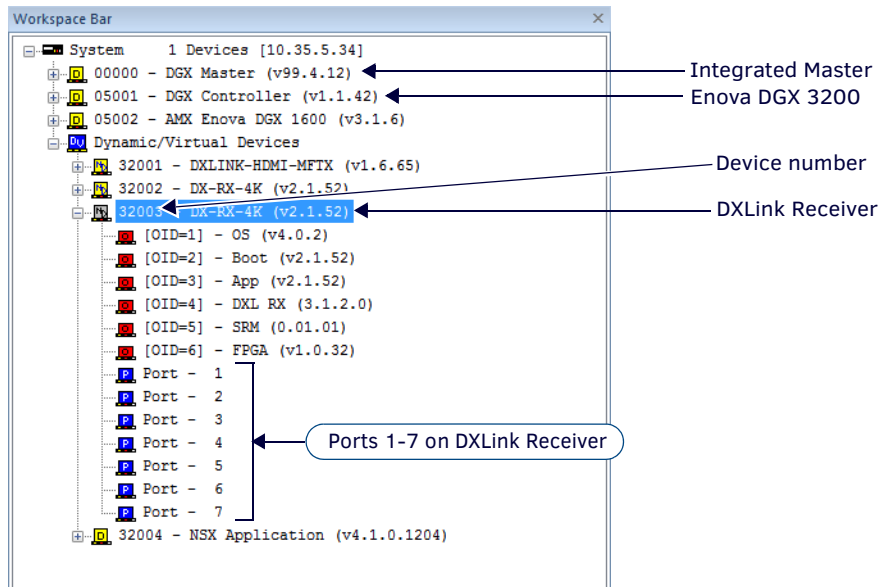
FIG. 24 NetLinx Studio – Integrated Master, Enova DGX 1600, and DXLink Receiver

Preparing for IRL File Transfers

To prepare for IRL file transfers:

1. Check to be sure #3 Toggle on the bottom of the Module is set to ON.
2. Verify that you have the latest version of NetLinx Studio on your PC.
    If the version is not the latest –
    - Use the Web Update option in NetLinx Studio's Help menu to obtain the latest version.
    Or
    - Go to www.amx.com and login as a Dealer to download the latest version.
3. Download the applicable IRL file from www.amx.com (Partners / Search Devices) to your PC.
4. Verify the following:
    a. Verify that an Ethernet/RJ-45 cable is connected from the switcher's integrated Master to the network (e.g., from the LAN 100/1000 port on the Enova DGX to a LAN).
    b. Verify that the target Module is connected via its DXLink connector to a DXLink Input or Output Board (respectively) on the switcher.
    c. Verify that the switcher is powered on.
5. Launch NetLinx Studio and open the OnLine Tree.
6. Bind the target Module to the integrated Master:
    a. Select and right-click the Module in the Online Tree.
    b. From the context sensitive menu, select Network Bind/Unbind Device.
    c. Verify that the check box is selected. If not selected, select it now.

d. Click OK.
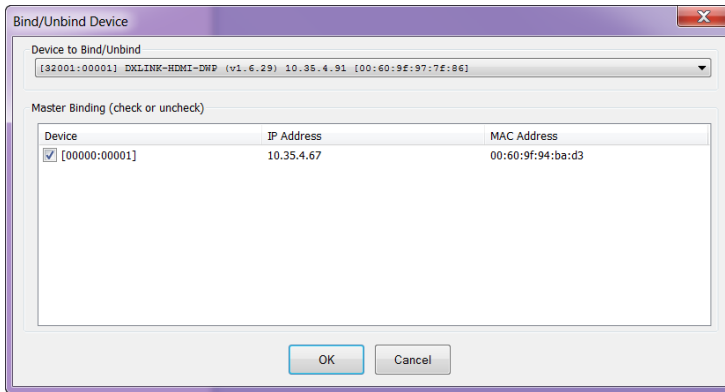
7. Determine the Device Number assigned to the target Module when it was bound. For the Device Number location, see FIG. 24 on the previous page.

   The Module is ready for the IRL file transfer (see page 44).

Transferring IRL Files

The *File Transfer* tool in NetLinx Studio is used to map IRL files to DXLink Modules. The instructions below assume that the preparations on the previous pages have been completed.

To send an IR Library (*.IRL) file to a Module:

1. In NetLinx Studio, select Tools > File Transfer to open the File Transfer dialog box.
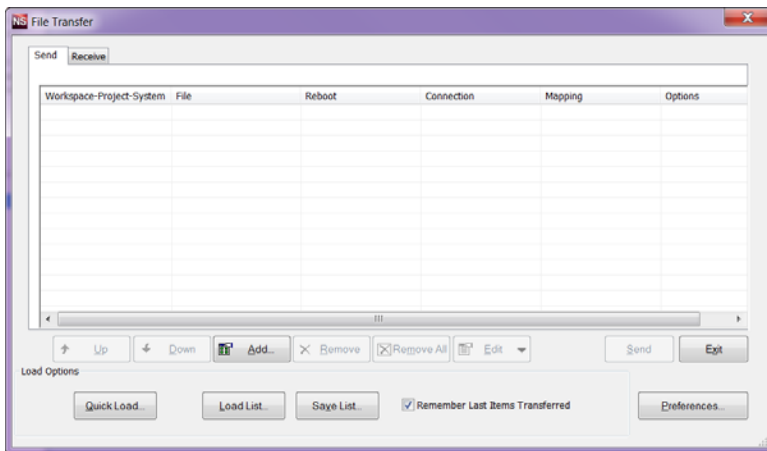
2. Click Add to open the Select Files for File Transfer dialog box.
3. Open the Other tab (if the file you want to transfer is not included in the open workspace.)

   The Other tab consists of a display of different types of files that can be transferred to a Master or System devices on the bus.
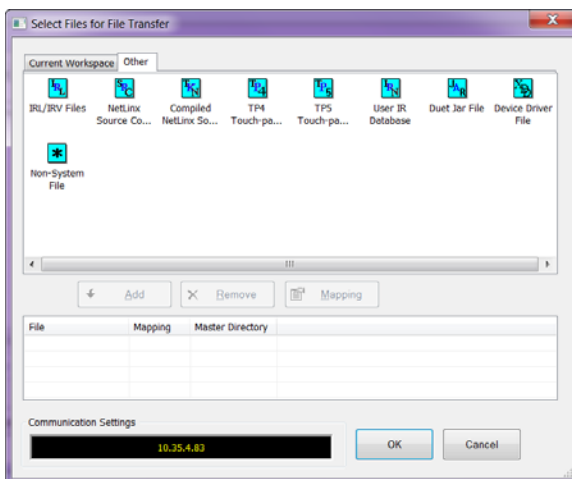
4. Select the type of file (in this case, IRL/IRV Files) that you want to add to the File list for transfer.
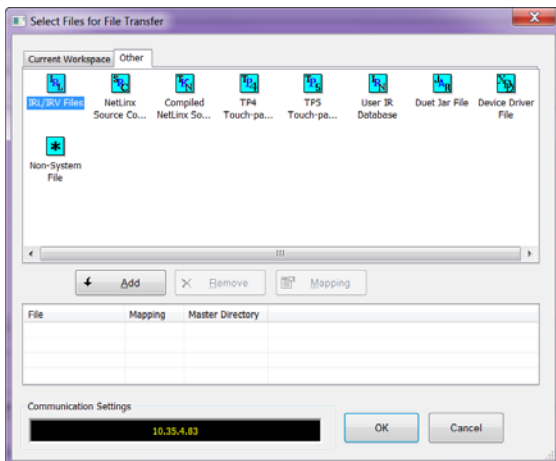
5. Click Add.

A standard Open dialog box opens with the Files of type selection set to IR Code files (*.IRL/*.IRV).

6. Locate and select the IRL file that you want to add.

7. Click Open.

The Enter Device Mapping Information dialog box opens.
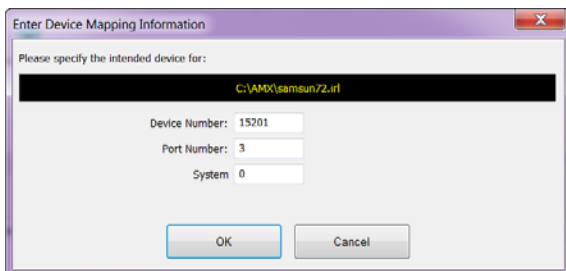
NOTE: *IRL files must be sent to Port 3 (IR Device Port) on the Module.*

8. If the fields are empty – Enter the Device, Port, and System numbers for the selected device.

If the fields are populated – Verify that the mapping information is correct for the selected device.

- IRL files are sent to Port 3 (IR Device Port) on the Module.
- Refer to the "Device Numbering" section on page 47 for information on device numbering for the Module.
- If the Module's assigned device number has been changed, use the OnLine Tree to determine it.

9. Click OK to return to the Select Files for File Transfer dialog box.

The selected IRL file and its mapping information are indicated in the File and Mapping lists.

10. Click OK to close the Select Files for File Transfer dialog box and return to the File Transfer dialog box. The IRL file appears in the File queue.
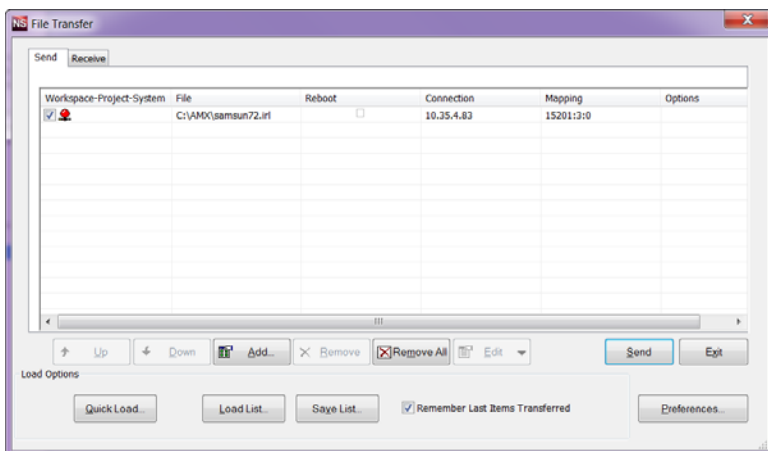
11. Click Send to transfer the file to the Module that the file is mapped to.

Additional Documentation

For additional information on using NetLinx Studio, refer to the *WebConsole & Programming Guide – NX-Series Controllers* (available at www.amx.com).

Additional IRL Information

ICSLan powered devices (such as the DXLink Modules) are not capable of having their IRL files received via the File Transfer dialog box, nor do they support the SEND_COMMAND: LOADIRL.

NetLinx Programming of DXLink Receivers

Overview

IMPORTANT: *The information in this Chapter does not pertain to the 4K HDMI Wallplate TX as the device does not communicate with or receive control from NetLinx Studio.*

NOTE: *Transmitters referenced in this chapter must meet the compatibility requirements described in the "DXLink Compatibility Appendix" on page 89.*

IMPORTANT: *Before DXLink Modules can receive any NetLinx SEND_COMMANDs, the DIP switch's #3 Toggle <u>must</u> be set to ON or the devices will not be accessible from a NetLinx control system.*

DXLink Modules recognize a select number of SEND_COMMANDs and CHANNELs.

- Receiver Video SEND_COMMANDs – page 49
- Receiver Audio SEND_COMMANDs – page 52
- IR SEND_COMMANDs and CHANNELs – page 53
- SERIAL SEND_COMMANDs – page 56
- Receiver USB SEND_COMMANDs – page 57
- Common DXLink Receiver SEND_COMMANDs – page 58
- DXLink System SEND_COMMANDs – page 59
- SEND_STRING Escape Sequences – page 60

NOTE: *For a listing of all supported Telnet commands, see page 69.*

Device Numbering and Ports

Each DXLink Module has its own Device Number (which is assigned when the unit is bound to a Master) and the following ports.

Receiver Module Port Numbering

Port 1 – Serial
Port 2 – Not used
Port 3 – IR TX
Port 4 – IR RX
Port 5 – USB
Port 6 – Video/Audio Output
Port 7 – Video/Audio Input

NOTE: *For an example of port numbering, see the NetLinx Studio illustration in FIG. 25 on the next page.*

IMPORTANT: *Best practices for using SEND_COMMANDs with DXLink endpoints include sending commands to the specific input or output port of the Enova DGX switcher (i.e., 5002:4:0 for input/output channel 4). For a complete list of NetLinx Programming Commands, Channels, Levels, and Port mapping see the "Enova DGX 100 Series Digital Media Switchers Hardware Reference Manual" at www.amx.com.*

In NetLinx Studio's OnLine Tree, the DXLink Receiver Module displays its ports.
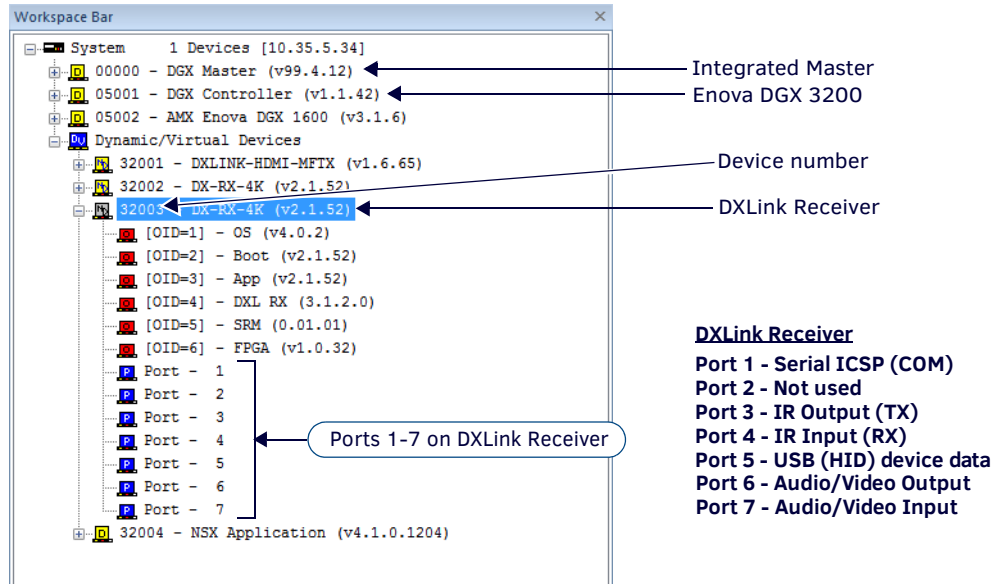
FIG. 25 NetLinx Studio OnLine Tree - Ports 1 through 7 on DXLink Receiver

NOTE: *For additional information on NetLinx Studio, refer to the "WebConsole & Programming Guide – NX-Series Controllers" (available at www.amx.com).*

NOTE: *All command text is based on a Unicode index.*

TIP: *Occasionally new firmware versions affect SEND_COMMANDs. If a command does not produce the expected results, we suggest checking the product's current firmware version against the information in the "Firmware Version" table on page 65.*

CHANNELs

Channel	Function
255	This channel On indicates that the DXLink Module has a valid UTP (twisted pair cable) connection to a switcher with an Integrated Master. If the channel is Off, the DXLink Module is incorrectly connected. 1-253 Key presses from selected remote control.

IMPORTANT: *Before DXLink Modules can receive any NetLinx SEND_COMMANDs, the DIP switch's #3 Toggle <u>must</u> be set to ON or the device will not be accessible from a NetLinx control system.*

NOTE: *Since not all devices support both upper and lower case, for best results all commands and parameters should be sent in upper case.*

DXLink Receiver Video SEND_COMMANDs

DXLink Receiver Video SEND_COMMANDs are sent to Port 6.

NOTE: *Asynchronous notifications are not available for the Receivers via NetLinx Studio (or Telnet).*

Video SEND_COMMANDs (Receivers)	
Command	**Description**

?VIDOUT_ASPECT_RATIO
 	
Requests the aspect ratio preference of the video through the Receiver. (For explanations of the ratio options, see page 52.)
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_ASPECT_RATIO'"`
	Valid responses:
	    ratio = MAINTAIN (default), STRETCH, ZOOM, ANAMORPHIC
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_ASPECT_RATIO'"`
	Returns a COMMAND of the form: `VIDOUT_ASPECT_RATIO-<ratio>`

VIDOUT_ASPECT_RATIO
 	
Sets the aspect ratio preference of the video through the Receiver to Stretch, Maintain, Zoom, or Anamorphic.
(For explanations of the ratio options, see page 52.)
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_ASPECT_RATIO-<ratio>'"`
	Valid responses:
	    ratio = STRETCH, MAINTAIN, ZOOM, ANAMORPHIC
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_ASPECT_RATIO-ZOOM'"`

?VIDOUT_BLANK
 	
Requests the image settings of the video blanking for the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_BLANK'"`
	Example:
	`SEND_COMMAND dvRX, "'?VIDOUT_BLANK'"`
	Returns a COMMAND of the form: `VIDOUT_BLANK-<color>`

VIDOUT_BLANK
 	
Sets the color of the video blanking feature for the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_BLANK-<color>'"`
	Variables:
	    color = BLACK, BLUE
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_BLANK-BLACK'"`

?VIDOUT_BRIGHTNESS
 	
Requests the status of the brightness option of the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_BRIGHTNESS'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_BRIGHTNESS'"`
	Returns a COMMAND of the form: `VIDOUT_BRIGHTNESS-50`

VIDOUT_BRIGHTNESS
 	
Sets the Brightness setting on the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>,"' VIDOUT_BRIGHTNESS-brightness'"`
	Variables:
	    brightness = [0..100] (default = 50)
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_BRIGHTNESS-75'"`

?VIDOUT_CONTRAST
 	
Requests the status of the contrast option of the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_CONTRAST'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_CONTRAST'"`
	Returns a COMMAND of the form: `VIDOUT_CONTRAST-contrast`

VIDOUT_CONTRAST
 	
Sets the Contrast setting on the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>,"' VIDOUT_CONTRAST-contrast'"`
	Variables:
	    contrast = [0..100] (default = 50)
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_CONTRAST-75'"`

?VIDOUT_FREEZE
 	
Requests the status of the freeze option of the specified video output port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_FREEZE'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_FREEZE'"`
	Returns a COMMAND of the form: `VIDOUT_FREEZE-<ON|OFF>`

VIDOUT_FREEZE
 	
Sets (enables / disables) the Freeze setting on the specified video output port. (If enabled, Freeze setting is on. If disabled, Freeze setting is off.)
	Syntax:
	`SEND_COMMAND <DEV>,"' VIDOUT_FREEZE-<ON|OFF>'"`
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_FREEZE-ENABLE'"`

Video SEND_COMMANDs (Receivers)

?VIDOUT_MUTE
 	
Requests the setting for the Mute preference applied to the image from the Receiver (Enable or Disable).
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_MUTE'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_MUTE'"`
	Returns a COMMAND of the form: `VIDOUT_MUTE-<ENABLE|DISABLE>`

VIDOUT_MUTE
 	
Sets the Mute preference of the image from the Receiver to Enable (displays a blank screen) or Disable.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_MUTE-<ENABLE|DISABLE>'"`
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_MUTE-ENABLE'"`

?VIDOUT_OSD
 	
Requests whether the specified video port has the OSD setting enabled or disabled.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_OSD'"`
	Example:
	`SEND_COMMAND dvRX,"'? VIDOUT_OSD'"`
	Returns a COMMAND of the form: `VIDOUT_OSD-<ENABLE|DISABLE>`

VIDOUT_OSD
 	
Enables or Disables the On Screen Display (OSD) setting on specified video port. If enabled, OSD setting is on. If disabled, OSD setting is off.
	Syntax:
	`SEND_COMMAND <DEV>," VIDOUT_'OSD-<ENABLE|DISABLE>'"`
	Example:
	`SEND_COMMAND dvRX,"' VIDOUT_OSD-ENABLE'"`

?VIDOUT_OSD_COLOR
 	
Requests the On Screen Display (OSD) color on the display connected to the specified video port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_OSD_COLOR'"`
	Example:
	`SEND_COMMAND dvRX,"'? VIDOUT_OSD_COLOR'"`
	Returns a COMMAND of the form: `VIDOUT_OSD_COLOR-<color>`

VIDOUT_OSD_COLOR
 	
Sets the On Screen Display (OSD) color scheme on the display connected to the specified video port.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_OSD_COLOR-<color>'"`
	Variables:
	   color = BLACK (black background, white font), BLUE (blue background, yellow font),
	        WHITE (white background, black font), YELLOW (yellow background, blue font)
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_OSD_COLOR-BLACK'"`

?VIDOUT_OSD_POS
 	
Requests the On Screen Display (OSD) position on the display connected to the specified video port.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_OSD_POS'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_OSD_POS'"`
	Returns a COMMAND of the form: `VIDOUT_OSD_POS-<position>`

VIDOUT_OSD_POS
 	
Sets the On Screen Display (OSD) position on the display connected to the specified video port.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_OSD_POS-<position>'"`
	Variables:
	   position = TOP LEFT, TOP RIGHT, BTM RIGHT, BTM LEFT
	Example:
	`SEND_COMMAND dvRX,"' VIDOUT_OSD_POS-TOP LEFT"`

?VIDOUT_RES
 	
Requests the resolution and refresh rate of the video through the Receiver.
 	
NOTE: *If the Scaling Mode is set to Bypass, the response will be "BYPASS."*
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_RES'"`
	Valid responses:
	• horizontal = An integer value representing the horizontal.
	• vertical = An integer value representing the vertical. May have an additional qualifier such as 'i' or 'p'.
	• rate = An integer value representing the refresh rate.
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_RES'"`
	Returns a COMMAND of the form: `VIDOUT_RES-<horizontal>x<vertical>,<rate>`

?VIDOUT_RES_REF
 	
Requests the resolution and refresh rate of the video through the Receiver.
 	
NOTE: *If the Scaling Mode is set to Bypass, the response will be "BYPASS."*
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_RES_REF'"`
	Valid responses:
	• horizontal = An integer value representing the horizontal.
	• vertical = An integer value representing the vertical. May have an additional qualifier such as 'i' or 'p'.
	• rate = An integer value representing the refresh rate.
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_RES_REF'"`
	Returns a COMMAND of the form: `VIDOUT_RES_REF-<horizontal>x<vertical>,<rate>`

Video SEND_COMMANDs (Receivers)

VIDOUT_RES_REF
 	
Sets the resolution and refresh rate of the video through the Receiver and also sets the Scaling Mode to MANUAL.
 	
IMPORTANT: *The "valid responses" used must come from the Resolution Names listed in the table in the "Supported Output Resolutions" appendix on page 82.*
 	
NOTE: *The default for Manual Mode is 1280x1024,60.*
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_RES_REF-<horizontal>x<vertical>,<rate>'"`
	Valid responses:
	• horizontal = An integer value representing the horizontal.
	• vertical = An integer value representing the vertical. May have an additional qualifier such as 'p' or 'i'.
	• rate = An integer value representing the refresh rate.
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_RES_REF-1920x1080p,60'"`

?VIDOUT_SCALE
 	
Requests the current Scaling Mode that the Receiver is set to. The modes are AUTO (SmartScale®), MANUAL, and BYPASS.
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_SCALE'"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_SCALE'"`
	Returns a COMMAND of the form: `VIDOUT_SCALE-<AUTO/MANUAL/BYPASS>`

VIDOUT_SCALE
 	
Sets the Scaling Mode on the Receiver to AUTO (SmartScale®), MANUAL, or BYPASS.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_SCALE-<scaling mode>'"`
	Valid response:
	    scaling mode = AUTO, MANUAL, BYPASS
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_SCALE-MANUAL'"`

?VIDOUT_SLEEP
 	
Requests to see the TMDS sleep has been enabled or disabled.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_SLEEP"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_SLEEP'"`
	Returns a COMMAND of the form: `VIDOUT_SLEEP-ENABLE`

VIDOUT_SLEEP
 	
Sets the TMDS clock behavior when no output signal on HDMI out. (Default for VIDOUT_SLEEP is DISABLE.)
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_SLEEP-{ENABLE|DISABLE]'"`
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_SLEEP-ENABLE'"`

?VIDOUT_SLEEP_DELAY
 	
Requests the delay prior to turning off TMDS clock when no input signal received.
	Syntax:
	`SEND_COMMAND <DEV>, "'?VIDOUT_SLEEP_DELAY"`
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_SLEEP_DELAY'"`
	Returns a COMMAND of the form: `VIDOUT_SLEEP_DELAY-30`

VIDOUT_SLEEP_DELAY
 	
Sets the TMDS clock behavior when no output signal on HDMI out.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_SLEEP_DELAY-timer'"`
	Variables:
	    timer = [0..32737] (default = 30)
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_SLEEP_DELAY-60'"`

?VIDOUT_TESTPAT
 	
Requests the test pattern setting on the Receiver.
	Syntax:
	`SEND_COMMAND <DEV>,"'?VIDOUT_TESTPAT'"`
	Valid responses:
	    pattern = OFF, COLOR BAR, GRAY RAMP, SMPTE BAR, HILOTRAK, PLUGE, X-HATCH
	Example:
	`SEND_COMMAND dvRX,"'?VIDOUT_TESTPAT'"`
	Returns a COMMAND of the form: `VIDOUT_TESTPAT-<pattern>`

VIDOUT_TESTPAT
 	
Sets the test pattern to display. Can be sent in any Scaling Mode.
	Syntax:
	`SEND_COMMAND <DEV>,"'VIDOUT_TESTPAT-<pattern>'"`
	Valid responses:
	    pattern = OFF, COLOR BAR, GRAY RAMP, SMPTE BAR, HILOTRAK, PLUGE, X-HATCH
	Example:
	`SEND_COMMAND dvRX,"'VIDOUT_TESTPAT-COLOR BAR'"`

Aspect Ratio Options

Stretch (to fit) – This option (default) scales the video to full screen size in both horizontal and vertical directions regardless of the input aspect ratio. No data is cropped. However, the image may be distorted as needed to fill the screen. When Stretch is selected, black bars are not added by the scaler. However, if an image has originated from a source device with either horizontal or vertical black bars (e.g., letter box from a movie), the black bars will be considered as active video and will be included in the stretched video.

Maintain (aspect ratio) – This option maintains the incoming video's aspect ratio, but will scale the image until the display fills either horizontal or vertical direction first. If the vertical direction is filled first, then the video will have pillar box black bars on the sides of the display. If the horizontal direction is filled first, then the video will have letter box black bars on the top and bottom of the display.

Zoom – This option maintains the input aspect ratio while zooming the image to fill the screen in all directions. Image data may be lost on the top and bottom or to the left and right of the displayed image.

Anamorphic – This option is used with anamorphic formatted video sources so that images appear correctly on the display.

DXLink Receiver Audio SEND_COMMANDs

DXLink Receiver Audio SEND_COMMANDs are sent to Port 6.

Audio SEND_COMMANDs (Receivers)	
Command	**Description**

?AUDOUT_MUTE
 	
Requests the setting for the Mute preference of the audio from the Receiver (Enable or Disable).
	Syntax:
	`SEND_COMMAND <DEV>,"'?AUDOUT_MUTE'"`
	Example:
	`SEND_COMMAND dvRX,"'?AUDOUT_MUTE'"`
	    Returns a COMMAND of the form:
	`AUDOUT_MUTE-<ENABLE|DISABLE>`

AUDOUT_MUTE
 	
Sets the Mute preference of the audio from the Receiver to Enable (no sound) or Disable.
	Syntax:
	`SEND_COMMAND <DEV>,"'AUDOUT_MUTE-<ENABLE|DISABLE>'"`
	Example:
	`SEND_COMMAND dvRX,"'AUDOUT_MUTE-ENABLE'"`

?AUDOUT_FORMAT
 	
Requests the audio format on the Receiver.
	Syntax:
	`SEND_COMMAND <DEV>,"'?AUDOUT_FORMAT'"`
	Valid response:
	    format = HDMI, ANALOG, ALL
	Example:
	`SEND_COMMAND dvRX,"'?AUDOUT_FORMAT'"`
	    Returns a COMMAND of the form:
	`AUDOUT_FORMAT-<format>`

AUDOUT_FORMAT
 	
Sets the audio format on the Receiver (default is ALL).
	Syntax:
	`SEND_COMMAND <DEV>,"'AUDOUT_FORMAT-<format>'"`
	Valid response:
	    format = HDMI, ANALOG, ALL
	Example:
	`SEND_COMMAND dvRX,"'AUDOUT_FORMAT-ANALOG'"`

DXLink Receiver IR SEND_COMMANDs

DXLink Receiver Module IR CHANNELS and SEND_COMMANDs are sent to Port 3 (IR output).

IR CHANNELs

Channel	Function
1–255	Generate the IR or serial command assigned to that channel.

IR SEND_COMMANDs

IR SEND_COMMANDs (Receivers)	
Command	**Description**

CAROFF
 	
Disable the IR carrier signal until a 'CARON' Send Command is received.
	Syntax:
	`SEND_COMMAND <DEV>,"'CAROFF'"`
	Example:
	`SEND_COMMAND IR_1,"'CAROFF'"`
	   Stops transmitting IR carrier signals to the IR port.

CARON
 	
Enable the IR carrier signals (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'CARON'"`
	Example:
	`SEND_COMMAND IR_1,"'CARON'"`
	   Starts transmitting IR carrier signals to the IR port.

CH
 	
Send IR pulses for the selected channel.
	• All channels below 100 are transmitted as two digits.
	• If the IR code for ENTER (function #21) is loaded, an Enter will follow the number.
	• If the channel is greater than or equal to (>=) 100, then IR function 127 or 20 (whichever exists) is generated for the one hundred digit.
	
	NOTE: *Set the Pulse and Wait times with 'CTON' and 'CTOF'.*
	
	Syntax:
	`SEND_COMMAND <DEV>,"'CH',<channel number>"`
	Valid response:
	   channel number = 0 to 199 channels
	Example:
	`SEND_COMMAND IR_1,"'CH',18"`
	The IR port on the DXLink RX performs the following:
	• Transmits IR signals for 1 (IR code 11).
	• The transmit time is set with the CTON command.
	• Waits until the time set with the CTOF command elapses.
	• Transmits IR signals for 8 (IR code 18).
	• Waits for the time set with the CTOF command to elapse.
	If the IR code for Enter (IR code 21) is programmed, the module performs the following steps:
	• Transmits IR signals for Enter (IR code 21).
	• Waits for the time set with the CTOF command to elapse.

CP
 	
Halt and clear all active or buffered IR commands, and then send a single IR pulse.
	Pulse and Wait times can be set with the 'CTON' and 'CTOF' commands.
	Syntax:
	`SEND_COMMAND <DEV>,"'CP',<code>"`
	Valid response:
	   code = IR port's channel value 0 to 252 (253 to 255 reserved).
	Example:
	`SEND_COMMAND IR_1,"'CP',2"`
	   Clears the active/buffered commands and pulses IR port's channel 2.

CTOF
 	
Sets the duration of the Off time (no signal) between IR pulses for channel and IR function transmissions. Off time settings are stored in non-volatile memory.
	This command sets the delay time between pulses generated by the 'CH' or 'XCH' Send Commands in tenths of seconds.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTOF',<time>"`
	Valid response:
	   time = 0 to 255. Given in 1/10th of a second increments. Default is 5 (0.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'CTOF',10"`
	   Sets the off time between each IR pulse to 1 second.

IR SEND_COMMANDs (Receivers)	

CTON
 	
Sets the total time of IR pulses transmitted and is stored in non-volatile memory.
	This command sets the pulse length for each pulse generated by the 'CH' (see previous page) or 'XCH' (see next page) Send Commands in tenth of a second increments.
	Syntax:
	`SEND_COMMAND <DEV>,"'CTON',<time>"`
	Valid response:
	   time = 0 to 255. Given in 1/10th of a second increments. Default is 5 (0.5 seconds).
	Example:
	`SEND_COMMAND IR_1,"'CTON',20"`
	   Sets the IR pulse duration to 2 seconds.

GET BAUD
 	
Get the IR port's current communication parameters.
	The port sends the parameters to the device that requested the information.
	Syntax:
	`SEND_COMMAND <DEV>,"'GET BAUD'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'GET BAUD'"`
	   The port responds with:
	`Port <port #>,<baud>,<parity>,<data>,<stop>`

GET MODE
 	
Poll the IR/Serial port's configuration parameters and report the active mode settings to the device requesting the information.
 	
NOTE: *Works with Port 3 only.*
	Syntax:
	`SEND_COMMAND <DEV>,"'GET MODE'"`
	The port responds with:
	`<port #> <mode>,<carrier>,<io link channel>.`
	Example:
	`SEND_COMMAND IR_1,"'GET MODE'"`
	   The system could respond with:
	`PORT 3 IR,CARRIER,IO LINK 0`

IROFF
 	
Halt and clear all active or buffered IR commands being output on the designated port.
	Syntax:
	`SEND_COMMAND <DEV>,"'IROFF'"`
	Example:
	`SEND_COMMAND IR_1,"'IROFF'"`
	   Immediately halts and clears all IR output signals on the IR port.

SET BAUD
 	
Use to set the IR communication parameters.
 	
NOTE: *Before sending the SET BAUD command, you <u>must</u> set the IR port to Data mode (for the SET MODE command, see page 54)*
	NOTE: *This value is not saved in non-volatile memory and is reset to default (9600, N, 8, 1) at power-up.*
	Syntax:
	`SEND_COMMAND <DEV>,"'SET BAUD <baud>,<parity>,<data>, <stop>'"`
	Valid responses:
	• baud = 9600, 4800, 2400, 1200, 600, 300, 150
	• parity = N (none), O (odd), E (even), M (mark), S (space)
	• data = 7 or 8 data bits
	• stop = 1 or 2 stop bits
	
	NOTE: *The only valid 9 bit combination is (baud),N,9,1.*
	
	Example:
	`SEND_COMMAND DEVICE_1,"'SET BAUD 1200,N,8,1'"`
	   Sets the DEVICE_1 port's communication parameters to 1200 baud, no parity, 8 data bits, and 1 stop bit.

SET MODE
 	
Set an IR port to either IR, Serial, or Data mode.
	Syntax:
	`SEND_COMMAND <DEV>,"'SET MODE'<mode>"`
	Valid response:
	   mode =
	• IR (standard IR output with carrier)
	• SERIAL (IR without carrier and waveform inverted)
	• DATA (1-way serial/TTL)
	Example:
	`SEND_COMMAND IR_1,"'SET MODE IR'"`
	   Sets the IR_1 port to IR mode for IR control.

SP
 	
Generate a single IR pulse.
	You can use the 'CTON' to set pulse lengths and the 'CTOF' to set time Off between pulses.
	Syntax:
	`SEND_COMMAND <DEV>,"'SP',<code>"`
	Valid response:
	   code = IR code value 1 to 252 (253 to 255 reserved).
	Example:
	`SEND_COMMAND IR_1,"'SP',25"`
	   Pulses IR code 25 on IR port on RX.

IR SEND_COMMANDs (Receivers)	
XCH Transmit IR codes.	Syntax: `SEND_COMMAND <DEV>,"'XCH <channel>'"` Valid response: channel = 0 to 999. **NOTE:** *For detailed usage examples, refer to the 'XCHM' command.*

XCHM
 	
Changes the IR output pattern for the 'XCH' Send Command.
	Syntax:
	`SEND_COMMAND <DEV>,"'XCHM <extended channel mode>'"`
	Valid response:
	   extended channel mode = 0 to 4.
	Example:
	`SEND_COMMAND IR_1,"'XCHM 3'"`
	   Sets the IR device's extended channel command to mode 3.
	Mode 0 Example (default): [x][x]<x><enter>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	   Transmits the IR code as 3-enter.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	   Transmits the IR code as 3-4-enter.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	   Transmits the IR code as 3-4-3-enter.
	Mode 1 Example: <x><x><x><enter>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	   Transmits the IR code as 0-0-3-enter.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	   Transmits the IR code as 0-3-4-enter.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	   Transmits the IR code as 3-4-3-enter.
	Mode 2 Example: <x><x><x>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	   Transmits the IR code as 0-0-3.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	   Transmits the IR code as 0-3-4.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	   Transmits the IR code as 3-4-3.
	Mode 3 Example: [[100][100]....]<x><x>
	`SEND_COMMAND IR_1,"'XCH 3'"`
	   Transmits the IR code as 0-3.
	`SEND_COMMAND IR_1,"'XCH 34'"`
	   Transmits the IR code as 3-4.
	`SEND_COMMAND IR_1,"'XCH 343'"`
	   Transmits the IR code as 100-100-100-4-3.
	Mode 4 Example:
	• Mode 4 sends the same sequences as the 'CH' command.
	• Only use Mode 4 with channels 0 to 199.

DXLink Receiver Serial SEND_COMMANDs

DXLink Module SERIAL SEND_COMMANDs are sent to Port 1.

Serial SEND_COMMANDs (Receivers)	
Command	**Description**

B9MOFF
 	
Set the port's communication parameters for stop and data bits according to the software settings on the RS-232 port.
	This command works in conjunction with the 'B9MON' command.
	• Disables 9-bit in 232 mode.
	• By default, this returns the Communication settings on the serial port to the last programmed parameters.
	Syntax:
	`B9MOFF`
	Example:
	`SEND_COMMAND SOMEDEVICE_1,"'B9MOFF'"`
	    Sets the port settings on SOMEDEVICE to match the port's configuration settings.

B9MON
 	
Override and set the current communication settings and parameters on the RS-232 serial port to 9 data bits with one stop bit.
	This command works in conjunction with the 'B9MOFF' command.
	• Enables 9-bit in 232 mode.
	Syntax:
	`B9MON`
	Example:
	`SEND_COMMAND SOMEDEVICE_1,"'B9MON'"`
	    Resets the SOMEDEVICE port's communication parameters to nine data bits and one stop bit.

CHARD
 	
Set the delay time between all transmitted characters to the value specified (in 100 microsecond increments).
	Syntax:
	`SEND_COMMAND <DEV>,"'CHARD-<time>'"`
	Valid response:
	    time = 0 to 10000 (1 second)
	Example:
	`SEND_COMMAND dvRXRS232,"'CHARD-10'"`
	    Sets a 1-millisecond delay between all transmitted characters.

CHARDM
 	
Set the delay time between all transmitted characters to the value specified (in 1 millisecond increments).
	Syntax:
	`SEND_COMMAND <DEV>,"'CHARDM-<time>'"`
	Valid response:
	    time = 0 to 1000 (1 second)
	Example:
	`SEND_COMMAND dvRXRS232,"'CHARDM-10'"`
	    Sets a 10-millisecond delay between all transmitted characters.

ESCSEQOFF Disables SEND_STRING escape sequences	Disables SEND_STRING escape sequences (see the "SEND_STRING Escape Sequences" section on page 60).
ESCSEQON Enables SEND_STRING escape sequences	Enables SEND_STRING escape sequences (see the "SEND_STRING Escape Sequences" section on page 60).

GET BAUD
 	
Get the RS-232 (serial) port's current communication parameters.
	The port sends the parameters to the device that requested the information.
	Syntax:
	`SEND_COMMAND <DEV>,"'GET BAUD'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'GET BAUD'"`
	    The port responds with:
	`Port <port #>,<baud>,<parity>,<data>,<stop>`

RXCLR
 	
Clear all characters in the receive buffer waiting to be sent to the Master.
	Syntax:
	`SEND_COMMAND <DEV>,"'RXCLR'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'RXCLR'"`
	    Clears all characters in the receive buffer waiting to be sent to the Master.

RXOFF
 	
Disable the transmission of incoming received characters to the Master (default).
	Syntax:
	`SEND_COMMAND <DEV>,"'RXOFF'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'RXOFF'"`
	    Disables the transmission of incoming received characters to the Master.

Serial SEND_COMMANDs (Receivers)	

RXON
 	
Start transmitting received characters to the Master.
Enables sending incoming received characters to the Master.
	This command is automatically sent by the Master when a 'CREATE_BUFFER' program instruction is executed.
	Syntax:
	`SEND_COMMAND <DEV>,"'RXON'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'RXON'"`
	   Sets the RX RS-232 port to transmit received characters to the Master.

TXCLR
 	
Stop and clear all characters waiting in the transmit out buffer and stops transmission.
	Syntax:
	`SEND_COMMAND <DEV>,"'TXCLR'"`
	Example:
	`SEND_COMMAND dvRXRS232,"'TXCLR'"`
	   Stops and clears all characters waiting in the RX serial port's transmit buffer.

SET BAUD
(shown in examples)
Or
TSET BAUD
 	
Use either of these commands to set the serial communication parameters.
 	
NOTE: *DXLink Receivers only support RS-232 serial communication.*
	NOTE: *This value is not saved in non-volatile memory and is reset to default (9600, N, 8, 1) at power-up.*
	
	Syntax:
	`SEND_COMMAND <DEV>,"'SET BAUD <baud>,<parity>,<data>, <stop>'"`
	Valid responses:
	• baud = 115200, 76800, 57600, 38400, 19200, 9600, 4800, 2400, 1200, 600, 300, 150.
	• parity = N (none), O (odd), E (even), M (mark), S (space)
	• data = 7 or 8 data bits
	• stop = 1 or 2 stop bits
	
	NOTE: *The only valid 9 bit combination is (baud),N,9,1.*
	
	Example:
	`SEND_COMMAND DEVICE_1,"'SET BAUD 115200,N,8,1'"`
	   Sets the DEVICE_1 port's communication parameters to 115,200 baud, no parity, 8 data bits, and 1 stop bit.

DXLink Receiver USB SEND_COMMANDs

DXLink Receiver USB SEND_COMMANDs are sent to Port 5.

NOTE: *Transmitters referenced in the commands below must meet the compatibility requirements described on page 89.*

USB SEND_COMMANDs (Receiver)	
Command	**Description**

?USB_HID_ROUTE
 	
Requests the IP address or hostname of the host device (Transmitter) sending USB keyboard/mouse data to the Receiver.
	Syntax:
	`SEND_COMMAND <DEV>,"'?USB_HID_ROUTE'"`
	Example:
	`SEND_COMMAND dvRX,"'?USB_HID_ROUTE'"`
	  Returns a COMMAND of the form:
	`USB_HID_ROUTE-<IP address or hostname>`

USB_HID_ROUTE
 	
Set the IP address or hostname of the host device (Transmitter) that will be sending USB keyboard/mouse data to the Receiver.
	NOTE: *When a hostname is specified, a maximum of 50 characters can be used.*
	
	Syntax:
	`SEND_COMMAND <DEV>,"'USB_HID_ROUTE-<IP address or hostname>'"`
	Example:
	`SEND_COMMAND dvRX,"'USB_HID_ROUTE-192.168.1.5'"`
	
	NOTE: *To eliminate the connection, specify 0.0.0.0 as the IP address. To redirect to a new host device (Transmitter), send the new IP address or hostname.*

Common DXLink Receiver SEND_COMMANDs

Common NetLinx SEND_COMMANDs for DXLink Receivers are provided in the following table.

These commands can be sent to any port (the #3 Toggle *must* be set to ON).

Common NetLinx SEND_COMMANDs (Receivers)	
Command	**Description**

?FWVERSION
 	
Requests the firmware version of the Receiver.
	Syntax:
	`SEND_COMMAND <DEV>,"'?FWVERSION'"`
	Example:
	`SEND_COMMAND dvRX,"'?FWVERSION'"`
	    Returns a COMMAND of the form:
	`FWVERSION <version-string>`

LED-DIS
 	
Disable all LEDs to the right of the Program port.
	Syntax:
	`LED-DIS`
	Example:
	`SEND_COMMAND DEVICE_1,"'LED-DIS'"`
	    Disables all LEDs to the right of the Program port on DEVICE_1.
	
	NOTE: *This parameter does not get stored in non-volatile memory. LEDs are enabled by default at each power-up.*

LED-EN
 	
Enable all LEDs to the right of the Program port (default).
	Syntax:
	`LED-EN`
	Example:
	`SEND_COMMAND DEVICE_1,"'LED-EN'"`
	    Enables all LEDs to the right of the Program port on DEVICE_1.

REBOOT
 	
Reboot the module.
	Syntax:
	`REBOOT`
	Example:
	`SEND_COMMAND DEVICE_1,"'REBOOT'"`
	    Reboots DEVICE_1.

SET_NDX_DESC Set Friendly name and location for NDP.	Syntax: `SET_NDX_DESC-friendly name:location` • Max of 25 characters for *friendly name* and max of 25 characters for *location*. If more than 25 characters are sent for either friendly name or location, they will be truncated to a max of 25 characters. • Neither the friendly name nor the location should contain a ":" character, as that is used as a delimiter. **NOTE:** *This command requires a reboot to enable new settings.*

DXLink System SEND_COMMANDs

DXLink System SEND_COMMANDs can be sent to any port on the Receiver.

DXLink System SEND_COMMANDs (Receivers)	
Command	**Description**

?DXLINK
 	
Requests the current mode for the Receiver.
	Syntax:
	`SEND_COMMAND <DEV>,"'?DXLINK'"`
	Example:
	`SEND_COMMAND dvRX,"'?DXLINK'"`
	  Returns a COMMAND of the form:
	`DXLINK-<DXLINK-EXTENDER/DXLINK-ENDPOINT>`

DXLINK
 	
Sets the RX to Extender Mode (for a standalone, direct connection from module to module) or Endpoint Mode (for use in conjunction with a switcher).
	Syntax:
	`SEND_COMMAND <DEV>,"'DXLINK-<EXTENDER|ENDPOINT>'"`
	Example:
	`SEND_COMMAND dvRX,"'DXLINK-EXTENDER'"`

ICSLAN
 	
Sets the ICS LAN connection to Enable or Disable.
	Syntax:
	`SEND_COMMAND <DEV>,"'ICSLAN-<ENABLE|DISABLE>'"`
	Example:
	`SEND_COMMAND dvRX,"'ICSLAN-ENABLE'"`

PERSISTAV
 	
Used to save the Receiver's Power-On Scaler settings/mode to the DGX DXLink Output Boards for DGX Configuration Software.
Not required to save A/V settings to the receiver. These are automatically saved when changes are made.
	Syntax:
	`SEND_COMMAND <DEV>,"'PERSISTAV'"`
	Example:
	`SEND_COMMAND dvRX,"'PERSISTAV'"`

FACTORYAV
 	
Clears the persisted settings for the Scaler mode,* resolution, aspect ratio policy, and audio output type and restores them to their factory defaults.
* The "Power-On" Scaler mode on an Enova DGX DXLink Output Board will not get reset to default (AUTO), but will remain as whatever was last persisted.
	Syntax:
	`SEND_COMMAND <DEV>,"'FACTORYAV'"`
	Example:
	`SEND_COMMAND dvRX,"'FACTORYAV'"`
	NOTE: *A reboot is required after sending the FACTORYAV command.*

SET TELNET PORT 0
 	
Sets the Telnet port to "0" (disabled state).
	Syntax:
	`SEND_COMMAND <DEV>,"'SET TELNET PORT 0'"`
	Example:
	`SEND_COMMAND dvRX,"'SET TELNET PORT 0'"`
	NOTE: *A reboot is required after sending the SET TELNET PORT 0 command.*

SET TELNET PORT 23
 	
Sets the Telnet port to "23" (default port).
	Syntax:
	`SEND_COMMAND <DEV>,"'SET TELNET PORT 23'"`
	Example:
	`SEND_COMMAND dvRX,"'SET TELNET PORT 23'"`
	NOTE: *A reboot is required after sending the SET TELNET PORT 23 command.*

SEND_STRING Escape Sequences

DXLink Modules support several special SEND_STRING escape sequences. If any of the character combinations listed below are found anywhere within a SEND_STRING program instruction, they will be treated as a command and not the literal characters.

Use the ESCSEQON and ESCSEQOFF NetLinx SEND_COMMANDS to control whether these are active or not. The ESCSEQON command *must* precede the Escape Sequences, otherwise strings will be processed normally. These commands are sent to Port 1.

SEND_STRING Escape Sequences	
Command	**Description**

27, 17
Send a break character for a specified duration to a specific device.
	Syntax:
	`27,17,<time>`
	Valid response:
	   time = 1 to 255 (measured in 100 microsecond increments)
	Example:
	`SEND_STRING RS232_1,"27,17,10"`
	   Sends a break character of 1 millisecond to the RS232_1 device.

27, 18, 0
Clear the ninth data bit by setting it to 0 on all character transmissions.
	Used in conjunction with the 'B9MON' command (see page 56).
	Syntax:
	`27,18,0`
	Example:
	`SEND_STRING RS232_1,"27,18,0"`
	   Sets the RS232_1 device's ninth data bit to 0 on all character transmissions.

27, 18, 1
Set the ninth data bit to 1 for all subsequent characters to be transmitted.
	Used in conjunction with the 'B9MON' command (page 56).
	Syntax:
	`27,18,1`
	Example:
	`SEND_STRING RS232_1,"27,18,1"`
	   Sets the RS232_1 device's ninth data bit to 1 on all character transmissions.

27, 19
Insert a time delay before transmitting the next character.
	Syntax:
	`27,19,<time>`
	Valid response:
	   time = 1 to 255. Measured in 1 millisecond increments.
	Example:
	`SEND_STRING RS232_1,"27,19,10"`
	   Inserts a 10 millisecond delay before transmitting characters to the RS232_1 device.

Troubleshooting

Overview

The troubleshooting suggestions/strategies provided apply to the Transmitters and Receivers, unless otherwise noted.

Five potential types of issues are covered in this chapter:

- Basic troubleshooting
- Determining HDCP compliance
- Power
- DXLink connections
- Network setup

This chapter also provides technical support contact information on page 63.

Basic Troubleshooting

We suggest using the following general list to rule out basic troubleshooting issues.

- ❑ Check the indicator LEDs on all of the equipment. If any are not illuminated, see the "Power Issues" section below.
- ❑ Check all link and signal connections to make sure everything is physically set up correctly.
- ❑ Isolate source and destination equipment and cable problems by cabling direct without the DXLink units.
- ❑ Check Module DIP switch toggle settings (see page 25).
- ❑ SEND_COMMANDs – double-check the command and the port number specified and re-send the command (see page 47).
- ❑ If any changes have been made, try resetting the unit to the factory defaults (see page 41).

Additional Resources for Troubleshooting Switching Systems

When the DXLink units are used in conjunction with an Enova DGX Switcher or Solecis 4K Digital Switcher, we suggest checking the troubleshooting information in that product's manual.

Determining HDCP Compliance

An orange screen on an output display is the visual cue from DXLink devices that the display device cannot display the HDCP compliant signal from the source.

Power Issues

Upon power up, the Power indicator LED on the front of the Module illuminates solid green.

If the Power LEDs on any of the system's equipment are not illuminated:

- ❑ Check the power cords or DXLink (RJ-45) connection if using power over the DXLink line.
- ❑ Check the power connections on the switcher if using power over the DXLink line.
- ❑ Check the power connections on the source and destination devices.

Important Power Considerations for Enova DGX Systems

- Local power – Local power (the desktop power supply) always takes precedence over power via the DXLink line from the switcher. However, if a locally powered Module is connected to a switcher and the local power is lost (i.e., unplugged or turned off), the Module will power down and then automatically power back up using power from the switcher via the DXLink connection (increasing the overall power draw on the switcher). When local power is restored, it automatically replaces the power over the DXLink line.
- DXLink power – When Transmitters/Receivers are being powered by an Enova DGX DXLink board or DXLink power injector (using power via the DXLink line), to maintain the switcher's power redundancy, we recommend that you:
  - Determine the power budget based on the Input/Output boards used and the quantity of powered endpoints (Transmitters/Receivers); see page 23.
  - Do not use the local DC power jack on Modules (even if the local power adapter is turned off).

Power Issues with Enova DGX Systems

In an Enova DGX System when multiple endpoints (Transmitters/Receivers) cycle their power and the DXLink connection fails, check the following:

- ❑ Check to be sure that Modules being powered via local DC jack have power. (Local power always takes precedence.)
- ❑ Check to be sure that Modules intended to be powered via the DXLink line do not have a DC jack plugged in (even if the local power adapter is turned off). This can cause inadvertent ground loops that can negatively affect DXLink power sensing circuits.

DXLink Connection Issues

One method for determining DXLink connection issues is to compare the pattern of the green and yellow DXLink LEDs on the Receiver Module against the tables below and then check the suggested items in the Troubleshooting column in the second table.

DXLink LED Patterns When Connection is Working as Expected

Check the status of the green and yellow DXLink LEDs (on rear of the modules) against the following table to determine the status of the video signal over the DXLink line. All of the green / yellow patterns in this table indicate that the unit is working as expected given its current connections. If the LED pattern does not correspond to any of the green / yellow patterns in this table, check the following table.

LED Patterns – Working as Expected		
Green	**Yellow**	**LED Pattern Description**
Solid green	Solid yellow	The DXLink link is established and the video stream is passing HDCP protected content.
Solid green	Flashing yellow	The DXLink link is established and the video stream is passing unprotected content.
Solid green	Off	The DXLink link is established but no video content is being passed.
Off	Off	The DXLink link is not established and the unit is either not powered on or is not connected.

DXLink LED Patterns When Connection is Failing

If the green / yellow DXLink LEDs on the DXLink unit do not have one of the normal patterns as stated in the table above, check the patterns in the table below and then check the items listed in the corresponding Troubleshooting column.

LED Patterns – Connection Failing				
Green	**Yellow**	**LED Pattern Description**	**Problem Symptoms**	**Troubleshooting**
Solid green	Sporadic flashing yellow	Poor DXLink signal quality	Video drops occasionally	Check for: • Cable installation problems • Alien crosstalk • If possible, identify the hostile cable
Fully illuminated, sporadic flashing green	Off	Bad DXLink signal quality		Check for: • Cable installation problems • Alien crosstalk • If possible, identify the hostile cable • Cable quality
Very dimly illuminated, rapid / sporadic flashing green	Off	Very bad DXLink signal quality	No video / audio / Ethernet	Check for: • Cable installation problems • Alien crosstalk • If possible, identify the hostile cable Cable quality

NOTE: *For installations where the DXLink Receiver could lose connectivity for an extended period of time (greater than 5 minutes), the Offline Recovery Mechanism is an option that allows the device to detect its offline state and reconnect to a Master (see page 38).*

Network Setup Issues

The instructions below can be used for first time setup of DXLink Modules on a network with no NetLinx Master (integrated or standalone). The information in this section does not pertain to the 4K HDMI Wallplate TX as the device does not communicate with or receive control from NetLinx Studio.

NOTE: *Before setting up the network, we recommend plugging all required Ethernet cables into the network before applying power to the DXLink Modules.*

To set the IP, connection, and device parameters on a DXLink Module:

1. Set the DIP switch on the DXLink Module to:
   - #1 and #3 Toggles – ON
   - #2 and #4 Toggles – OFF
2. Attach the DXLink Module via its ICS LAN 10/100 port to the network or PC.
3. Power up the DXLink Module.
   The DXLink Module will get a DHCP address or default to 169.254.2.2 (or if the module is in Static IP Mode, the address will be 192.168.1.2).

4. Establish a Telnet connection to the DXLink Module and set up the network parameters using the following three commands:
   - `SET IP`
   - `SET CONNECTION`
   - `SET DEVICE`
5. Enter REBOOT.
6. Reset the DIP switches to configure the DXLink Module for the specific type of system setup being used (see the "Common Scenarios" table on page 27).

NOTE: *If you cannot locate the DXLink Module in the Online Tree, you can reset the factory default by holding the ID button during power up until the LEDs blink in unison and then releasing the ID button. This will revert the DXLink Module to DHCP mode. Start again at Step 1 above.*

Technical Support

If this manual has not satisfactorily answered your questions regarding the DXLink Twisted Pair 4K Transmitters and Receivers or they are not operating as expected, please contact your AMX representative or technical support. Have the serial numbers for the modules ready. If the modules are connected to a switcher, locate the serial number for the switcher too. We recommend recording the serial numbers in an easily accessible location.

AMX Contact Information

- 3000 Research Drive, Richardson, TX 75082
- 800.222.0193
- 469.624.8000
- Fax 469.624.7153
- Technical Support 800.932.6993
- www.amx.com

Appendix A - Upgrading the Firmware

Overview

IMPORTANT: *The information in this Chapter does not pertain to the 4K HDMI Wallplate TX as the device does not contain upgradeable firmware.*

The NetLinx Studio software application (available for free download from www.amx.com) provides the ability to transfer KIT files to NetLinx devices such as DXLink Receivers. The firmware on the Receivers can be upgraded in the field. When Receivers are being used in conjunction with a switcher, the switcher's integrated Master is used for the KIT file transfer.

FIG. 26 shows a Receiver bound to the Enova DGX 1600's integrated Master in NetLinx Studio's OnLine Tree. Follow the instructions on the top of page 65 to prepare for KIT file transfer and the instructions on page 66 for the actual transfer.
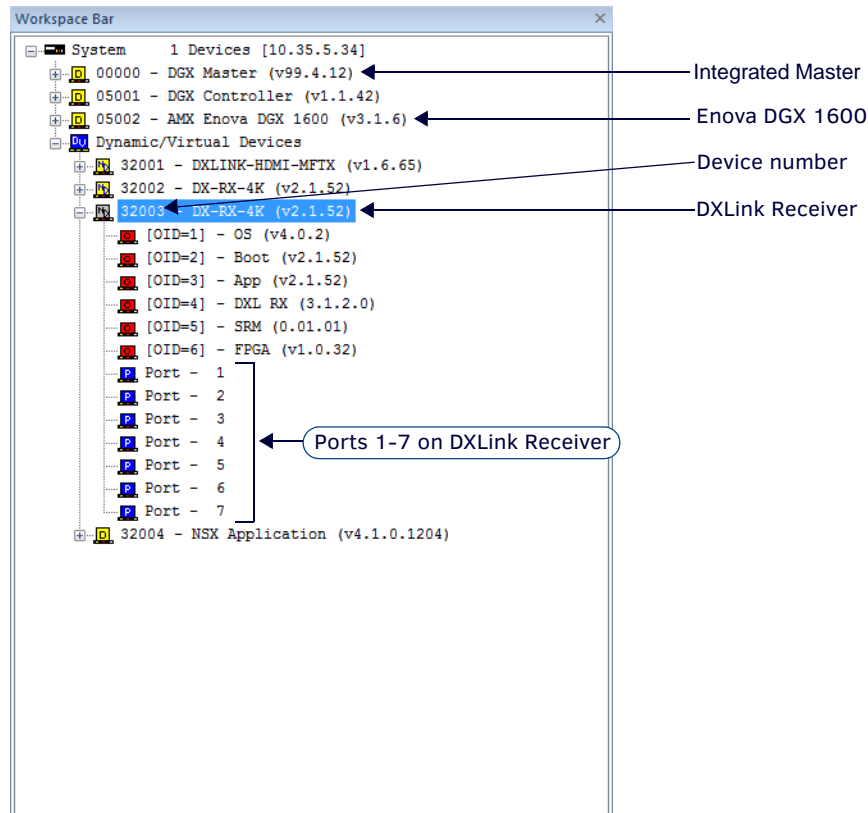

FIG. 26 NetLinx Studio – Integrated Master, Enova DGX 1600, DXLink Receiver

Preparing for KIT File Transfers

NOTE: *The DX-TX-DWP-4K does not require any special steps to prepare for upgrades. This section only applies to the DX-RX-4K.*

To prepare for KIT file transfers:

1. Check to be sure #3 Toggle on the bottom of the Receiver is set to ON.
2. Verify that you have the latest version of NetLinx Studio on your PC.
   If the version is not the latest –
   - Use the Web Update option in NetLinx Studio's Help menu to obtain the latest version.
   Or
   - Go to www.amx.com and login as a Dealer to download the latest version.
3. Download the latest Firmware (KIT) file from www.amx.com on the DXLink product page to your PC.
   (Place KIT files on a local drive for speedy throughput.)
4. Verify the following:
   a. Verify that an Ethernet/RJ-45 cable is connected from the switcher's integrated Master to the network (e.g., from the LAN 100/1000 port on an Enova DGX 32 to a LAN).
   b. Verify that the target Receiver is connected via its DXLink connector to a DXLink 4K Output Board on the switcher.
   c. Verify that the switcher is powered on.
5. Launch NetLinx Studio and open the OnLine Tree.
6. Bind the target Receiver to the integrated Master: select and right-click the RX; from the context sensitive menu, select Network Bind/Unbind Device (be sure the check box is selected); click OK.
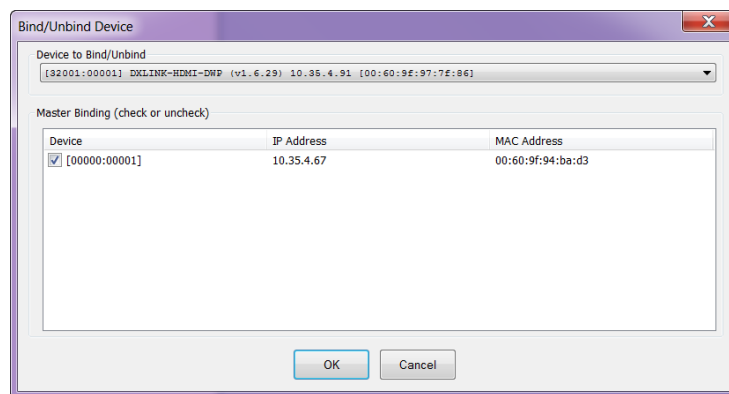
7. Determine the Device Number assigned to the target Receiver when it was bound. For the Device Number location, see FIG. 26 on page 64. The Receiver is ready for the KIT file transfer.

Important Upgrade Information

CAUTION: *Upgrading the firmware is a serious action in that if the upgrade fails, it can leave the system completely non-operational.*

In the Event of Power Loss During an Upgrade

If power loss occurs *before* any firmware information has been transferred – when power is restored, the module will remain operational using the original firmware.

If power loss occurs *after* some of the firmware information has been transferred *but before* the transfer is complete – when power is restored, the module will time out and will not operate until a successful upgrade takes place.

CAUTION: *If the application signals a failure, you <u>must</u> immediately reboot the Transmitter or Receiver and attempt to upgrade the firmware again, as the module is in an unknown state and cannot be guaranteed to be operational.*

Firmware Versions

The following table contains firmware version information for the DXLink 4K units.

DXLink Firmware Versions			
Applies to	**Version #**	**Date**	**Key Features**
DX-RX-4K	v2.1.74	May 2016	• Initial hardware support

NOTE: *For additional details on version differences, see the applicable Readme file(s).*

Transferring KIT Files

The system will be non-operational during the upgrade procedure below.

The *Firmware Transfers* tool in NetLinx Studio is used to map KIT files to DXLink 4K Receivers. The instructions below assume that the preparations on the previous pages have been completed.

To send a KIT file to a DXLink Receiver:

1. In NetLinx Studio from the Tools menu, select "Firmware Transfers > Send to NetLinx Device" to open the Send to NetLinx Device dialog box.
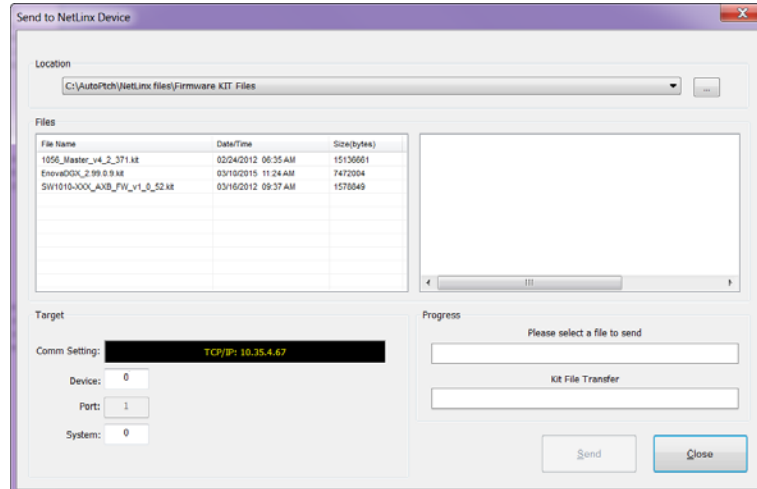
2. Click Browse (...) to navigate to the target directory. The selected directory path is displayed in the Location text box. KIT files in the target directory display under Files.
3. Select the appropriate KIT file from the list.
4. Enter the Device and System numbers (see FIG. 26 on page 64) for the target module in the Device and System text boxes.
5. Review the File and Target Device information for accuracy before you send.
6. Click Send to upgrade the firmware on the DXLink 4K Receiver.
    *   The Power LED blinks during the process for upgrading the firmware (this is normal).
    *   The progress of the upgrade displays in the Upload Status field. Status is also indicated in the Status bar at the bottom.
    *   The success of the upgrade or any errors that occur will be reported.*

* If an incorrect file has been selected or if the upgrade has failed, the Power LED will briefly illuminate solid green then change to a slow blink. To recover (in either case), reboot the Receiver and browse to select the correct file and then re-send.

7. Close the window when the transfer is complete.
8. When the process is complete, cycle power using the new image on the DXLink Module:
    a. Unplug the desktop power supply from the AC power source and plug it back in.
    Or
    b. If the power source is the switcher, unplug the RJ-45 connector from the DXLink port on the module and plug it back in.
9. Wait 60 seconds and refresh the System OnLine Tree, and check to be sure the firmware version matches the version selected for the upgrade.

Reminders

When the file transfer is complete, remember to do the following:
*   Set the #1 Toggle on the DXLink Module to OFF.
*   If you set the PC to Static IP Mode for a Virtual NetLinx Master file transfer, return the setting to "Obtain an IP address automatically" (see page 77).

Appendix B - Telnet (Terminal) Commands

Establishing a Terminal Connection Via Telnet

IMPORTANT: *The information in this Appendix does not pertain to the 4K HDMI Wallplate TX as the device does not communicate with or receive control from a terminal connection.*

Telnet terminal communication is accessed remotely via TCP/IP. The DXLink unit *must* have its own TCP/IP address for a Telnet connection. The connection can be started from the Windows taskbar (see below) or in NetLinx Studio (see the following page).

By default, a User Name and Password are not applied to the Telnet port (Port 23). Therefore, the port does not require login credentials.

**Welcome Banner with and without Security Enabled:**

- Without Telnet security enabled, a session will begin with a welcome banner similar to the following:
  ```
  Welcome to DXLINK-HDMI-RX 0.0.106.0 Copyright AMX LLC 2011
  >
  ```
- If Telnet security is enabled, user credentials are required:
  ```
  Enter username: admin
  Enter protected password: ****
  Welcome to DXLINK-HDMI-RX 0.0.106.0 Copyright AMX LLC 2011
  >
  ```

NOTE: *When security is enabled, a user can retry logging in three times before being disconnected (for information on setting a username and password, see page 68).*

IMPORTANT: *If auto-setup mode is being used, Telnet is the only way to access some of the network settings. Also note that some network settings will disable the auto-setup feature (for auto-setup requirements, see the "Quick Reference Table – Modes for Handling Addressing/Networking" on page 14).*

To establish a terminal connection via Telnet at the CMD prompt:

1. From your Windows Taskbar (at the far left), select Start > Run to open the Run dialog box.
2. Type `cmd` in the Open field.
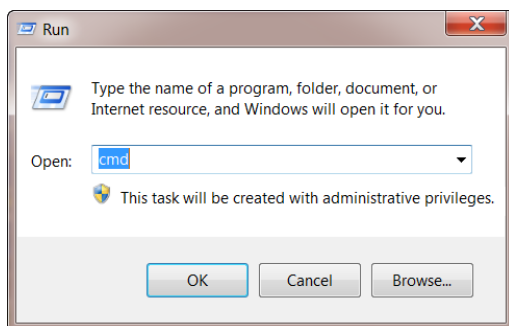
3. Click OK to open an instance of the Windows command interpreter (cmd.exe).
4. At the prompt (>), type `telnet` followed by a space and the Receiver's IP address.
   Example:
   ```
    >telnet XXX.XXX.XXX.XXX
   ```
   A Telnet session opens for the Receiver and the welcome banner appears.*
5. At the prompt, type the Telnet command (see the table starting on page 69) and press Enter.

* If you are using Windows 7 and receive an error message, you may need to enable Telnet by completing the following: (1) go to Start / Control Panel / Programs and Features, (2) on the left, select "Turn Windows features on or off," (3) select the check-boxes Telnet Client and Telnet Server, and (4) click OK.

To establish a terminal connection via NetLinx Studio:

1. In the Online Tree, select the DXLink unit and right-click to access the short-cut menu.

2. Select Launch Telnet Window via NetLinx Studio.
   The Telnet window opens and the welcome banner appears.
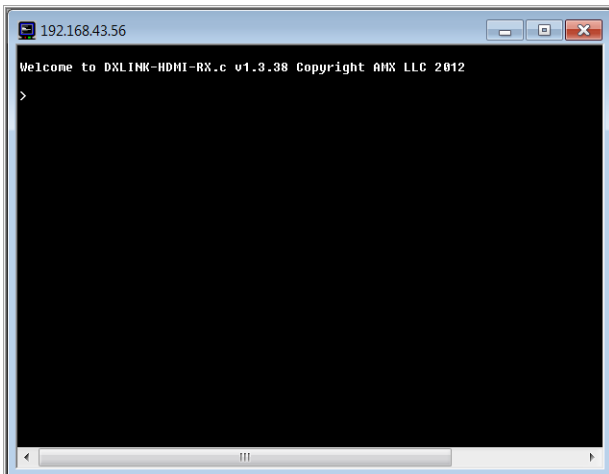
3. At the prompt (>), type the Telnet command and press Enter.

Telnet Username and Password

The following commands are used to set the Telnet username and password for a Telnet connection:

- `Set Telnet Username`
- `Set Telnet Password`

By default, both the username and password are blank (empty strings). Performing a factory reset on the device with the Pushbutton will return these values to that default. For details, see page 42.

- Username – Setting the Username will have no effect if the password remains blank (empty string). That is, defining the username alone will not result in Telnet prompting for a user login.

- Password – Setting the Password will cause Telnet to prompt for a user login, whether the username has been defined or not. If the username has been defined, this value must be entered.
  However, since the password can be set independently of the username, it's possible to have a password defined, but the username still at its default (blank, empty string). In this case do not enter anything for the username when prompted. Simply press Enter, which will then present the password prompt. Here, the defined password must be entered in order to successfully open the Telnet session.

Additional Notes

- Both the Telnet username and password are case-sensitive.
- Three consecutive, unsuccessful attempts to log in to Telnet will cause the Telnet window to close.
- Re-launching Telnet will again present the login prompt, with a fresh "batch" of login attempts.
- If a Telnet login fails because of an incorrect username, an "Invalid Password" message will appear
- (as opposed to an "Invalid Username" message).
- The username and password are saved after reboot or power cycle.
- The username and password are deleted/removed after a factory reset.

NOTE: *Enova DGX 100 Series Switchers support Telnet commands and BCS commands over Telnet, while Enova DGX 8/16/32/64 Switchers support BCS tunneling access over TCP/IP. For information, see the applicable manual.*

Setting a Telnet Username and Password

To set a Telnet username and password:

1. Establish a terminal connection via Telnet (see page 67).
2. Type `Set Telnet Username`, and press Enter.
   a. The program will prompt you to enter a new Telnet username; enter a username and press Enter.
   b. The program will indicate that the username is being stored.
3. Type `Set Telnet Password`, and press Enter.
   a. The program will prompt you to enter a password; press Enter twice to clear both the Telnet username and password.
   b. Enter a password and press Enter.
   c. The program will prompt you to re-enter the password; re-enter the password and press Enter.
      The program will indicate that the password is being stored.

Telnet Commands

The Telnet commands listed in the table below can be sent directly to the Transmitter or Receiver via a Telnet terminal session.

- The default Telnet port is 23. A value of 0 (zero) disables the Telnet server.
- Telnet is enabled by default.

In the terminal program, type Help or a question mark (?) and press Enter to access the Help Menu and display the terminal commands described in the table below.

Telnet Commands	
Command	**Description**
? or Help	Display the commands listed in this table.

DEVICE STATUS	Displays device status of a specified device, port, system (<D:P:S>).
	
	NOTE: *Devices other than the DXLink Receiver itself will be ignored.*
	
	Example:
	<pre>>device status 32002:1:0
	Device Status
	------------- 	
	Device 32002 AMX LLC,DXLINK-HDMI-RX, 0.0.106.0 contains
	7 Ports
	Port 1 - Channels:255 Levels:8
	    MaxStringLen=64 Types=8 bit MaxCommandLen=64 Types=8 bit
	    The following input channels are on:None
	    The following output channels are on:None
	    Level 1=0 Supported data types=UByte,UInt
	    Level 2=0 Supported data types=UByte,UInt
	    Level 3=0 Supported data types=UByte,UInt
	    Level 4=0 Supported data types=UByte,UInt
	    Level 5=0 Supported data types=UByte,UInt
	    Level 6=0 Supported data types=UByte,UInt
	    Level 7=0 Supported data types=UByte,UInt
	    Level 8=0 Supported data types=UByte,UInt
	></pre>

DIPSWITCH	Displays the current value for each of the DIP switch's four toggles.
	Example:
	<pre>>dipswitch
	Dipswitch - ON OFF OFF OFF
	></pre>

EXIT	Exit the Telnet session
FACTORYFWIMAGE	Resets unit to factory firmware image and reboots DXLink Receiver.

Telnet Commands	

GET CONFIG	Displays the current connection settings.
	Example:
	<pre>>get config
	     Device number: 7010
	     Connection Settings
	     ------------------------------ 	
	     Mode: NDP
	     System Number: 2155
	     Master IP/URL: 192.168.43.83
	     Master Port: 1319
	     Username:
	     Password:
	
	     IP Settings
	     ------------------------------ 	
	     HostName: DXL-RX-36d0110
	     Type: DHCP
	     IP Address: 192.168.43.63
	     Subnet Mask: 255.255.255.0
	     Gateway IP: 192.168.43.2
	     MAC Address: 00:60:9f:99:26:f1
	
	 DHCP Server : 192.168.43.2
	 Lease Origin : THU 01/09/2031 12:59:02
	 Lease Duration : SUN 01/12/2031 12:59:02 (259200 sec)
	 Lease Renew (T1): SAT 01/11/2031 00:59:02 (129600 sec)
	 Lease Rebind (T2): SUN 01/12/2031 03:59:02 (226800 sec
	
	     DNS Servers
	     ------------------------------ 	
	     Domain suffix: amx.internal
	     Entry 1: 192.168.40.7
	     Entry 2: 192.168.40.8</pre>**NOTE:** *The system number and IP addressing information displayed is reflective of actual operating values, not stored parameters.*

GET CONNECTION	Shows the Master connection information.
	Example:
	<pre>>get connection
	     Connection Settings
	     ------------------------------ 	
	     Mode: UDP URL
	     System Number: 1
	     Master IP/URL: 192.168.44.53
	     Master Port: 1319
	     Username:
	     Password:</pre>

GET DEVICE	Displays the device number.

GET DNS	Gets the list of DNS entries.
	Example:
	<pre>>get dns
	     DNS Servers
	     ------------------------------ 	
	     Domain suffix: amx.internal
	     Entry 1: 192.168.40.7
	     Entry 2: 192.168.40.8</pre>**NOTE:** *When the DXLink Receiver is in DHCP Mode, these are active values, NOT the stored values that only apply to Static IP Mode.*

GET ETHERNET MODE	Displays the current LAN configuration setting.
	Settings are _either_ "auto" in which the LAN driver will discover its settings based on the network it is connected to _or_ <speed> and <duplex> where speed and duplex are either 100 full or 10 half.
	Example:
	<pre>>GET ETHERNET MODE
	 Ethernet mode is auto.</pre>**NOTE:** *See SET ETHERNET MODE.*

GET FRIENDLY	Displays the device's friendly name (for NDP).

Telnet Commands	

GET IP	Displays the IP configuration of a device.
	The device displays its D:P:S, Host Name, Type (*DHCP* or *Static*), IP Address, Subnet Mask, Gateway IP, and MAC Address.
	Example:
	<pre>>GET IP
	     HostName DXL-RX-36d0110
	     Type DHCP
	     IP Address 192.168.43.63
	     Subnet Mask 255.255.255.0
	     Gateway IP 192.168.43.2
	     MAC Address 00:60:9f:99:26:f1</pre>[[*also displays "Lease" details; see example for GET CONFIG command*]]

GET LOCATION	Displays the location parameter for NDP, which is set by using the *SET LOCATION* command.
GET SN	Returns the device's serial number.
LED [ON|OFF]	Enables/Disables LEDs for identification.

MSG [ON|OFF]	Enables/Disables extended diagnostic messages.
	• MSG ON [error|warning|info|debug] sets the terminal program to display log messages generated by the Master. The level of log printed to the terminal window depends both on the level used when sending the message and the output level selected with "msg on."
	For example if log output is enabled via "msg on warning" then logs produced at levels AMX_ERROR and AMX_WARNING will be displayed, but not logs produced at levels AMX_INFO or AMX_DEBUG.
	The order of severity from highest to lowest is ERROR, WARNING, INFO, DEBUG.
	If no severity is supplied with "msg on," the default setting is WARNING.
	• MSG OFF disables the display.
	Example:
	<pre>> MSG ON
	  Extended diagnostic information messages turned on.
	> MSG OFF
	  Extended diagnostic information messages turned off.</pre>

NDP UNBIND	Clears the NDP binding to a Master (requires reboot to take effect).

PING [ADDRESS]	Pings an address (IP or URL), to test network connectivity to and confirms the presence of another networked device.
	The syntax matches the PING application in Windows or Linux.
	Example:
	<pre>>ping 192.168.29.209
	  192.168.29.209 is alive.</pre>

REBOOT	Reboots the DXLink Receiver.
	Example:
	<pre>>REBOOT
	  Rebooting...</pre>

RENEW DHCP	Renews / releases the current DHCP lease for the DXLink Receiver. **NOTE:** *Because sending this command can result in the unit acquiring a new DHCP address and the functionality of the endpoints is dependent on the mated IP addresses of the TX (host) and RX (device), the USB connection may need to be re-established.* Example: <pre>>RENEW DHCP</pre>
RESET FACTORY	Resets the device's stored parameters to factory default state including removal of all security settings, resetting to DHCP. This command will cause an automatic reboot. **NOTE:** *This command does not reset the device to the factory software image.*
SEND_COMMAND [D:P:S,"'command'"]	Sends the specified SEND_COMMAND (does not work with queries) to the current DXLink Receiver. **NOTE:** *Commands cannot be forwarded to other D:P:S. Asynchronous notifications are available for the Transmitters via Telnet (and NetLinx Studio).* Example: <pre>send_command 6501:1:0,"'VIDIN_AUTO_SELECT-ENABLE'"</pre>
SEND_STRING [D:P:S,"string"]	Sends the specified SEND_STRING to the current DXLink Receiver or connected Master. **NOTE:** *Commands cannot be forwarded to other D:P:S.* Example: <pre>send_string 32001:1:1,"27,18,0"</pre>

Telnet Commands	
SET CONNECTION	Sets the Master connection settings interactively, allowing the user to specify the mode (for descriptions of various connection modes, see page 14). • If the mode is TCP or UDP, the Master URL and port number can be specified as well. • If Auto is selected, the System number can be specified. • After all data is entered, if the parameters have changed, the DXLink Receiver will disconnect from the Master, and begin trying to connect with the new settings. **NOTE:** *These changes do not require a reboot to take effect.*
SET DEVICE	Sets the device number, and stores it in non-volatile memory. Syntax: `SET DEVICE <num>` The valid range of device numbers is 0 to 31999. • If the user enters a number outside that range, then no change will be made and the DXLink Receiver will issue an error message. • A Device Number of '0' means that the DXLink Receiver will accept the auto-assigned device number from the Master. • If the new device number is different from the old device number, the DXLink Receiver will disconnect from the Master, and begin trying to connect with the new settings. **NOTE:** *These changes do not require a reboot to take effect.*

SET DNS	Sets the DNS configuration of the DXLink Receiver, only as applied to Static IP Mode (DNS settings in DHCP Mode are received from the DHCP server).
	Syntax:
	`SET DNS`
	This command prompts you to enter a Domain Name, DNS IP #1, DNS IP #2, and DNS IP #3.
	    ● Enter Y (yes) to approve/store the information in the Master.
	    ● Enter N (no) cancels the operation.
	
	NOTE: *The device must be rebooted to enable new settings.*
	
	Example:
	`>SET DNS`
	`-- Enter New Values or just hit Enter to keep current settings --`
	`  Enter Domain Suffix: amx.com`
	`  Enter DNS Entry 1  : 192.168.20.5`
	`  Enter DNS Entry 2  : 12.18.110.8`
	`  Enter DNS Entry 3  : 12.18.110.7`
	`   You have entered: Domain Name: amx.com`
	`                     DNS Entry 1: 192.168.20.5`
	`                     DNS Entry 2: 12.18.110.8`
	`                     DNS Entry 3: 12.18.110.7`
	`  Is this correct? Type Y or N and Enter -> Y`
	`   Settings written. Device must be rebooted to enable new settings`

SET ETHERNET MODE	This command sets the current LAN configuration settings per new mode.
	Syntax:
	`SET ETHERNET MODE <newmode>`
	Values for *newmode* are:
	`auto`
	Or
	`100 full or 10 half`
	
	NOTE: *This command requires a reboot to enable new settings.*
	
	Examples:
	`set ethernet mode auto`
	`set ethernet mode 100 full`
	
	NOTE: *See GET ETHERNET MODE.*

SET FRIENDLY	Set the device's friendly name for NDP to <name>. Syntax: `SET FRIENDLY <name>` • Maximum length = 25 characters. If the name entered exceeds 25 characters, it will be truncated. • The value is stored in non-volatile memory. • If no value specified, an automatic name consisting of AMX, the product name, and serial number will be used. **NOTE:** *This command requires a reboot to enable new settings.*

Telnet Commands	

SET IP	Sets the IP configuration of a specified device.
	Enter a Host Name, Type (*DHCP* or *Fixed*), IP Address, Subnet Mask, and Gateway IP Address.
	
	IMPORTANT: *Host Names may only contain ASCII letters "a" through "z" (not case-sensitive), digits "0" through "9", and the hyphen ("-").*
	
	NOTE: *DHCP implies "DHCP with link-local fallback".*
	
	NOTE: *For NetLinx Masters, the Host Name can only consist of alphanumeric characters.*
	
	• Enter Y (yes) to approve/store the information on the Master.
	• Enter N (no) to cancel the operation.
	
	NOTE: *This command requires a reboot to enable new settings.*
	
	Example:
	<pre>>SET IP
	 --- Enter New Values or just hit Enter to keep current settings ---
	 Enter Host Name: DXL-RX-36d0110
	 Enter IP type. Type D for DHCP or S for Static IP and then Enter: DHCP
	  You have entered: Host Name DXL-RX-36d0110
	                    Type DHCP
	 Is this correct? Type Y or N and Enter -> y
	 Settings written. Device must be rebooted to enable new settings.</pre>
	NOTE: *DXLink Modules can also be set to Static IP or DHCP Mode via the front panel ID Pushbutton.*

SET LOCATION	Sets the location parameter for NDP. Syntax: <pre>SET LOCATION <location></pre>• Maximum length = 25 characters. If the name entered exceeds 25 characters, it will be truncated. **NOTE:** *This command requires a reboot to enable new settings.*

SET TELNET PORT	Sets the device's IP port listened to for Telnet connections.
	Example:
	<pre>>SET TELNET PORT
	 Current telnet port number = 23
	 Enter new telnet port number (Usually 23)(0 = disable Telnet):</pre>Once you enter a value and press the Enter key, you get the following message:
	<pre> Setting telnet port number to 23
	 New telnet port number set, reboot the device for the change to take effect.</pre>
	NOTE: *This command requires a reboot to enable new settings.*
	
	IMPORTANT: *If you set the Telnet port to "0" to disable it, you will need to reset it with a SEND_COMMAND in NetLinx Studio (see page 59).*

SET TELNET USERNAME	**NOTE:** *This command is supported but is not presently in the Help file list of commands.* Sets the Username for a secure Telnet session. ● Default = blank (no username required) ● For details, see page 68.
SET TELNET PASSWORD	**NOTE:** *This command is supported but is not presently in the Help file list of commands.* Sets the Password for a secure Telnet session. • Default = blank (no password required) • For details, see page 68.
SHOW CONNECTION LOG	Shows the Master connection log for the device.

SHOW CONNECTION STATS	Shows the connection statistics for the device.
	Output similar to the following example:
	<pre>>show connection stats
	 Connection Statistics
	                 Total Last 15 Minutes
	                 ===== ===============
	 ICSP Messages: 10039 received 333 received
	                  10038 transmitted 333 transmitted
	 Blink Messages: 5014 received 166 received
	
	 IP Statistics:
	   RX packets:29298 errors:0 discarded:0
	   TX packets:15286 errors:0 discarded:0</pre>

SHOW EDID	Retrieves the downstream EDID and displays an EDID report. In addition to a raw EDID file (EDID Hex Dump), the EDID report includes Product Information (Sink), Supported Video Modes, and Monitor Support.

Telnet Commands	

SHOW LOG	Displays the message log.
	Syntax:
	`SHOW LOG <start>`
	Specifies the message number to start displaying.
	`SHOW LOG <all>` or `SHOW LOG`
	Displays all messages.

SHOW VS100 STATS	Displays DXLink transport information (MSE values, length, etc.).

Master Connection Modes

The mode of communication used for connection to the Master is specified via the SET CONNECTION Telnet command (see page 72).

Connection mode setting options are AUTO, TCP URL, UDP URL, or NDP (default) as described:

- **AUTO** – This mode utilizes TCP communication. It looks for a matching System Number and attempts to come online with the first Master it sees with that System Number.
- **TCP URL** – TCP; the Master is specified via URL.
- **UDP URL** – UDP; the Master is specified via URL.
- **NDP** – UDP; this mode utilizes the NDP binding process to assign the DXLink Module (the physical device) to a Master (or Virtual Master) via NetLinx Studio. Once bound, communications are conducted via UDP.

NOTE: *In URL modes, the Master can use either an IP address or a DNS name.*

Guidelines

UDP mode is recommended for the following types of installations:

- Small-to-medium residential and corporate installations on a single subnet
- Segmented control network installations (control network is a separate switching domain and subnet from other network equipment)
- Installations with the total number of NetLinx / ICSNET devices on a single Master exceeding 128

TCP mode is recommended for installations where (a) the switching domain of the network is subject to "bursty" traffic or heavy streaming activity (>20 Mbps consumption by streaming) and where (b) the total number of NetLinx / ICSNET devices on a single Master is less than 128.

TCP vs. UDP

- TCP – Protocol has a built-in retry mechanism.
- UDP – Protocol does not have a built-in retry mechanism, but consumes fewer resources on the Master. AMX's UDP implementation of NetLinx employs a retry mechanism to provide the reliability of TCP with the resource efficiency of UDP.

URL vs. NDP vs. Auto

Determining which connection method to use for Master Connection Mode is essentially a matter of deciding what information the device should use to identify the correct Master to connect to.

The default mode is NDP; the mode can be changed via the `SET CONNECTION` Telnet command (see page 72).

- **URL** – The device connects to the Master with the specified URL. The device must be configured with the URL of a specific Master via the `SET CONNECTION` Telnet command (see page 72).
- **NDP** – The device connects to the Master it's been bound to, which is based on the Master's MAC address. The binding is configured via NetLinx Studio. Once bound, the device must be unbound using either NetLinx Studio or the Telnet `NDP UNBIND` command before being re-bound to a different Master.
  Alternatively, NDP devices can be bound/unbound via options on the Master's Web Configuration pages (System > Manage NetLinx). For details, refer to the *WebConsole & Programming Guide – NX-Series Controllers* (System - Manage NetLinx section).
- **Auto** – The device connects to the first Master it finds with the specified System Number.
  The device must be configured with the desired system number via the `SET CONNECTION` Telnet command (see page 72).

Use of this method requires that only one Master has any particular system number and is visible to the subnet. If this is the case, then Auto is the simplest choice. However, with Auto, you are not hard-bound to a particular Master. Therefore, if at some point in the future, another Master is configured with the same system number, the result is that the DXLink Module could show up on that other Master.

Notes on Specific Telnet Clients

Telnet and terminal clients exhibit different behaviors in some situations. This section states some of the known anomalies.

Windows Client Programs

Anomalies occur when using a Windows® client if you are not typing standard ASCII characters (i.e., using the keypad and the Alt key to enter decimal codes). Most programs will allow you to enter specific decimal codes by holding Alt and using keypad numbers.

Example

For example, hold Alt, hit the keypad 1, then hit keypad 0, then release Alt. The standard line feed code is entered (decimal 10). Windows will perform an ANSI to OEM conversion on some codes entered this way because of the way Windows handles languages and code pages.

The following codes are known to be altered, but others may be affected depending on the computer's setup.

- Characters **15, 21, 22**, and **any characters above 127**.

This affects both Windows Telnet and Terminal programs.

Linux Telnet Client

The Linux Telnet client has three anomalies that are known at this time:

- A null (\00) character is sent after a carriage return.
- If an "Alt 255" is entered, two of the "255" characters are sent (per the Telnet RAFT).
- If the code to return to Command mode is entered (Alt 29 which is CTRL+]), the character is not sent, but the Telnet Command Mode is entered.

Appendix C - Virtual NetLinx Master

Overview Virtual NetLinx Master (Masterless)

IMPORTANT: *The information in this Appendix does not pertain to the 4K HDMI Wallplate TX as the device does not communicate with or receive control from NetLinx Studio.*

A Virtual NetLinx Master can be created using your PC, which allows NetLinx Studio to facilitate direct file transfers to a DXLink Receiver when a Master is not available.

Four basic procedures must be completed for Virtual Master file transfers:

- Set the PC to a static IP address (see below).
- Create a Virtual Master in NetLinx Studio (see page 78).
- Prepare the DXLink Receiver by placing it in Static IP Mode, assigning a device ID, and setting the connection type to TCP (see page 79).
- Transfer the files using a Virtual Master TCP/IP connection (for IRL file transfers, see page 43; for Firmware file transfers, see page 64).

Setting PC to Static IP Address

IMPORTANT: *When you change the PC's settings to a static IP address, the address must be in the same subnet as the DXLink unit (the default static IP address for DXLink Receivers is 192.168.1.2).*

Important Information for PCs with Multiple Network Access Points

If the PC has more than one point of network access (multiple NIC cards or wireless networking), check to see if one of the connections uses an IP address of 192.168.1.x before proceeding.

To check for multiple networks:

1. Open the PC's Start menu (at the lower left of the desktop on the Taskbar) and select Run.
2. Enter cmd and click OK.
3. At the prompt, enter `ipconfig /all` and press the Enter key.
4. Check the IP Addresses under Connection.

If the PC or Laptop is currently using a connection with an IP address of 192.168.1.x, you will need to disconnect the connection.

To disconnect a network connection:

1. From the PC's Control Panel, select Network and Internet \ Network Connections.
2. Right-click the network connection and select Disable.

NOTE: *The following procedure uses the most current version of Windows available at the time of publication.*

To set a PC to Static IP Mode:

1. From the PC's Control Panel, select Network Sharing Center.
2. Click "Change adapter settings" (top left).

3. Right-click on Local Area Connection and select Properties.
   The Local Area Connection Properties dialog box opens.
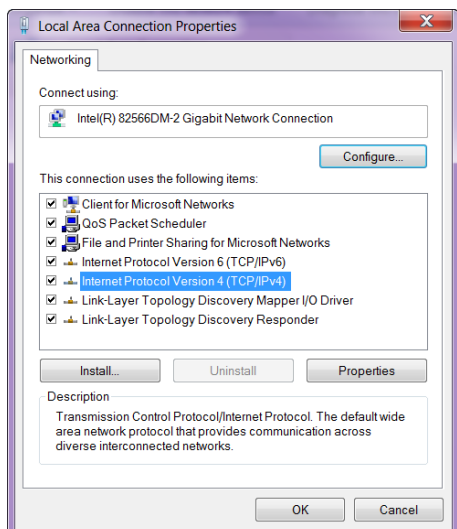
4. From the list of "This connection uses the following items" (see previous step), highlight Internet Protocol Version 4 (TCP/IPv4) and click Properties.

   The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens.
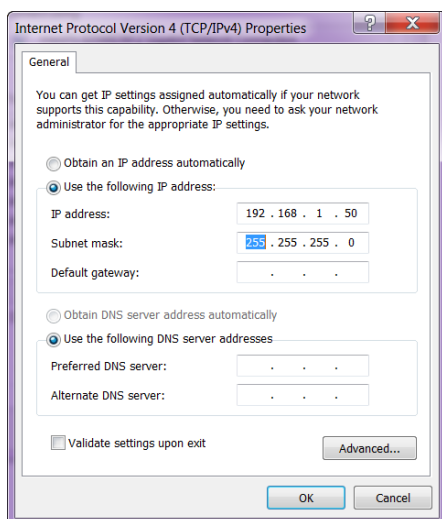
5. Select "Use the following IP address" and enter 192.168.1.50 (or the IP range of the switcher).

6. Press the Tab key on your keyboard to auto-fill the Subnet mask field.

7. Click OK and click Close.

IMPORTANT: *When finished using the PC as a Virtual Master, change the setting in the dialog box shown in Step 4 back to "Obtain an IP address automatically."*
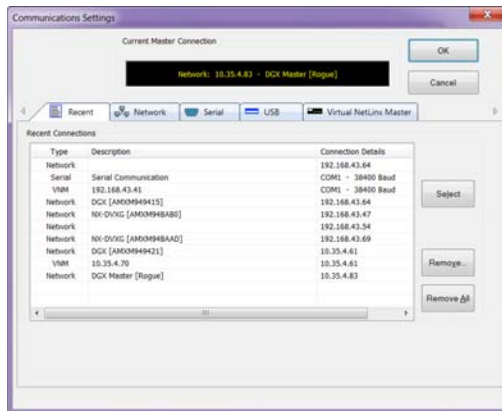
Creating a Virtual Master

To create a Virtual Master in NetLinx Studio:

1. Open NetLinx Studio.
2. From the Settings menu, select Workplace Communication Settings.
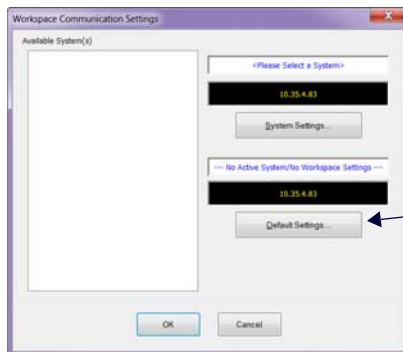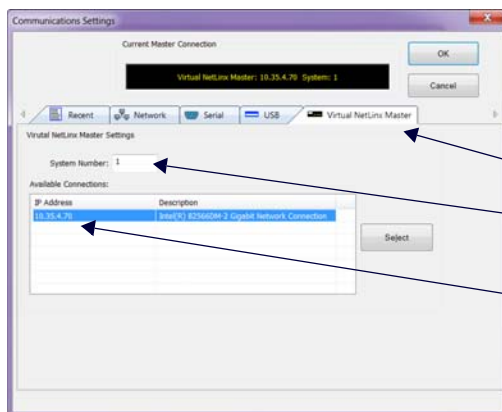

Click to open the Communication Settings dialog box

3. Click the Default Settings button.
   The Communication Settings dialog box opens.

4. Select the Virtual NetLinx Master tab.

Virtual NetLinx Master tab
Master System Number

IP address (PC's static IP address)

5. Under Virtual NetLinx Master Options:
   a. Optional – Change the Master System Number (default = 1; range = 1 to 65535).
   b. Select the desired IP Address in the Available Connections list (this will be the static IP address that the PC was set to in the previous instructions).
6. Click Select.
7. Click OK to save the changes and close the dialog box.
   The Virtual Master displays in the NetLinx Studio's OnLine Tree.

IMPORTANT: *When transferring files via a Virtual Master, a direct connection must be made between the module and the PC via the module's ICS LAN 10/100 port.*

Preparing a DXLink Unit to Work with a Virtual Master

Preparing the DXLink Receiver to work with a Virtual Master requires placing the unit in Static IP Mode, assigning it a device ID, and setting the connection type to TCP.

NOTE: *When using the first set of instructions below, only one DXLink Module can be connected to the Virtual Master at a time because the static IP address is the same for all modules.*

To place a DXLink Module in Static IP Mode:

1. Connect the DXLink unit via its ICS LAN 10/100 port to the PC acting as a Virtual Master.
2. Set the DIP Switch's #1 and #3 Toggles to ON.
3. Apply power to the DXLink Module.
4. Once the DXLink Module has booted up (the Power LED on the front of the module turns a constant green, indicating a ready state), press and hold the ID Pushbutton for at least 10 seconds.
5. The NetLinx LEDs toggle back and forth during this time and then blink faster in unison; release when the faster blink starts.
   - When the Pushbutton is released, the DXLink Module toggles either from static to dynamic (DHCP) IP addressing or vice versa and remains in that mode until the ID Pushbutton is used to set it again.
   - The DXLink Module automatically reboots to complete the process.

To assign a device number and set the connection type:

1. From the Tools menu in NetLinx Studio, select Telnet Session.
   The TELNET Communication Selection dialog box opens.
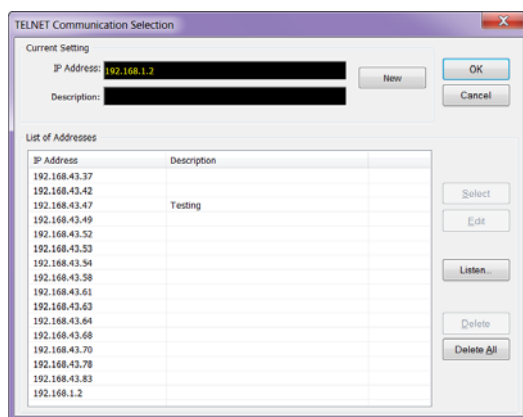
2. Click the New button.
   The New Telnet Address dialog box opens.
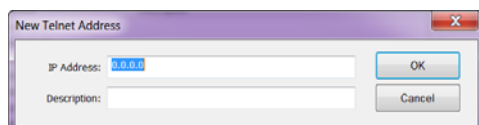
3. Enter the default static IP address for the DXLink unit: 192.168.1.2 and click OK.
4. Select the new address in the List of Addresses.
5. Click the Select button and click OK.
6. A Telnet session opens.
7. At the prompt (>), type `SET DEVICE <num>` and press Enter.
   - For the variable `<num>`, the valid range of device numbers is 0 to 31999.
   - Setting a device number does not require a reboot to take effect.
8. At the prompt, type `SET CONNECTION` and press Enter.
9. Specify TCP for the connection and the PC's static IP address for the Master.
   The Receiver displays under the Virtual Master and is now ready for file transfers.

NOTE: *The process can be repeated for additional DXLink Receivers.*

File transfers via a Virtual Master:

- IRL file transfers, see page 43
- Firmware file transfers, see page 64

IMPORTANT: *Once you have finished using the Virtual Master – If you disabled a network connection before setting the PC's static IP address, be sure to disable the Virtual Master's network connection and enable the original connection.*

# Appendix D – Cable Details and Pinout Info

Overview

Both DXLink Transmitters and Receivers have connectors for HDMI.

HDMI Connector Cable Pinout

HDMI connectors are found on all DXLink units. These connectors are used to pass HDMI or DVI-D signals (using a DVI-to-HDMI cable adapter) from a source device to a DXLink Transmitter or from a DXLink Receiver to a destination device. The following table provides cable pinout details for HDMI connections.

HDMI Connector Cable Pinout	
Pin	**Signal Assignment**
1	TMDS Data 2+
2	TMDS Data 2 Shield
3	TMDS Data 2-
4	TMDS Data 1+
5	TMDS Data 1 Shield
6	TMDS Data 1-
7	TMDS Data 0+
8	TMDS Data 0 Shield
9	TMDS Data 0-
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock-
13	CEC
14	Utility
15	SCL
16	SDA
17	DDC/CEC Ground
18	+5 V Power (max. 55 mA)
19	Hot Plug Detect
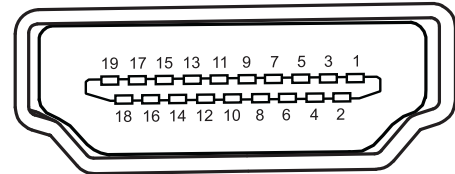
NOTE: *DVI-to-HDMI cables may be required for particular system needs (see page 81).*

FIG. 27 HDMI pinout information and connector pins

DVI Pinout for DVI-to-HDMI Cable Adapter

The pinout in FIG. 28 is for DVI-to-HDMI cable adapters which can be used with the modules when a DVI-I signal is required.
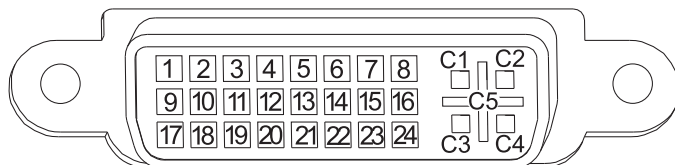

FIG. 28 DVI pinout for DVI-to-HDMI cable adapter

DVI Connector Pinout			
DVI Input Pin #	**Signal Name**	**DVI Output Pin**	**Signal Name**
1	Data 2-	1	Data 2-
2	Data 2+	2	Data 2+
3	Gnd	3	Gnd
4	n/c	4	n/c
5	n/c	5	n/c
6	DDC-CLK	6	DDC-CLK
7	DDC-Data	7	DDC-Data
8	n/c	8	n/c
9	Data 1-	9	Data 1-
10	Data 1+	10	Data 1+
11	Gnd	11	Gnd
12	n/c	12	n/c
13	n/c	13	n/c
14	+5 VDC in	14	+5 VDC out*
15	Gnd	15	Gnd
16	Hot-Detect	16	Hot-Detect
17	Data 0-	17	Data 0-
18	Data 0+	18	Data 0+
19	Gnd	19	Gnd
20	n/c	20	n/c
21	n/c	21	n/c
22	Gnd	22	Gnd
23	CLK+	23	CLK+
24	CLK-	24	CLK-
C1	n/c	C1	n/c
C2	n/c	C2	n/c
C3	n/c	C3	n/c
C4	n/c	C4	n/c
C5	n/c	C5	n/c

*The +5 VDC on output pin 14 supplies a maximum of 55 mA.

Appendix E - Supported Output Resolutions

ICSP Settable Output Resolutions

The resolutions in the following table are supported on the Receivers and can be set using a SEND_COMMAND. The horizontal/ vertical/refresh information from the Resolution Name (in the first column) can be entered in a SEND_COMMAND command (`VIDOUT_RES_REF`) to specify scaling parameters for the Receiver. For complete command information, see page 49.

IMPORTANT: *The resolutions and timings in the table below can only be changed with SEND_COMMANDs.*

HDMI and DVI Supported Output Resolutions					
Resolution Name	Horizontal Active Pixels	Vertical Active Pixels	Refresh (Hz)	Comments	Video Standard
640x480,60	640	480	60		VESA DMT
640x480,72	640	480	72		VESA DMT
640x480,75	640	480	75		VESA DMT
800x600,60	800	600	60		VESA DMT
800x600,72	800	600	72		VESA DMT
800x600,75	800	600	75		VESA DMT
1024x768,60	1024	768	60		VESA DMT
1024x768,70	1024	768	70		VESA DMT
1024x768,75	1024	768	75		VESA DMT
1280x720,50	1280	720	50	720p	CTA 861
1280x720,60	1280	720	60	720p	CTA 861
1280x768,60	1280	768	60		
1280x800,60	1280	800	60		VESA CVT
1280x1024,60	1280	1024	60		VESA DMT
1360x768,60	1360	768	60		VESA DMT
1440x900,60	1440	900	60		VESA CVT
1600x1200,60	1600	1200	60		VESA DMT
1680x1050,60	1680	1050	60		VESA CVT
1920x1080,50	1920	1080	50	1080p	CTA 861
1920x1080,60	1920	1080	60	Reduced Blanking	VESA CVT-R
1920x1080p,60	1920	1080	60	1080p	CTA 861
1920x1200,60	1920	1200	60	Reduced Blanking	VESA CVT-R
3840x2160,24	3840	2160	24		CTA 861
3840x2160,25	3860	2160	25		CTA 861
3840x2160,30	3840	2160	30		CTA 861
4096x2160,24	4096	2160	24		CTA 861
4096x2160,25	4096	2160	25		CTA 861
4096x2160,30	4096	2160	30		CTA 861

NOTE: *The Consumer Technology Association (CTA) was formerly known as the Consumer Electronics Association (CEA): the CEA 861 video standard has been renamed to CTA 861.*

Digital Video Output Resolution Support

IMPORTANT: *The resolutions and timings in the list below can only be set via the Enova DGX Switcher when the DXLink Receiver is being used directly from a DXLink output board.*

CTA (RGB Color Space):

640x480p,59Hz

720x480p,59/60Hz
720(1440)x480i,59Hz
720x480p,119Hz
720x480p,120Hz
720x480p,239Hz
720x480p,240Hz
720x576p,50Hz
720(1440)x576i,50Hz
720x576p,100Hz
720x576p,200Hz

768x576p,50Hz

960x576p,50Hz
960(1920)x576i,50Hz

1280x720p,23/24Hz
1280x720p,25Hz
1280x720p,29/30Hz
1280x720p,50Hz
1280x720p,59/60Hz
1280x720p,100Hz
1280x720p,119Hz
1280x720p,120Hz

1920x1080p,23/24Hz
1920x1080i,25Hz
1920x1080p,25Hz
1920x1080i,29/30Hz
1920x1080p,29/30Hz
1920x1080p,50Hz
1920x1080p,59Hz
1920x1080p,60Hz

2560x1080p,50Hz

2560x1080p,60Hz

3840x2160p,23/24Hz

3840x2160p,29/30Hz

3840x2160p,50Hz*

3840x2160p,59/60Hz*

4096x2160p,24Hz

4096x2160p,30Hz

4096x2160p,50Hz*

4096x2160p,59/60Hz*

*Resolution is only supported in Passthrough Mode with 4:2:0 chroma sub-sampling.

NOTE: *The Consumer Technology Association (CTA) was formerly known as the Consumer Electronics Association (CEA): the CEA 861video standard has been renamed to CTA 861.*

CVR (RGB Color Space):

IMPORTANT: *The resolutions and timings in the list below can only be set via the Enova DGX Switcher when the DXLink Receiver is being used directly from a DXLink output board.*

768x480,60Hz
800x600,60Hz
800x600,120Hz
848x480,60Hz
960x600,60Hz
1024x576,60Hz
1024x640,60Hz
1024x768,60Hz
1024x768,120Hz
1064x600,60Hz
1152x720,60Hz
1152x864,60Hz
1224x768,60Hz
1280x720,60Hz
1280x768,60Hz
1280x768,120Hz
1280x800,120Hz
1280x960,60Hz
1280x1024,60Hz
1360x768,60Hz
1360x768,120Hz
1400x1050,60Hz
1440x900,60Hz
1536x960,60Hz
1600x1000,60Hz
1600x1200,60Hz
1680x1050,60Hz
1704x960,60Hz
1728x1080,60Hz
1800x1350,60Hz
1864x1050,60Hz
1920x1080,60Hz
1920x1200,60Hz
2560x1440,60Hz
3840x2160,25Hz*
3840x2160,30Hz*

* Resolution supported by Auto Scaler output of the DX-RX-4K.

CVT (RGB Color Space):

IMPORTANT: *The resolutions and timings in the list below can only be set via the Enova DGX Switcher when the DXLink Receiver is being used directly from a DXLink output board.*

640x360,85Hz
640x400,75Hz
640x400,85Hz
640x480,75Hz
640x480,85Hz
768x480,60Hz
768x480,75Hz
768x480,85Hz
800x600,50Hz
800x600,60Hz
800x600,75Hz
800x600,85Hz
848x480,50Hz
848x480,60Hz
848x480,75Hz
848x480,85Hz
960x600,50Hz
960x600,60Hz
960x600,75Hz
960x600,85Hz
1024x576,50Hz
1024x576,60Hz
1024x576,75Hz
1024x576,85Hz
1024x640,50Hz
1024x640,60Hz
1024x640,75Hz
1024x640,85Hz
1024x768,50Hz
1024x768,60Hz
1024x768,75Hz
1024x768,85Hz
1064x600,50Hz
1064x600,60Hz
1064x600,75Hz
1064x600,85Hz
1152x720,50Hz
1152x720,60Hz
1152x720,75Hz
1152x720,85Hz
1152x864,60Hz
1224x768,50Hz
1224x768,60Hz
1224x768,75Hz
1224x768,85Hz
1280x720,50Hz
1280x720,60Hz
1280x720,75Hz
1280x720,85Hz
1280x768,50Hz
1280x768,60Hz
1280x768,75Hz
1280x768,85Hz

1280x800,50Hz
1280x800,75Hz
1280x800,85Hz
1280x960,50Hz
1280x960,60Hz
1280x960,75Hz
1280x960,85Hz
1280x1024,50Hz
1280x1024,60Hz
1280x1024,75Hz
1280x1024,85Hz
1360x768,50Hz
1360x768,60Hz
1360x768,75Hz
1360x768,85Hz
1400x1050,50Hz
1400x1050,60Hz
1400x1050,75Hz
1440x900,60Hz
1440x900,75Hz
1440x900,85Hz
1536x960,50Hz
1536x960,60Hz
1536x960,75Hz
1600x1000,50Hz
1600x1000,60Hz
1600x1200,50Hz
1600x1200,60Hz
1680x1050,50Hz
1680x1050,60Hz
1704x960,50Hz
1704x960,60Hz
1728x1080,50Hz
1728x1080,60Hz
1864x1050,50Hz
1864x1050,60Hz
1920x1080,50Hz
1920x1200,50Hz
2048x1152,50Hz
2048x1152,85Hz
2048x1536,50Hz
2560x1440,50Hz
2560x1600,50Hz
2728x1536,50Hz

DMR (RGB Color Space):

IMPORTANT: *The resolutions and timings in the list below can only be set via the Enova DGX Switcher when the DXLink Receiver is being used directly from a DXLink output board.*

1280x800,60Hz
1366x768,60Hz
1600x900,60Hz

DMT (RGB Color Space):

IMPORTANT: *The resolutions and timings in the list below can only be set via the Enova DGX Switcher when the DXLink Receiver is being used directly from a DXLink output board.*

640x350,85Hz
640x400,85Hz
640x480,60Hz
640x480,72Hz
640x480,75Hz
640x480,85Hz
720x400,85Hz
800x600,56Hz
800x600,60Hz
800x600,72Hz
800x600,75Hz
800x600,85Hz
848x480,60Hz
1024x768,43Hz*
1024x768,60Hz
1024x768,70Hz
1024x768,75Hz
1024x768,85Hz
1152x864,70Hz
1152x864,75Hz
1152x864,85Hz
1280x800,60Hz
1280x960,60Hz
1280x960,75Hz
1280x960,85Hz
1280x1024,43Hz*
1280x1024,60Hz
1280x1024,75Hz
1280x1024,85Hz
1360x768,60Hz
1366x768,60Hz
1600x1200,48Hz*
1600x1200,60Hz

* Format uses interlaced video resolution.

Appendix F - Ground Wire Attachment

Applicability

If the system is experiencing problems with delivery of DXLink signals to/from an Enova DGX Digital Media Switcher, adding a ground wire from the TX/RX to the switcher may improve performance. The problem is likely caused by the use of a single phase powered system that does not provide an earth ground for a source or destination's chassis and shields. This can inject unnecessary AC voltage on the HDMI cable shield that can lead to DXLink signal integrity issues. To check for indications of this type of power in the system, look for a two pronged plug or a cord that has only two wires.

NOTE: *Attaching ground wires to DXLink Transmitters and Receivers is only required when instructed to do so by Technical Support or an electrical technician.*

Items Required
☐ Phillips #1 screwdriver
☐ 6 foot ground wire with ring terminal ends

Attaching a Ground Wire to a Common Earthed Ground

Connect the running end of the ground wire (fixed end attached to DXLink Module or Wallplate) to a common earthed ground (ideally, referenced to the Enova DGX Switcher).

IMPORTANT: *If one DXLink Transmitter or Receiver is grounded, any remaining ungrounded units that are connected to the same board on the Enova DGX Switcher must also be grounded.*

Attaching a Ground Wire to a Module or Wallplate

IMPORTANT: *Before attaching the ground wire to the chassis, ensure all connectors are clear.*

To attach a ground wire to a module or wallplate:

1. If powered, power down the DXLink unit.
2. Remove the designated ground screw and washer from the rear of the unit.
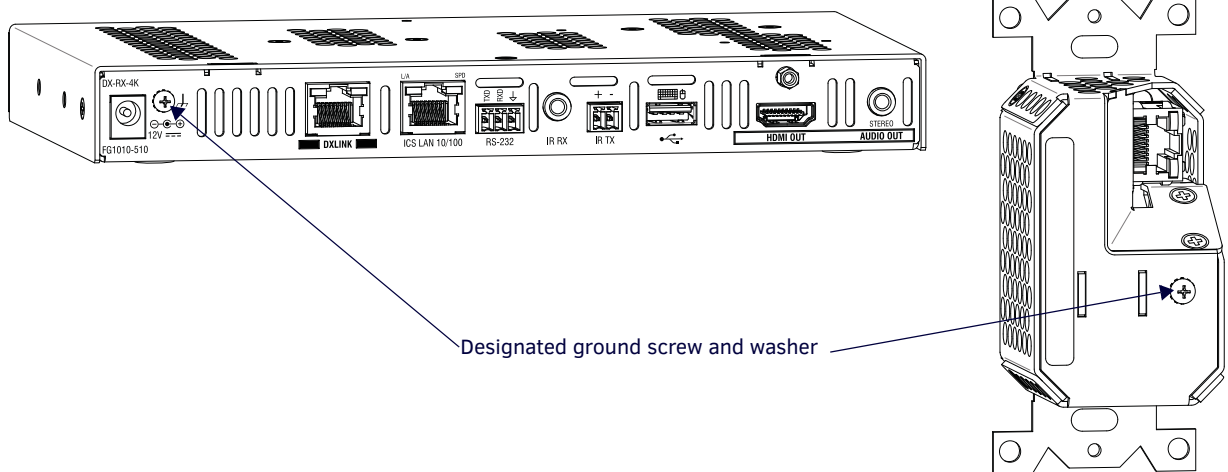

Designated ground screw and washer

FIG. 29 Remove designated ground screw and washer

3. Secure the ring terminal of the ground wire against the chassis with the ground screw and washer.

4. Ensure the ground wire is positioned so that it does not interfere with any of the connectors.
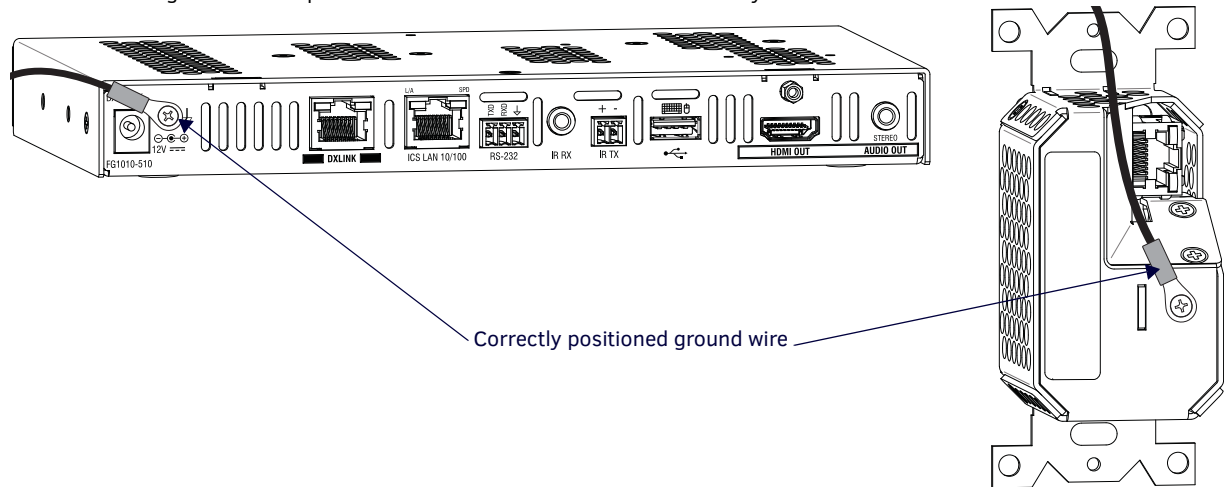

Correctly positioned ground wire

FIG. 30 Position ground wire away from connectors

5. Attach the ground wire to a common earthed ground (see "Attaching a Ground Wire to a Common Earthed Ground" on previous page).

6. Continue the installation process (or reapply power to the unit).

Appendix G - DXLink Compatibility

Overview

While DXLink Twisted Pair 4K hardware is intended for primary use with other DXLink Twisted Pair 4K hardware (full capability compatibility), it is also compatible with DXLink Twisted Pair hardware. When DXLink Twisted Pair 4K is used in conjunction with DXLink Twisted Pair hardware, Input and Output signal support matches the lowest common denominator (e.g., if you want to use the DX-TX with the DX-RX-4K, the DX-RX-4K will behave exactly like a DX-RX). See the tables below for compatibility between hardware types.

Compatibility with DXLink Twisted Pair Endpoints

By default, DXLink 4K Input Boards provide a 4K EDID to all connected DXLink Transmitter devices. While DXLink Transmitters are supported by the DXLink 4K Input Board, the default EDID provided to the Transmitter may result in a source device (computer, media player, etc) presenting a video resolution out of the Transmitter's range. To ensure the source device presents a resolution the DXLink Transmitter can support, simply use the Enova DGX 100 Series System Configuration interface to select a non-4K EDID (All, Wide, Full in non-4K range) to ensure a supported format is requested by the DXLink Transmitter.

NOTE: *All of the DXLink Twisted Pair Transmitters (i.e., DX-TX, DX-TX-WP, and DX-TX-DWP) must be running firmware version 1.8.23 or later for compatibility with the DX-RX-4K. Likewise, the 4K HDMI Wallplate TX is only compatible with the DX-RX if the Receiver is running firmware version 1.13.24 or later.*

DXLink Twisted Pair Endpoints	DXLink Twisted Pair 4K Endpoints	Compatibility
DX-TX module*	DX-RX-4K module	Yes, endpoint or extender mode
AVB-TX-HDMI-DXLINK module (discontinued)*	DX-RX-4K module	Yes, endpoint or extender mode
DX-TX-WP*	DX-RX-4K module	Yes, endpoint or extender mode
DX-TX-DWP*	DX-RX-4K module	Yes, endpoint or extender mode
DX-RX module	DX-TX-DWP-4K	Yes, endpoint or extender mode

* This configuration of equipment supports USB HID between endpoints. Serial and IR Control is only supported between modules, not wallplate and module pairs (see the *DXLink Twisted Pair Transmitters/Receiver Hardware Reference Manual*).

Compatibility with Enova DGX DXLink Twisted Pair Input and Output Boards

NOTE: *4K HDMI Wallplate TX and 4K RX are compatible with Enova DGX DXLink Twisted Pair Input and Output Boards in an Enova DGX 100 Series enclosure, but DXLink Twisted Pair 4K Transmitters and Receivers attached to DXLink Twisted Pair equipment truncate signal support to match the capabilities of the DXLink Twisted Pair equipment.*

Enova DGX DXLink Twisted Pair Input and Output Boards	DXLink Twisted Pair 4K Endpoints	Compatibility
DGX-I-DXL	DX-TX-DWP-4K	Yes, 4 inputs per board
DGX-O-DXL	DX-RX-4K	Yes, 4 outputs per board

Compatibility with Solecis Digital Switchers

Solecis Digital Switchers	DXLink Twisted Pair 4K Endpoints	Compatibility
SDX-410-DX 4x1	DX-RX-4K	1 output
SDX-510M-DX 5x1	DX-RX-4K	1 output (powered)
SDX-810-DX 8x1	DX-RX-4K	1 output

Compatibility with Enova DVX Presentation Switchers

Enova DVX Presentation Switchers	DXLink Twisted pair 4K Endpoints	Compatibility
DVX-3x56HD	DX-TX-DWP-4K DX-RX-4K	4 inputs (powered) 2 outputs
DVX-3x55HD	DX-TX-DWP-4K DX-RX-4K	2 inputs (powered) 2 outputs
DVX-3x50HD	DX-RX-4K	2 outputs
DVX-2x55HD	DX-TX-DWP-4K DX-RX-4K	2 inputs (powered) 1 output (powered)
DVX-2x50HD	DX-TX-DWP-4K	1 output (powered)

DXLink Twisted Pair 4K and DXLink Twisted Pair Hardware Capabilities

The following tables display hardware capability differences and similarities between DXLink Twisted Pair 4K and DXLink Twisted Pair Transmitters and between DXLink Twisted Pair 4K and DXLink Twisted Pair Receivers.

Transmitter Hardware Capabilities

	DX-TX	DX-TX-WP	DX-TX-DWP	DX-TX-DWP-4K
4K Signal Support				✓
Local Power	✓			
DXLink / PoE Power	✓	✓	✓	✓
USB Program Port	✓	✓	✓	
ID Pushbutton	✓	✓	✓	
HDMI Input Port	✓	✓	✓	
HD-15 Input Port	✓	✓	✓	
Stereo Audio Input Port	✓		✓	
Digital Audio Input Port	✓			
USB HID Host Port	✓	✓	✓	
Reset Button		✓	✓	
DIP Switches	✓	✓	✓	
ICS LAN 10/100 Port	✓			
Serial Communication Support	✓			
IR Communication Support	✓			

Receiver Hardware Capabilities

	DX-RX	DX-RX-4K
4K Signal Support		✓
Local Power	✓	✓
DXLink / PoE Power	✓	✓
USB Program Port	✓	✓
ID Pushbutton	✓	✓
HDMI Output Port	✓	✓
Stereo Audio Output Port	✓	✓
USB HID Port	✓	✓
DIP Switches	✓	✓
ICS LAN 10/100 Port	✓	✓
Serial Communication Support	✓	✓
IR Communication Support	✓	✓

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