1080p and 4K AV over IP Encoders and Decoders

NetworkHD Full Product Range

WyreStorm

Quickstart Guide

WyreStorm recommends reading through this document in its entirety to become familiar with the product's features prior to starting the installation process.

NETWORKHD

IMPORTANT! Installation Requirements

WyreStorm Documentation and Firmware

Download the following items from the product page on wyrestorm.com. They are essential for accurate configuration and use of the NetworkHD system.

- Latest NetworkHD Firmware
- Management Suite v1.3 or Higher
- NetworkHD Installation Guide
- NetworkHD Technical Reference Guide
- NetworkHD Certified Switches
- NetworkHD Switch Configuration Guides
- NetworkHD Switch Mapping Worksheet
- 3rd Party Control System Drivers

Network Switch Requirements

- WyreStorm highly recommends the use of switches listed in the NetworkHD Certified Switches. These switches have been verified by WyreStorm to meet the requirements of a NetworkHD system.
- NetworkHD requires a Layer 2+ / Layer 3 managed switch network with support for Multicast & IGMP Snooping. Ensure that the switch being used supports these features and that they are configured prior to connecting the NetworkHD system.
- Configure all network switches to the exact specifications contained in the WyreStorm Switch Configurations Guides prior to connecting the NetworkHD system. This will ensure proper operation from startup.

Wiring and Connections

WyreStorm recommends that all wiring for the installation is run and terminated prior to making connections to the switcher. Read through this section in this entirety before running or terminating the wires to ensure proper operation and to avoid damaging equipment.

IMPORTANT! Wiring Guidelines

- The use of patch panels, wall plates, cable extenders, kinks in cables, and electrical or environmental interference will have an adverse effect on signal transmission which may limit performance. Steps should be taken to minimize or remove these factors completely during installation for best results.
- WyreStorm recommends using pre-terminated HDMI and DP cables due to the complexity of these connector types. Using pre-terminated cables will ensure that these connections are accurate and will not interfere with the performance of the product.

LAN Port Wiring

The NetworkHD Series LAN port is a 1GbE link for connection to a 1000BASE-T Ethernet device port. Refer to IEEE 802.3ab for official guidance on the Ethernet link. Cables must be tested to 100MHz across the entire link. 1000BASE-T uses the IEC 60603-7 8P8C modular connector.

HDMI/DVI Wiring

WyreStorm recommends using pre-terminated HDMI and DVI cables due to the complexity of these connector types. Using pre-terminated cables will ensure that these connections are accurate and will not interfere with the performance of the product.

Warranty Information

WyreStorm Technologies LLC warrants that its products to be free from defects in material and workmanship under normal use for a period of five (5) years from the date of purchase. Refer to the Product Warranty page on wyrestorm.com for more details on our limited product warranty.

5 YEAR WARRANTY™

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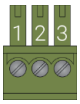
support@wyrestorm.com

RS-232 Wiring

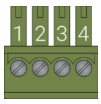
The NetworkHD devices use a 3-pin or a 4-pin phoenix with no hardware flow control. Most control systems and computers are DTE where pin 2 is RX, this can vary from device to device. Refer to the documentation for the connected device for pin functionally to ensure that the correct connections can be made.



WyreStorm Connector			3rd Party Device
Pin 1	TX (Transmit)	---> To --->	RX (Receive)
Pin 2	RX (Receive)	---> To --->	TX (Transmit)
Pin 3	G (Ground)	---> To --->	G (Ground)

Devices that use a 3-pin connection include:

NHD-110-TX
NHD-110-RX
NHD-250-RX
NHD-400-DNT-TX



WyreStorm Connector			3rd Party Device
Pin 1	12V DC Out	No Connection	Reserved
Pin 2	TX (Transmit)	---> To --->	RX (Receive)
Pin 3	RX (Receive)	---> To --->	TX (Transmit)
Pin 4	G (Ground)	---> To --->	G (Ground)

Devices that use a 4-pin connection include:

NHD-400-E-RX
NHD-400-RX
NHD-600-TX
NHD-600-RX

IR TX/RX Guidelines

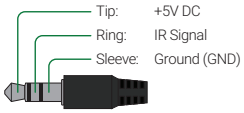
- Using WyreStorm infrared emitters and receivers is the best way to ensure that most IR coding formats are transmitted and received by the NetworkHD system. Other 3rd party emitters and receivers can be used; however, these devices must operate in the same manner as the WyreStorm devices.
- Due to differences in IR across 3rd party control systems their IR ports should never be connected directly to a NetworkHD system as an incompatibility may exist. WyreStorm offers a cable that compensates for voltage differences as well adjusts for differences in the pins used within the port. Refer to the CAB-IR-LINK product page for more information.

IR TX Port Pinout

Connection for IR TX (transmit) uses a 3.5mm (1/8in) mono plug.

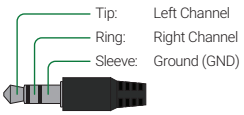
IR RX Port Pinout

Connection for IR RX (receive) uses a 3.5mm (1/8in) stereo jack that outputs +5V DC to power the included IR receiver.

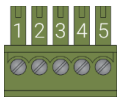


Audio Wiring

NetworkHD uses three different audio outputs. A 3.5mm (1/8in) TRS Stereo Jack audio connection, a 3-pin phoenix unbalanced audio connection and a 5-pin phoenix balanced audio connection.



WyreStorm Connector			3rd Party Device
Pin 1	L (Left Signal)	---> To --->	Left Signal (L+)
Pin 2	R (Right Signal)	---> To --->	Right Signal (R+)
Pin 3	GND (Ground)	---> To --->	Left Ground (L-) Right Ground (R-)



WyreStorm Connector			3rd Party Device
Pin 1	Left Positve (L+)	---> To --->	Left Positive (L+)
Pin 2	Left Negative (L-)	---> To --->	Left Negative (L-)
Pin 3	Ground (G)	---> To --->	Ground (G)
Pin 4	Right Negative (R-)	---> To --->	Right Negative (R-)
Pin 5	Right Positive (R+)	---> To --->	Right Positive (R+)

Devices that use a 3.5mm connection include:

NHD-400-TX
NHD-400-RX v2
NHD-400-DNT-TX
NHD-600-TX
NHD-600-RX

Devices that use a 3-pin connection include:

NHD-110-TX
NHD-110-RX
NHD-250-RX

Devices that use a 5-pin connection include:

NHD-400-RX v3

Setup and Configuration

IMPORTANT! Installation Guidelines

- Do not connect the power supply until all NetworkHD devices are connected to the network switch.
- NetworkHD Series uses DHCP to assign IP addresses by default. In the absence of a DHCP server an AutoIP address will be assigned in the subnet 169.254.0.0/16. Ensure the PC being used for configuration obtains an IP via DHCP or is set to an address in the AutoIP range prior to starting the configuration process.
- In order to configure the NetworkHD encoders and decoders, the AV port on the NHD-000-CTL MUST be connected to the same LAN/VLAN and Subnet as the NetworkHD encoders and decoders.
- In order for the devices in the system to be controlled via a 3rd party controller on a different VLAN, the CONTROL port MUST be connected to the same LAN/VLAN and Subnet as the control system.
- The NHD-000-CTL's two Ethernet ports are designed to be used in different Networks or VLANs. When using a single Network or VLAN for example when using NetworkHD Touch – do not connect both ports – only use the AV port of the CTL.

Installation and Connections

1. Install NetworkHD devices to allow airflow through the product - WyreStorm recommends using the NetworkHD rack mounts. The install location should be dry, well ventilated and guaranteed to maintain the mandatory operating temperature range of the product.
2. Connect sources to the NetworkHD encoders using a DisplayPort or HDMI cable from a quality brand such as WyreStorm Essentials ensuring a firm port connection.
3. Connect the HDMI display to the NetworkHD decoders using an HDMI cable from a quality brand such as WyreStorm Essentials ensuring a firm port connection.
4. Connect NetworkHD encoders, decoders, and CTL to the network switch using well terminated and tested category cable, whilst ensuring compliance with IEEE 802.3an (10GbE encoder/decoder port) or IEEE 802.3ab (for CTL, encoder, and decoder 1GbE ports).
5. Optionally connect the LAN port to equipment following the guidance in the LAN Port Wiring section.
6. Optionally connect the encoder/decoder RS-232 port to equipment following the pinout in the RS-232 Wiring section.
7. Optionally connect the Audio In or Out to an audio device following the pinout in the Audio Wiring section.

Download the **NetworkHD Switch Mapping Worksheet** from any NetworkHD product page to keep track of Mac addresses, device and alias names for later reference. This will aid in any reconfiguration or troubleshooting.

NetworkHD Console Configuration

In addition to the steps below more information on configuration can be found in the NetworkHD Installation Guide.

1. Connect a computer running Windows™ to the same LAN/VLAN as the NetworkHD components and ensure its IP is within the same subnet as the NetworkHD default 169.254.x.x IP addresses. The NHD-000-CTL is set to a static address of 169.254.1.1 by default – do not choose this address for your PC.
2. Power On the NetworkHD devices by connecting the included power supplies to the **Power Input** or by powering On the PoE switch.
3. Open the WyreStorm Management Suite (Available from the WyreStorm website) and launch the **NetworkHD 000 Series Console** and press **Search**.

Note: If a no devices are discovered, verify that encoders/decoders, CTL and PC are within the same subnet scope and within the same range of the CTLs AV Port and disable or create an exception for the **NetworkHD Console** in the **Windows Firewall.**

4. Configure the system as per the instructions in the NetworkHD Installation Guide. Right Click on the NHD-x00-TX/RX to see its available options, including setting the devices IP address and setting an Alias name. You will also find other configuration options under the **Batch Settings window.**

Note: If a 3rd Party control system with a WyreStorm driver for NetworkHD is going to be used, the encoders must use the names IN1, IN2, etc. This also applies to decoders, OUT1, OUT2, etc. For example, IN1-Satellite Receiver 1.

5. Upload to the configuration to the NHD-000-CTL by right clicking the CTL in the **Other Devices** section and selecting Upload.
6. Configure the scaling, HDCP values of each decoder based on the requirements of the content and display using the settings found in the **Video** tab in the **Batch Settings** screen.

NHD-000-CTL Default Settings	
IP Address:	CTRL Port: 192.168.11.243 | AV Port: 169.254.1.1
Default User:	admin
Default Password:	admin

Specifications - NHD-000-CTL

Communication and Control	
Ethernet	1x LAN AV 8-pin RJ-45 female | 1x LAN Control 8-pin RJ-45 female | 10/100 Mbps auto-negotiating
RS-232	1x RS-232 6-pin Phoenix Connector
Power	
Power Supply	Input: 100~240V AC 50/60Hz | Output: 12V DC 1A
PoE	<15.4W | 802.3af
Max Power Consumption	1.6W
Environmental	
Operating Temperature	32°F ~ 113°F (0°C ~ 45°C) | 10% ~ 90%, non-condensing
Storage Temperature	-4°F to ~ 158°F (-20°C ~ +70°C) | 10% ~ 90%, non-condensing
Maximum BTU	5.45 BTU/hr
Dimensions and Weight	
Rack Units/Wall Box	0.58U
Height	26mm/1.1in
Width	93.2mm/3.67in
Depth	138.7mm/5.47in
Weight	0.4kg/0.88lbs
Regulatory	
Safety and Emission	CE | FCC | RoHS | EAC

Specifications - NetworkHD 100/200/400/600 Series

Audio and Video				
	110 Series	**NHD-250-RX**	**400 Series**	**600 Series**
Inputs	**TX** 1x 19-pin HDMI type A female **RX** 1x 8-pin RJ-45	1x 8-pin RJ-45 (Transmission from TX)	**TX** 1x 19-pin HDMI Type A **RX** 1x 8-pin RJ-45	**TX** 1x DisplayPort 20-pin 1x HDMI 19-pin type A 1x 3.5mm (1/8in) TRS Stereo **RX** 1x 8-pin RJ-45
Outputs	**TX** 1x 8-pin RJ-45 female 1x Audio Out: 3-pin Phoenix **RX** 1x 19-pin HDMI Type A 1x Audio Out: 3-pin Phoenix	1x 19-pin HDMI Type A 1x Audio Out: 3-pin Phoenix	**TX** 1x 19-pin HDMI Type A 1x 3.5mm (1/8in) TRS Stereo 1x 8-pin RJ-45 **RX** 1x HDMI Out 19-pin type A 1x Audio Out: 5-Pin Phoenix 1x 3.5mm (1/8in) TRS Stereo (v2)	**TX** 1x 8-pin RJ-45 1x 3.5mm (1/8in) TRS Stereo **RX** 1x HDMI 19-pin type A 1x 3.5mm (1/8in) TRS Stereo
Output Video Encoding	H.264/H.265 (H.265 only on 110s)	H.264	JPEG 2000	SDVoE
Encode/Decode Data Rate	2~30Mb/s	Max: 30Mb/s per stream	850Mbps	10Gbps
Max End to End Latency	60~90 ms (Low latency mode) | 250~300 ms (High quality mode)	~80ms (low latency mode) | ~300ms (high quality mode)	1 video frame latency (pass-through mode) 16ms @60fps | 2 video frames latency (scaler/VW mode) 33ms @60fps	Genlock Mode: Uncompressed = 30us, Compressed <120us Fast Switch Mode: 1~2 video frames = min. between 16.7 – 33.4ms @ 60fps
Audio Formats	2ch PCM	2ch LPCM 48KHz	2ch LPCM | Multichannel: LPCM up to 7.1 and up to DTS:X and Dolby Atmos	2ch PCM | Multichannel: LPCM and Up to Dolby Atmos and DTS-X
Max Video Resolutions	1920x1200p @60Hz 8bit	1920x1200p @60Hz 8bit	3840x2160p @60Hz 8bit 4:2:0	2160p @60Hz 12bit 4:2:2
Max Pixel Clock	165MHz	594MHz	300 MHz	595 MHz
Supported Standards			HDR10, HLG, BT.2020	HDR10 | HLG | BT.2020 | 3D Video | Dolby Vision
Communication and Control				
HDMI	HDCP 1.4 | CEC	HDCP 1.4 | CEC	HDCP 2.2 | CEC	HDCP 2.2 | CEC
Ethernet	1x 8-pin RJ-45 female | 10/100Base-T | PoE	1x LAN (PoE): 8-pin RJ-45 ANSI/TIA-568 8P8C, 1000Base-T, PoE PD (IEEE 802.3af)	1x LAN (PoE): 8-pin RJ-45 ANSI/TIA-568 8P8C, 1000Base-T, PoE PD (IEEE 802.3af)	1x 10GbE SDVoE: 8-pin RJ-45 Female 10GBASE-T | 1x LAN: 8-pin RJ-45 Female 1000BASE-T
USB	RX: 2x USB 1.1 Device: Type A TX: 1x USB 1.1 Host: Type B Power: 5v 500ma per port Data Rate: Max 115200bps	NA	RX: 2x USB 2.0 Device: Type A TX: 1x USB 2.0 Host: Type B Power: 5v 500ma per port Data Rate: Max 9MB/s	NA
IR	1x IR TX: 3.5mm (1/8in) TS Mono | 1x IR RX: 3.5mm (1/8in) TRS Stereo | Bidirectional Over Ethernet | 2 Way | Broadcast | Routed | API Programmable	NA	1x IR TX: 3.5mm (1/8in) TS Mono | 1x IR RX: 3.5mm (1/8in) TRS Stereo | Bidirectional Over Ethernet | 2 Way | Broadcast | Routed | API Programmable*	1x IR TX: 3.5mm (1/8in) TS Mono Jack | 1x IR RX: 3.5mm (1/8in) TRS Stereo Jack 2 Way | Broadcast | Routed | API Programmable
RS-232	1x RS-232: 4-pin Phoenix | 2 Way (RX only) | Routed | API Programmable	1x RS-232: 4-pin Phoenix | 2 Way (RX only) | Routed | API Programmable	1x RS-232: 4-pin Phoenix | 2 Way (RX only) | Routed | API Programmable	1x RS-232: 4-pin Phoenix Connector | 2 Way | Broadcast | Routed | API Programmable
Power				
Power Supply	12V DC 1A	12V DC 1A	12V DC 1A	12V DC 3A
PoE	IEEE 802.3af | 12V 1A 12.95W	IEEE 802.3af (15.4W at PSE)	IEEE 802.3af (15.4W at PSE)	NA
Power Consumption	6W (DC adapter)	8.3W (with PSU)	8W (with PSU)	TX: 15.24W | RX: 18.64W
Environmental				
Operating Temperature	0 to + 45°C (32 to + 113 °F), 10% to 90%, non-condensing			
Storage Temperature	-20 to +70°C (-4 to + 158 °F), 10% to 90%, non-condensing			
Maximum BTU	20.47 BTU/hr	31 BTU/hr	51.18 BTU/hr	63.6 BTU/hr
Regulatory				
Safety and Emission	CE | FCC | RoHS | EAC | RCM			

*IR not available on 400-E models

Note: WyreStorm reserves the right to change product specification, appearance or dimensions of this product at any time without prior notice.
For full specifications for individual NetworkHD products, visit wyrestorm.com.