

4K AV over IP JPEG 2000 Encoder and Decoder

NHD-400-TX | NHD-400-RX

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



! IMPORTANT! Installation Requirements

- Visit the NetworkHD product pages download section at wyrestorm.com to check for the latest firmware, document versions, and WyreStorm Management Suite configuration tools.
- Install the latest firmware onto all encoders and decoders using the Maintenance Tool found in the Management Suite and via the NHD-000-CTL web interface. Full firmware update instructions are included with the firmware download.
- NetworkHD requires a Layer 2+ or Layer 3 managed switch network with support for Multicast & IGMP snooping enabled.
- WyreStorm highly recommends using network switches listed in the [NetworkHD Switch Recommendation Guide](#). These switches have been verified by WyreStorm to meet the requirements of a NetworkHD system.

- Configure all network switches to the exact specification of the guides at wyrestorm.com prior to connecting any NetworkHD devices.
- NetworkHD uses stateless address autoconfiguration (auto-IP) to assign link-local IP addresses in the range of 169.254.x.x to encoders and decoders out of the box. Your PC must be set to an address in this range in order to discover the encoders, decoders and NHD-000-CTL.
- WyreStorm recommends the use of the NHD-000-RACK4 for installations containing multiple NetworkHD devices. Use of this product provides an enclosure to mount and secure all NetworkHD devices in a standard 19-inch rack frame (EIA-310).
- If using a mix of HD & UHD resolution displays with differing HDCP versions and for HDMI 1.4/HDCP 1.4 displays – Ensure the decoder is set to HDCP 1.x by right clicking the unit in the NetworkHD Console and opening the video settings option.

In the Box

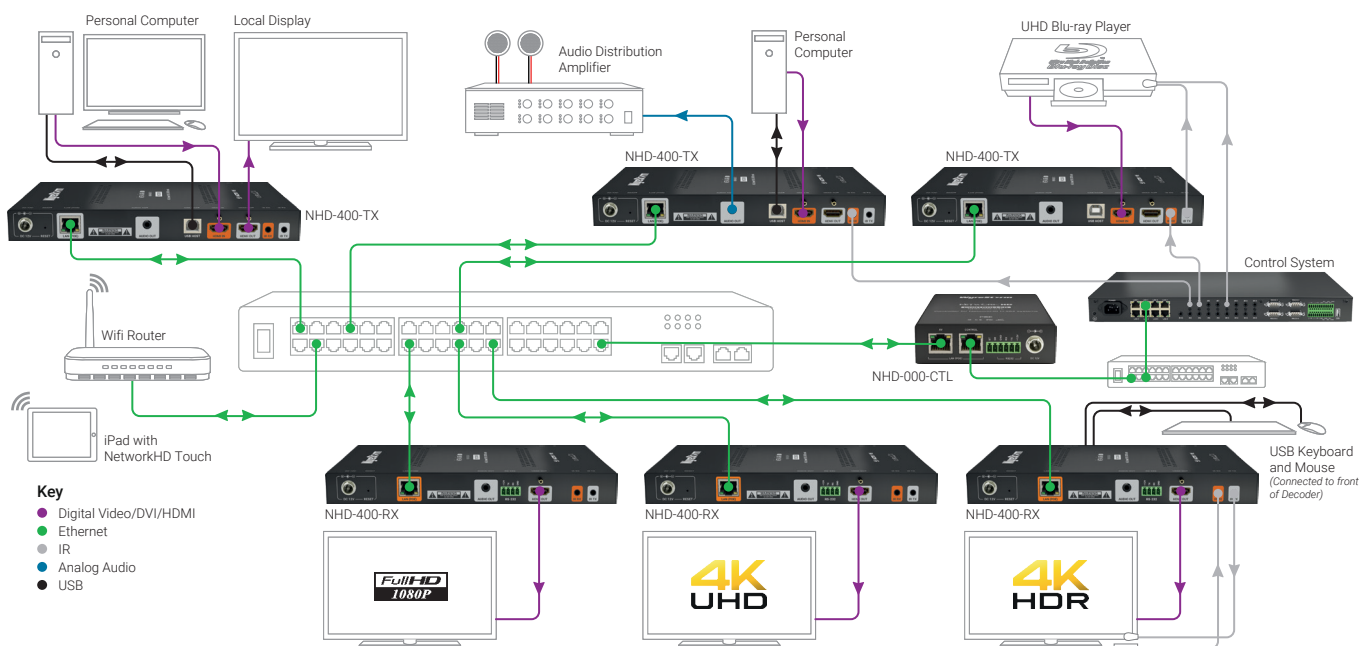
- 1x NHD-400-TX or NHD-400-RX
- 1x 12V DC Power Supply (US/UK/EU)
- 1x IR Emitter
- 1x IR Receiver
- 2x Wall Mounting Brackets
- 2x Rack Mounting Brackets
- 1x Quick Start Guide (This Document)

Additional Information

More information and required software can be found within the Download section of the product page on wyrestorm.com.

- Management Suite v1.1.0 or Higher
- NetworkHD Switch Recommendations
- NetworkHD Switch Mapping Worksheet
- NetworkHD Switch Configuration Guides
- NetworkHD Touch Installation Guide
- NetworkHD Touch User Guide
- Drivers for Popular Control Systems

Basic Wiring Diagram



Note: Connections above represent version 2 or higher. Some connections may not be available on version 1.

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 its 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.

RS-232 Wiring

The NetworkHD 400 Series uses 3-pins of 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 functionality to ensure that the correct connections can be made.

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.

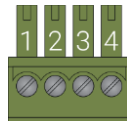
Audio Wiring

The audio connections use a 3.5mm (1/8in) TRS Stereo Jack.



LAN Port Wiring

The NetworkHD 400 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.



	WyreStorm Connector		3rd Party Device
Pin 1	12V DC Out	---> To --->	Reserved
Pin 2	TX (Transmit)	---> To --->	RX (Receive)
Pin 3	RX (Receive)	---> To --->	TX (Transmit)
Pin 4	G (Ground)	---> To --->	G (Ground)

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.



Setup and Configuration



IMPORTANT! Installation Guidelines

- Do not connect the power supply until all NetworkHD devices are connected to the network switch.
- NetworkHD 400 Series uses stateless address autoconfiguration (auto-IP) to assign link-local IP addresses in the range of 169.254.x.x to encoders and decoders out of the box. Your PC must be set to an address in this range in order to discover the encoders, decoders and NHD-000-CTL.
- 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 NHD 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 NHD devices to allow airflow through the product - WyreStorm recommend using the NHD-000-RACK4. 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 Express](#) 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 Express](#) 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 802.3ab (for CTL, encoder, and decoder 1GbE ports).
5. Optionally connect the encoder/decoder RS-232 port to equipment following the pinout in the [RS-232 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 the setup process in NetworkHD Console and help with 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 AV port 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 NHD devices by connecting the included power supplies to the **Power Input**.
3. Open the WyreStorm Management Suite (Available from the [WyreStorm](#) website) and launch the **NetworkHD Console** software 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-400-TX/RX to see its available options, including setting the device's 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 Alias prefix 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 and 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.

Troubleshooting



Verify that all NHD devices contain the latest version of firmware. This will ensure that all devices are up to date and working at their highest performance level.

NetworkHD Software fails to locate TX/RX/CTL Devices

- Verify that all NHD and Network devices are powered On.
- Adjust Windows Firewall Settings – Create an exception for NetworkHD Console.
- Verify that the PC, CTL AV Port, and NHD encoders and decoders are on the same LAN/VLAN/Subnet.
- Verify that all network switches share the same VLAN configuration.
- Reboot all system components including the NHD-000-CTL and the PC.
- Ensure that only one CTL port is connected per LAN/VLAN. If only one LAN/VLAN exists only use the AV port.
- Ensure the network switch is fully configured per the appropriate switch configuration guide.

Failure to Connect to CTL Controller

- Follow the previous steps for failing to connect to devices. If these are unsuccessful, press and hold the reset button on the front of the CTL for 5 seconds.
- After a reboot the CTL will be returned to the default IP address of 192.168.11.243 for the control port and 169.254.1.1 for the AV port.

No Image Appearing on Displays

- Verify that all NHD, Network, Source, and Display devices are powered On.
- Test sources and displays by connecting them directly together.
- Swap out the HDMI cable
- Connect the power supply to the component rather than using PoE.
- If the display is only HDMI 1.4/HDCP 1.4 – Ensure the decoder is set to HDCP 1.x by right clicking the unit in the NetworkHD Console and opening the video settings option.

Specifications

Audio and Video		
	Encoder (TX)	Decoder (RX)
Inputs	1x HDMI In: 19-pin HDMI Type A	1x 8-pin RJ-45 (Transmission from TX)
Outputs	1x HDMI Out: 19-pin HDMI Type A 1x Audio Out: 3.5mm (1/8in) TRS Stereo 1x 8-pin RJ-45 (Transmission to RX)	1x HDMI Out 19-pin type A 1x Audio Out: 3.5mm (1/8in) TRS Stereo
Output Video Encoding	JPEG 2000	
Encoding Data Rate	Max: 850Mbps	
End to End Latency (Max)	1 video frame latency (pass-through mode) 16ms @60fps 2 video frames latency (scaler/VW mode) 33ms @60fps	
Audio Formats	2ch LPCM Multichannel: LPCM up to 7.1 and up to DTS:X and Dolby Atmos	
Video Resolutions (Max)	Input at TX	
	1280x720p @50/59.94/60Hz 12bit 4:4:4 RGB 1920x1080i @29.97/30Hz 12bit 4:4:4 RGB 1920x1080p @23.98/24/25/29.97/30/50/59.94/60Hz 12bit 4:4:4/RGB 12b 3840x2160p @23.98/24/25/29.97/30Hz 10/12bit 4:2:2/4:2:0 HDR-10 3840x2160p @23.98/24/25/29.97/30Hz 8bit 4:4:4 RGB 3840x2160p @50/59.94/60Hz 8bit 4:2:0 720x480p @59.94/60Hz 12bit 4:4:4 RGB 720x576p @50Hz 12bit 4:4:4 RGB 60fps Progressive 4:4:4/RGB: 640x480 800x600 1024x768 1280x800 1280x960 1280x1024 1360x768 1366x768 1400x1050 1440x900 1600x1200 1680x1050 1920x1200	
	Output at RX	Scaler mode (always RGB 8bit)
	Pass-through mode (always RGB) Up to 3840x2160p @30Hz 8bit HDR-10 Up to 1920x2160 @60Hz 12bit	Up to 3840x2160p @30Hz Up to 1920x1080p @60Hz
Maximum Pixel Clock	300 MHz	
3D	HDMI 1.4b 3D: TnB, Sbs, F.P	
Communication and Control		
HDMI	HDCP 2.2 CEC	
Ethernet	1x LAN (PoE): 8-pin RJ-45 ANSI/TIA-568 8P8C, 1000Base-T, PoE PD (IEEE 802.3af)	
USB (Version 2 Only)	RX: 2x USB Device: USB Type A TX: 1x USB Host: USB Type B	
IR	1x IR TX: 3.5mm (1/8in) TS Mono 1x IR RX: 3.5mm (1/8in) TRS Stereo Bidirectional Over Ethernet	
RS-232	1x RS-232: 4-pin Phoenix 2 Way (RX only)	
Power		
Power Supply	12V DC	
PoE	IEEE 802.3af (15.4W at PSE)	
Max Power Consumption	8W (with PSU)	
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	51.18 BTU/hr	
Dimensions and Weight		
Rack Units/Wall Box	<1U flat on shelf 6U in NHD-000-RACK4	
Height	25mm/1in	
Width	220mm/8.67in	
Depth	130mm/5.12in	
Weight	0.75kg/1.65lbs	
Regulatory		
Safety and Emission	CE FCC RoHS	

Note: WyreStorm reserves the right to change product specification, appearance or dimensions of this product at any time without prior notice.

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.

