4K AV over IP JPEG 2000 Encoder and Decoder

NHD-400-E-TX | NHD-400-E-RX

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.

NETWORK HD 4K HDR HDMI® HDCP 2.2 PoE

⚠ 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).
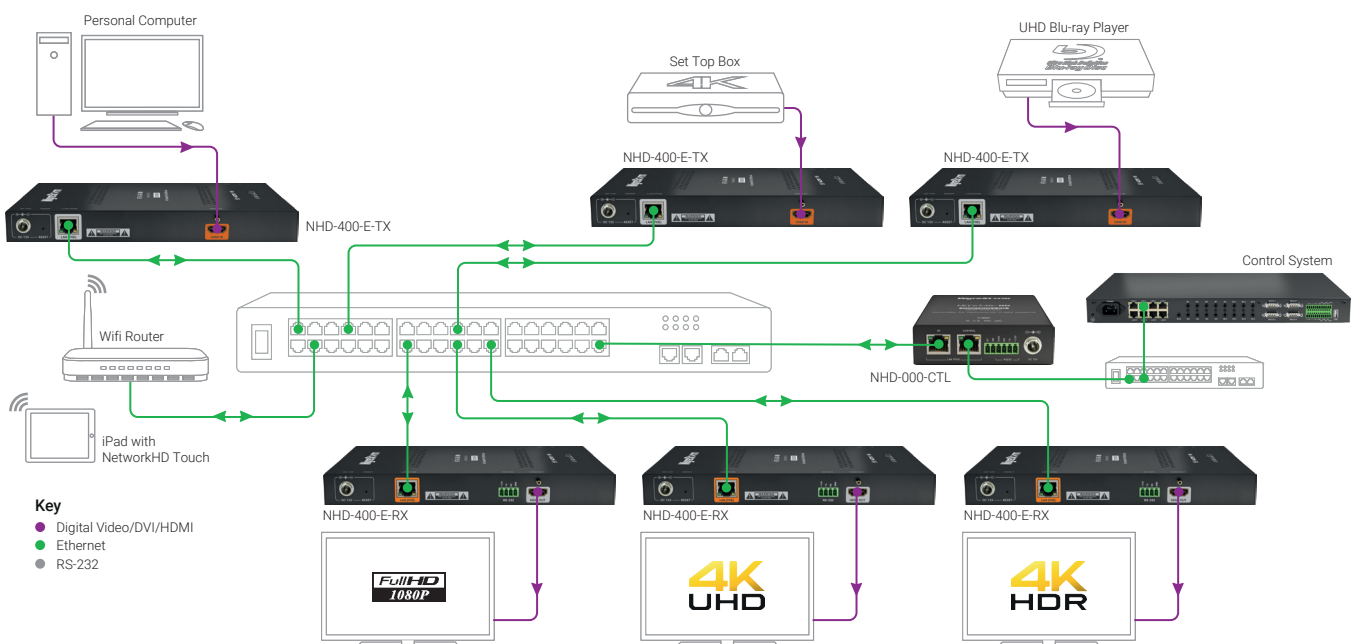
In the Box

1x NHD-400-E-TX or NHD-400-E-RX
1x 4-pin Terminal Block (RX only)
2x Mounting Brackets for NHD-000-RACK4
2x Wall Mounting Brackets
1x Quickstart 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 v1.6 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

Personal Computer

Set Top Box

UHD Blu-ray Player

NHD-400-E-TX

NHD-400-E-TX

NHD-400-E-TX

Wifi Router

Control System

NHD-000-CTL

iPad with NetworkHD Touch

Key
- ● Digital Video/DVI/HDMI
- ● Ethernet
- ● RS-232

NHD-400-E-RX

NHD-400-E-RX

NHD-400-E-RX

Full HD 1080P

4K UHD

4K HDR

UK: +44 (0) 1793 230 343 | ROW: 844.280.WYRE (9973)
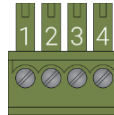support@wyrestorm.com

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 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.

RS-232 Wiring

The NetworkHD 400 Series uses 3 pins from a 4 pin phoenix connector. The RS-232 communication does not utilize hardware flow control. Please ensure that the data flow direction is observed (i.e. the NetworkHD RS-232 TX pin is connected to the attached device's RX pin) – pinouts on 3rd-party equipment will vary – please check the relevant device documentation.

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)

Setup and Configuration

⚠️ **IMPORTANT! Installation Guidlines**

- Do not connect the power supply until all NetworkHD devices are connected to the network switch.
- NetworkHD 400 Series uses either DHCP (where a DHCP server is reachable) or 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, either the "CONTROL" port on the NHD-000-CTL can be connected to the other LAN/VLAN and Subnet containing the control system directly (isolated approach, recommended) or the use of a router must be employed to route the data between different subnets by using the NHD-000-CTL "AV" port only.
- The NHD-000-CTL's two Ethernet interface ports are designed to reside in different Subnets and cannot have IP addresses/subnet masks that cause an "overlap" of the Subnets assigned to them. 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 NHD-000-CTL.

Installation and Connections

1. Install NHD devices to allow airflow through the product – when rack mounting, WyreStorm recommend using the NHD-000-RACK4 kit. 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 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 802.3ab (for CTL, encoder, and decoder 1GbE ports).
5. Optionally connect the decoder's RS-232 port to equipment following the RS-232 pinout section in the appropriate Quickstart Guide.

💡 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. Ensure that a correctly configured network switch has been setup in advance. Guides are available from the WyreStorm website.

2. 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. Ensure that no DHCP server will allocate 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.

3. Power On the NHD-000-CTL by connecting to a PoE switch or by using the included DC power adapter.

4. Power On the NHD devices by connecting the device to a PoE switch or by using the optional power adapter, PSU-12V-1A, available separately.

5. Once all devices have booted, 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 **Windows Firewall or any 3rd-party firewall/malware/antivirus software.**

6. Configure the system as per the instructions in the NetworkHD Installation Guide. Right Click on the 400 Series device 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**

7. Upload to the configuration to the NHD-000-CTL by right clicking the CTL in the **Other Devices** section and selecting Upload.

8. 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.
- Verify that the configuration in NetworkHD Console is correct based on system layout and components used.
- Ensure the network switch is fully configured per the appropriate switch configuration guide.
- Test sources and displays by connecting them directly together.
- Swap out the HDMI cable.

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.

Specifications

Connectivity		
	Encoder (TX)	**Decoder (RX)**
Inputs	1x HDMI IN: 19-pin HDMI Type A	1x LAN (PoE): 8P8C "RJ45" Socket ANSI/TIA-568
Outputs	1x LAN(PoE): 8P8C "RJ45" Socket ANSI/TIA-568	1x HDMI OUT: 19-pin HDMI Type A 1x RS-232: 4-Pin Phoenix

Transmission	
Transmssion Encoding	Proprietary stream encoding. Video compression based on JPEG 2000
End to End Latency	With RX, 1 video frame (Passthrough mode) 2 video frames (scaling/video wall) e.g. 16ms @ 60Hz
Max Transmission Bit Rate	850Mb/s

Video		
HDMI	300MHz Max.TMDS Clock	
Maximum Data Rate	8.91Gb/s HDMI	
Video Resolutions (Max)	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 3840x2160p @23.98/24/25/29.97/30Hz 10/12bit 4:2:2/4:2:0 HDR10 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	**Passthrough mode:** Output at RX matches input at TX except for: 1) YUV 4:2:0 converted to 8bit RGB 2) For resolutions above 1920x1200 at 50/60Hz framerate is halved **Scaler mode:** User-selectable scaled output 1) All formats converted to 8bit RGB 2) Up to 3840x2160p @30Hz
Supported Standards	HDR10 | BT.2020 | BT.709 | 3D Video	

Audio	
Audio Formats	PCM up to 8ch | Bitstream audio formats including Dolby Atmos & DTS:X

Communication and Control	
Ethernet	IEEE 802.1ab 1000BASE-T
HDCP	HDCP 2.2 | 1.x
EDID	Programmable EDID | EDID Copy/Import | Custom EDID
CEC	Programmable CEC Commands | Custom Command Generation (RX Only)
RS-232	Programmable RS-232 Commands | Custom Command Generation (RX Only)

Installation & Mounting	
Compatible Rack Mount Kit	NHD-000-RACK4
Included Accessories	Wall Mount Brackets | Brackets for NHD-000-RACK4
Orientation	Observe product chassis text

Power	
Power Over Ethernet	IEEE 802.3af (15.4W at PSE)
External Power Supply	Optional part: PSU-12V-1A
Nominal Power Consumption	8W

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 | RCM | CE LVD | RoHS

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