



NetworkHD™ Installation Guide

100 | 200 | 400 | 600 Series

Document Revision:	v5.0.0
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Supported Firmware:	v5.0.0 or higher

IMPORTANT! Safety Information

Safety Classifications

Note:	Provides special information for installing, configuring, and operating the equipment.
 IMPORTANT!	Provides special information that is critical to installing, configuring, and operating the equipment.
 CAUTION!	Provides special information on avoiding situations that may cause damage to equipment.
 WARNING!	Provides special information on avoiding situations that may cause physical danger to the installer, end user, etc.
 ELECTRIC SHOCK!	The source power poses an electric shock hazard that has the potential to cause serious injury to installers and end users.
 ELECTRICAL DISCONNECT:	The source power outlet and power supply input power sockets should be easily accessible to disconnect power in the event of an electrical hazard or malfunction.
 WEIGHT INJURY!	Installing some of the equipment requires two installers to ensure safe handling during installation. Failure to use two installers may result in injury.

Safety Statements

1. Read these instructions in their entirety and retain a copy for later reference.
2. Follow all instructions and heed all warnings.
3. Do not expose this apparatus to rain, moisture, sprays, drips or splashes and ensure that no objects containing liquids are placed on the apparatus, including cups, glasses and vases.
4. Do not place this unit in a confined space such as enclosed shelving, cabinets or bookshelves. Ensure the unit is adequately ventilated.
5. To prevent the risk of electric shock or fire hazard due to overheating, do not cover the unit or obstruct ventilation openings with material, newspaper, cardboard or anything that may restrict airflow into the unit.
6. Do not install near external heat sources such as radiators, heat registers, boilers or any device that produces heat such as amplifiers or computers and do not place near sources of naked flame.
7. Unplug apparatus from power supply during lightning storms or when unused for long periods of time.
8. Protect the power cable from being walked on, pinched or restricted in any way, especially at plug connections.
9. Only use attachments/accessories specified by the manufacturer.
10. Units contain non-serviceable parts - Refer all servicing to qualified service personnel.

IMPORTANT!

Do Not Hot swap HDMI or LAN connections - Please insert and extract cables carefully with the power SWITCHED OFF. Power is passed along transmissions so connecting and disconnecting cables while powered can result in damage to circuitry or possible injury.

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Overview

The following information outlines the process to configure a NetworkHD system. While the some of the information can be used for design, other documents such as the NetworkHD Technical Reference Guide provide more detail on the requirements for NetworkHD.

Before You Begin

Verify that the following items are on hand and that all documentation is reviewed before continuing.

- NetworkHD 100/200/400/600 Series components running the latest version of Firmware
- Configured Network Switches, Sources, and Displays
- Refer to the [NetworkHD Technical Reference Guide](#) for details on Network guidelines and requirements.
- PC with the WyreStorm Management Suite v1.4 or higher installed
- All required cables and connectors.....
- Latest Configuration Software, Firmware, and Documentation for NetworkHD
- Download from Website or by using this [link](#).

Pre-Configuration Guidelines and Requirements

Before designing, installing, and configuring a NetworkHD system with the content provided in this document, refer to [NetworkHD Technical Reference Guide](#) located on the website. This document contains all the information about network and infrastructure requirements for designing a NetworkHD system.

Technical Reference Guide Important Sections

System Components – Refer to this section for information on the NetworkHD components and how they can be used within a system.

Application Scenarios - Refer to this section for the various application methods that NetworkHD can be used.

System Design Guidelines and Requirements – Refer to this section for guidelines for designing a system and what is required for optimum functionality.

System Infrastructure Guidelines and Requirements – Refer to this section for guidelines and requirements for selecting network switches based on the operation of the system.

Other important information is provided in the [NetworkHD Technical Reference Guide](#). Read through the document in its entirety to be familiar with NetworkHD and how it can be used within applications.

Installation

Mounting Guidelines

NetworkHD components should be installed on a flat, level surface such as a table, cabinet top/shelf, or mounted on a wall using the included wall mount brackets. The location should be dry, well ventilated, and out of direct sunlight. Units should never be flat stacked without space between the units for ventilation and the side vent holes should not be obstructed.

Rack Mounting

For AV and IT racks, WyreStorm offers rack mount kits to allow for quick and easy installation that provides a clean properly ventilated installation. All rack mount kits provide a steel housing that can be used in a central and secure location for the components.

NHD-000-RACK3 is designed for 600 series encoders and decoders

NHD-000-RACK4 is designed for 100/200/400 series encoders (Replaces NHD-000-RACK and NHD-000-RACK2)

NHD-140-RACK-1U is designed for use with the NHD-140-TX encoder

Note: The NHD-200-TX has dipswitches to set the video source format, these switches should be set before mounting the NHD-200-TX. Refer to [NHD-200-TX Dipswitch Settings](#) for details.

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.

Network Connections

Note: Before connecting any NetworkHD devices the network switch should be fully configured to ensure proper operation. Refer to the [NetworkHD Technical Reference Guide](#) for details on Network guidelines and requirements

There are different types of network connections on NetworkHD products that require connection to different network ports and types. While most are the same, some products contain a separate port based on its functionality.

100 | 200 | 400 Series Encoders/Decoders and NHD-000-CTL LAN Ports



These units contain a network interface port that should be connected to a 1GbE link on a 1000BASE-T Ethernet switch with a cabling infrastructure that is suitable for use with IEEE 802.3ab standards with a link cable bandwidth tested to 100MHz across the entire link. This applies to the LAN ports on the Encoders, Decoders, as well as the AV/POE and Control ports on the CTL.

The LAN ports on the 100, 200 and 400 Series devices are used for all AV over IP media streams and NetworkHD management/configuration.

600 Series 10GbE (SDVoE) and LAN Ports



The 600 series contains a 10GbE SDVoE network interface port that must be connected to a 10GbE link on a 10GBASE-T Ethernet switch with a cabling infrastructure that is suitable for use with IEEE 802.3an standards with a link cable bandwidth tested to 500MHz across the entire link. This port is used for all AV over IP media streams between the TX and RX.

Additionally, the 600 series contains an optional LAN port that could be connected to a 1GbE link on a 1000BASE-T Ethernet switch, Source or Display device with a cabling infrastructure that is suitable for use with IEEE 802.3ab standards that are tested to 100MHz across the entire link. This port is used for peripheral device network connections and is not used for main AV over IP media streams. The use of this LAN port is optional and cannot be used in isolation – the 10GbE port must be used for proper 600 Series operation. For more detail on the 600 Series LAN port, please see the [NetworkHD Technical Reference Guide](#).

IMPORTANT! IR TX/RX Guidelines

Using WyreStorm infrared emitters and receivers is the best way to ensure that compatible 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.

On the 400 series the IR data modulation (carrier) frequency is passed through NetworkHD from the receiver to the emitter, however on the 600 series the carrier frequency is fixed at 38kHz when used in pass-through mode. When using the API the carrier frequency can be defined for greater compatibility.

Due to differences in IR port electrical signals 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 electrical differences as well adjusts for differences in the pins used within the port. Refer to the [CAB-IR-LINK](#) product page for more information.

RS-232/Debug Wiring

NetworkHD components use 3, 4, or 6-pin phoenix connectors 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.

NHD-000-CTL Controller

WyreStorm Connector		3rd Party Device
Pin 1 ST		Reserved
Pin 2 SR		Reserved
Pin 3 G (Ground)	---> To --->	G (Ground)
Pin 4 RX (Receive)	---> To --->	TX (Transmit)
Pin 5 TX (Transmit)	---> To --->	RX (Receive)
Pin 6 +12V		Reserved

NHD 100/200 Series

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)

Audio Wiring

Audio connections on NHD components vary from 3.5mm/1/8in TRS Stereo to 3-pin phoenix connectors based on the series and the product. Some products may contain both a 3.5mm TRS and a phoenix connection.

NHD 100/200Series

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-)

IR TX Port Pinout

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



IR RX Port Pinout

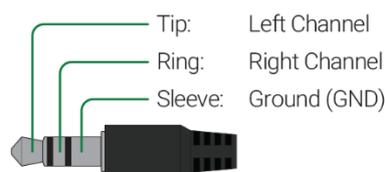
Connection for IR RX (receive) uses a 3.5mm (1/8in) stereo jack that outputs +5V DC to power the included IR receiver.



NHD 400/600 Series

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)

NHD 200-TX/400/600 Series



NHD-200-TX Dipswitch Settings

While most NHD components are completely configured by the NHD Console software, the NHD-200-TX has dipswitches to manually select the video format used by the DVI-I input connector. These DIP switches should be configured before mounting the NHD-200-TX.

DVI-D		YPbPr	
HDMI		CVBS	
VGA			

Notes

- The 3.5mm audio input on the NHD-200-TX is only activate in DVI-D or VGA modes.
- An active DVI converter may be necessary if connecting a source, such as PC with a DVI output, to an encoder. If a passive converter/cable is used a color space issue may occur.

NHD-000-CTL Controller Network Ports



IMPORTANT!! Controller Port Connectivity Guidelines

- A network switch should be configured fully before attempting to connect any NetworkHD devices to it. Refer to the [NetworkHD Technical Reference Guide](#) for details on Network guidelines and requirements
- Refer to the [NetworkHD Technical Reference Guide](#) and the various [Switch Configuration Guides](#) for help with setting up a network switch for use with NetworkHD.
- Refer to the [NetworkHD Technical Reference Guide](#) for example connectivity diagrams before continuing.

The NHD-000-CTL Controller presents two network interface ports to offer isolation between different physical networks. This is useful for when a NetworkHD system is isolated within a separate VLAN or physical switch with respect to another VLAN or network. The two ports are not equivalent however and their use can be defined using the following rules:

1. Only one VLAN or switch is used
 - In this case, only the AV/POE ports should be connected
2. A NetworkHD system is using a separate VLAN or switch with respect to another VLAN or Network. A control system is used, such as NetworkHD Touch or a 3rd-party control processor, that resides on the separate VLAN or Network
 - In this case, the AV/POE ports should be connected to the VLAN or switch that connects the NetworkHD encoders/decoders.
 - The CONTROL port should be connected to the VLAN or network that contains the control system.

The AV/POE port is exclusively used for communication with the NetworkHD encoders, decoders and the computer running the configuration software. Thus, the CONTROL port cannot be the only network connection on the CTL.

System Configuration

The steps listed here should be followed when configuring a NetworkHD system. Aside from the content within this guide there is configuration required for network components that is covered elsewhere. These documents will need to be followed in order to the system operate at its optimum performance level.

Please refer to the [NetworkHD Technical Reference Guide](#) and the various Switch Configuration Guides for help with setting up a network switch for use with NetworkHD. A correctly configured network switch is required before continuing with this guide.

A network switch should be configured fully before attempting to connect any NetworkHD devices to it.

NetworkHD IP Addresses

Communications with NetworkHD devices is achieved using an IP network. It is highly recommended that, during the configuration stage using the NetworkHD configuration software, no data will need to pass through a router to a different subnet. The following instructions assume therefore that all NetworkHD devices and computers using the NetworkHD configuration software all reside in the same subnet.

The NetworkHD devices exclusively use IPv4 addresses and not IPv6 addresses.

Subnet ranges are controlled on a NetworkHD device (or the computer used for configuration) by using a subnet mask.

Two examples are given below for brevity:

1. Subnet IP range for devices of 192.168.1.1 through to 192.168.1.254 would use a subnet mask of 255.255.255.0. This is enough IP addresses for 254 devices.
2. Subnet IP range for devices of 169.254.0.1 through to 169.254.255.254 would use a subnet mask of 255.255.0.0. This is enough IP addresses for 65534 devices.

NetworkHD devices each require a unique IP address. To communicate without data traversing a router all devices also need to be within the same subnet. When a NetworkHD device uses its factory default configuration there are two methods by which unique IP addresses can be assigned to devices:

1. In the presence of a DHCP server the encoder/decoder will assign an IP via DHCP
2. In the absence of a DHCP server the encoder/decoder will use link-local address autoconfiguration (auto-IP).

If IP assignment is achieved via DHCP it is important that the pool of available IP addresses available to assign via DHCP is large enough to accommodate all encoders and decoders.

If IP assignment is achieved via auto-IP the encoders and decoders will give themselves a unique IP address in the range 169.254.x.x

The NHD-000-CTL controller is an exception to rule 1. When using its factory default configuration, the CTL will assign a static IP address to both of its network interfaces:

AV/POE port: IP = 169.254.1.1 Subnet Mask = 255.255.0.0

CONTROL port: IP = 192.168.1.243 Subnet Mask = 255.255.255.0

Since the AV/POE interface on the CTL is exclusively used to communicate with NetworkHD encoders/decoders and the computer running the configuration software WyreStorm highly recommends that during first-time setup, the NetworkHD encoders/decoders are allowed to assign IP addresses according to rule 2 – auto-IP. This removes the requirement to assign an IP address to the CTL AV/POE port to a value within the IP address range used by a DHCP server.

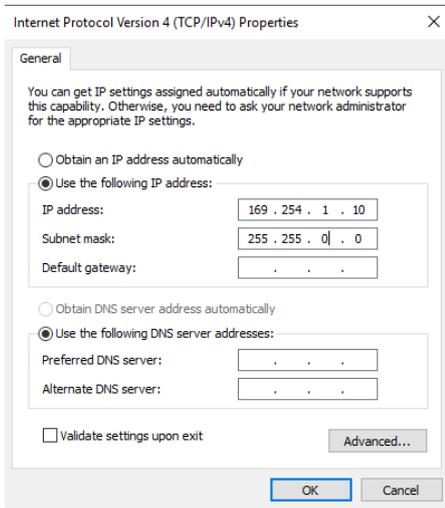
Firmware Updates

In order to guarantee the most up-to-date experience using NetworkHD systems, ensuring the devices contain the most recent firmware versions is essential.

In order to update the firmware in all NetworkHD equipment, the first step is to update the firmware in the NHD-000-CTL, if necessary. Some NetworkHD endpoints rely on the CTL to coordinate firmware updates, thus it is essential that the CTL be the first device to be updated.

To update the firmware on the NHD-000-CTL perform the steps below.

1. Ensure that your computer is connected to the same physical switch and the switch network port is part of the same VLAN as the NHD-000-CTL's IP 1 AV/POE port.
2. Ensure that your computer's network interface has an IP address in the same scope as the NHD-000-CTL's IP 1 AV/POE port, which by default is 169.254.x.x. Use a subnet mask of 255.255.0.0.



3. Open a web browser and log into the WebUI of the CTL. The default IP address is 169.254.1.1 (IP 1 AV Port). The default username and password are both admin.
4. Select the Controller Settings tab and scroll down to reach the Software Upgrade section.
5. Check if the CTL firmware version matches that of the current CTL firmware available from wyrestorm.com
6. Click browse next to both the Web and Adapter modules and select the appropriate .bin file for each.
7. Click the Upgrade button.



The CTL will now perform the upgrade. This process will take 3-4 minutes to complete. A pop-up message will appear at the top right of the web browser indicating completion.

Note: DO NOT refresh the web browser during the process. Only after the NHD-000-CTL status indicator has extinguished and then illuminated again after the system self-reboots should you then refresh the web browser.

WyreStorm Management Suite (WMS)

WyreStorm Management Suite is an application launcher that allows quick and easy access to the most used software applications for WyreStorm products, including NetworkHD. To get started configuring a NetworkHD system perform the following.

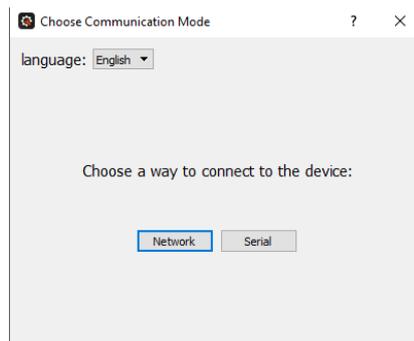
1. Download the WyreStorm Management Suite from a NetworkHD product download tab located on wyrestorm.com
2. Install the Management Suite by extracting the contents of the zip file to your computer.
3. Run the WyreStormManagementSuiteSetup.exe and complete the installation.
4. Launch the WyreStorm Management Suite application.



NetworkHD Maintenance Tool

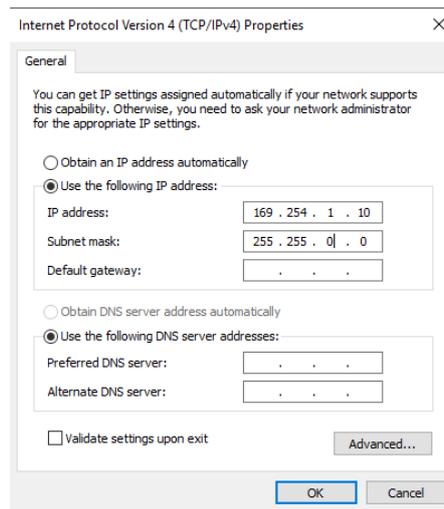
The NetworkHD Maintenance Tool is used to view detailed information for encoders and decoders. It is also used to update firmware on encoders and decoders. To use the Maintenance Tool, perform the following.

5. Ensure that the NHD-000-CTL Controller is running the latest firmware version.
6. Open the WyreStorm Management Suite.
7. From the WyreStorm Management Suite tiles select Maintenance Tool.
8. When prompted, select Network and the connection method.



Firmware updates for NetworkHD can always be found at WyreStorm.com in the Downloads tab of any NetworkHD product. Once any applicable firmware updates have been downloaded perform the following.

- Extract the contents of the **NetworkHD_Firmware_vXXX.zip** file to a location on your computer. If not performed already, you will need to change the IP address of your computer to match the same subnet as the NetworkHD Encoders and Decoders, which by default is 169.254.x.x. Use a subnet mask of 255.255.0.0.



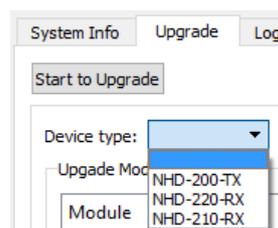
- Ensure that the NHD-000-CTL IP 1 AV/POE port is connected and online. This port will need to have the same scope as the NetworkHD encoders and decoders, which by default is 169.254.x.x. The default IP address of the AV/POE interface is 169.254.1.1.
- Return to the Maintenance Tool and press the Search button to find available NetworkHD components.

Alias	HostName	IP Address	Version	VISelect	VITiming
Warehouse	NHD-210-RX-70B3D5D59600	192.168.1.17	v2.11.3		
VW-TR	NHD-210-RX-E4CE020004C1	192.168.1.12	v2.11.3		
VW-TL	NHD-210-RX-E4CE0210002C	192.168.1.16	v2.11.3		
VW-BR	NHD-210-RX-E4CE02000479	192.168.1.14	v2.11.3		
VW-BL	NHD-210-RX-E4CE0200046B	192.168.1.15	v2.11.3		
VideoRoom	NHD-100-RX-E4CE02000199	192.168.1.28	v2.11.3		
SetTopBox	NHD-200-TX-E4CE0200083D	192.168.1.20	v2.11.3	hdmi1	720P_60
ScreenLink	NHD-200-TX-70B3D5D5A5C3	192.168.1.23	v2.11.3	hdmi3	none
Roku	NHD-200-TX-E4CE020008AF	192.168.1.19	v2.11.3	hdmi1	720P_60
NHD-SW-0501-...	NHD-SW-0501-70B3D5D5A...	192.168.1.27	v3.0.2	hdmi1	none
Kitchen	NHD-210-RX-E4CE021000DE	192.168.1.11	v2.11.3		
KathTV	NHD-210-RX-E4CE021000CF	192.168.1.10	v2.11.3		
Conference	NHD-210-RX-E4CE02000476	192.168.1.13	v2.11.3		
Bluray	NHD-200-TX-70B3D5D5A5E7	192.168.1.22	v2.11.3	hdmi1	1080P_60

Note: If no devices are discovered follow these steps:

- Ensure the Maintenance Tool is allowed through Windows Firewall.
- Ensure the PC's IP address is in the same range as NetworkHD components.
- Ensure that the NHD-000-CTL is connected and online, and that the AV/POE port IP address is in the same range as the NetworkHD encoders and decoders.
- Ensure the network switch is correctly configured.

- Press the dropdown menu next to Device Type and choose the encoder or encoder model you wish to update first.



Note: Devices of the same model can be upgraded simultaneously. For example, if you have 20, NHD-200-TXs, all 20 can be upgraded at the same time.

- In the Upgrade Module section select the Open button next to:

- 14. For NetworkHD 100 and 200 Series: **IP_MAIN**
- 15. For NetworkHD 400 and 600 Series: **HTTP**
- 16. Select the appropriate .bin firmware file for the device(s) being upgraded.

Upgrade Module:

Module	File
IP_FPGA	Open...
IP_MCU	Open...
IP_MAIN	Open...
UpgradeAgent	Open...

Note: Be vigilant in choosing the correct .bin file for the currently selected device type. Installing the wrong firmware file for a NetworkHD component could break the product.

- 17. Ensure the Auto Reboot After Upgraded check box is selected.
- 18. Press the Start to Upgrade button.

The progress of the upgrade can be seen as it is performed. Repeat this process for any other devices.

For quicker reference to the Maintenance Tool or the firmware update process refer to the [NetworkHD Firmware Update Application Note](#) available for download at WyreStorm.com.

NetworkHD Console Software

The NetworkHD Console Software is the center for configuring encoders and decoders. It allows for the creating of video walls and groups, along with a number of further options to setup a NetworkHD system. To begin using the Console software perform the following.

IMPORTANT! Requirements Before Proceeding

WyreStorm is constantly improving our products and releasing new products and features within firmware. When these additions and changes are made to the products the requirements for firmware and software also changes.

Refer to the supported firmware and software within the NetworkHD release notes document for compatibility between firmware and software across all NHD products.

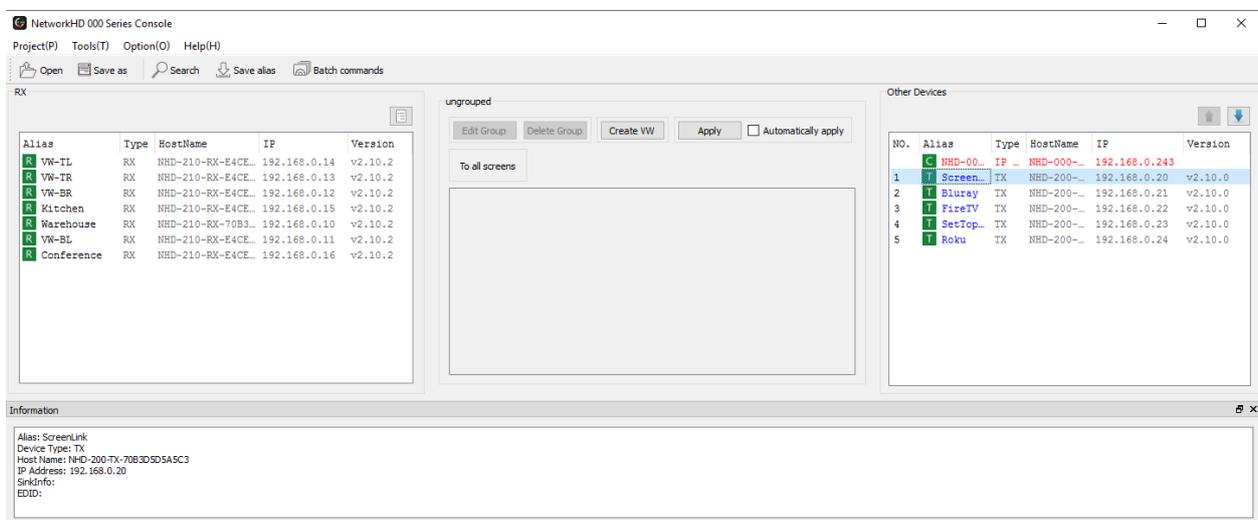
Searching for Components

To successfully search and find available NetworkHD components, the PC's network interface must be set into the same IP range as encoders/decoders and CTL. By default, this range is 169.254.x.x with a subnet mask of 255.255.0.0.

For example, a static IP address of 169.254.1.10 could be set.

Note: It is important to configure a static IP address to a PC prior to opening the Console Software.

1. Select the NetworkHD Series Console tile from the WyreStorm Management Suite launcher.
2. Select Create a New project file.
3. Ensure that the NHD-000-CTL is listed in the Other Devices pane and is showing a green status symbol.
4. Press the Search button and the Console will find and populate a list of all available devices. Decoders appear at the left of the Console and encoders, along with the NHD-000-CTL, appear at the right.



Note: If no devices are discovered follow these steps:

- Ensure all NetworkHD Components are running the latest available firmware from the products downloads section at wyrestorm.com
- Ensure that the NHD-000-CTL is online and has an illuminated status light
- Ensure that the encoders and decoders are powered on
- Ensure the Software is allowed through the Windows firewall by checking you firewall settings and allowed applications
- Ensure that your PC's IP address is in the same range as the NetworkHD components

Configuring IP Addresses

NetworkHD devices assign themselves unique IP addresses when using their factory default settings. In this way, all devices are able to be discovered in Console at once.

WyreStorm highly recommends that once all devices are discovered, the IP addresses of the devices are set both to a Static value and also set within a subnet that is not link-local (169.254.x.x). This is for the following reasons:

1. If encoders are set to obtain an IP via DHCP or via auto-IP their IP address could change, either when a device is power-cycled or if a DHCP lease expires.
In some cases, the IP address of an encoder is referenced by other software – such as when using the Preview Streams in NetworkHD Touch or with a 3rd-party control UI.
Making the device IP statically assigned means that this reference IP will not change.
2. The range of link-local IPs (169.254.x.x) is generally not a subnet range that is able to be routed – that is, data cannot traverse a router into another subnet/VLAN/network.
In some cases, unicast data is referenced by other software – such as when using the Preview Streams in NetworkHD Touch or with a 3rd-party control UI that has an IP within a different subnet.
Not using the link-local address range means that routing data to a different subnet/VLAN/network is guaranteed.

Encoder and decoder IP addresses can be changed individually by right clicking the device and choosing **General Settings**. In larger systems you can change the IP addresses of multiple devices in one action using Batch Commands.

Note: Some NetworkHD devices utilize the NHD-000-CTL to coordinate the IP address change commands. Thus, the CTL's IP address must only be changed **after** all encoder and decoder IP addresses have been reassigned.

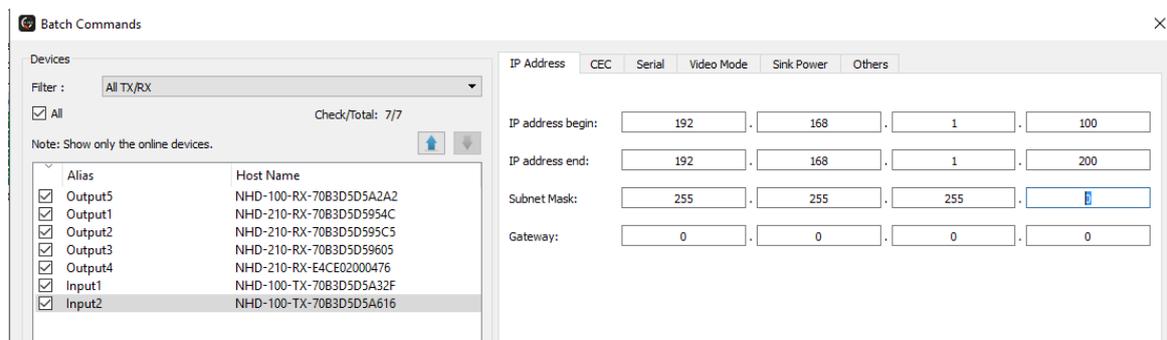
Note: Once you change the IP address of an encoder, decoder or CTL it may no longer be reachable from the computer until the computer's IP is also changed. Therefore, after address reassignment, the NetworkHD components may not show in Console or they will show as offline. Ensure all device's IP address changes have been implemented before reassigning an IP to your computer.

Batch IP Address Editing

1. Press the Batch commands button and select the IP address tab.
2. Filter to a specific device type using the Filter dropdown menu
3. In the left pane select the All checkbox.
4. Enter the required starting IP address of the encoders and decoders in the Starting IP address field and the highest IP address in the Finishing IP address field.
5. Ensure the Device Restart box is checked and then click Apply.

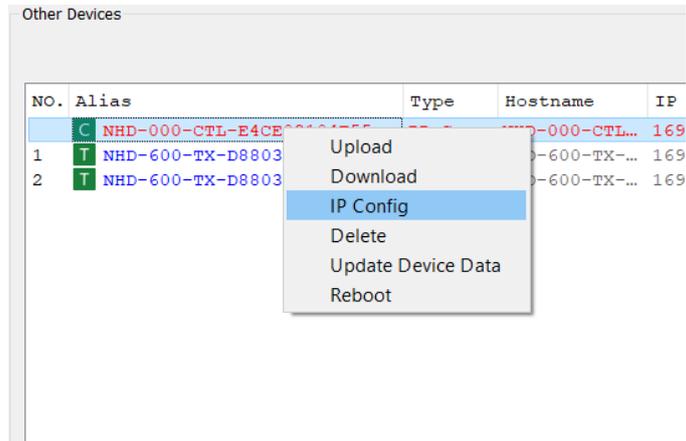
Note: You will need to change the IP address of your PC in order for the Console to rediscover the devices on the network after changing the devices addresses. Online devices have green icons. Please do this only after all encoders, decoders and CTL have had their IP addresses changed.

Note: All NetworkHD encoders, decoders and CTL must be assigned new IP addresses within the same IP address range.



To change the NHD-000-CTL's IP addresses perform the following.

1. Right click the CTL in the **Other Devices** section and choose **IP Config**.



2. Enter in the IP information for the AV and Control Ports and click Apply when done. The CTL will then reboot, please be patient as the process will take approximately 2 minutes to complete. A solid blue status light on the CTL indicates it is fully booted and operational.

Note: Both CTL network interfaces cannot be on the same subnet and must be on independent subnets, **even if only one network interface is physically connected**. Please double check your IP addresses and subnet masks to be sure.

IP Config
✕

IP 1 (AV) [TX and RX communication]

IP Address: . . .

Subnet Mask: . . .

Gateway: . . .

IP 2 (C) [Telnet client and browser communication]

IP Address: . . .

Subnet Mask: . . .

Gateway: . . .

Active Gateway

IP 1 (AV)

IP 2 (C)

Note: The deactivated gateway IP will change to 0.0.0.0 automatically.

After pressing "Apply", this Device will automatically reboot for the settings to take effect.

Creating Aliases

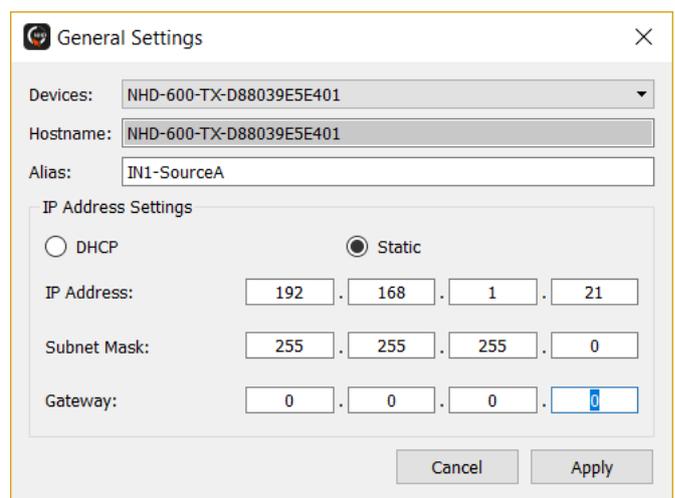
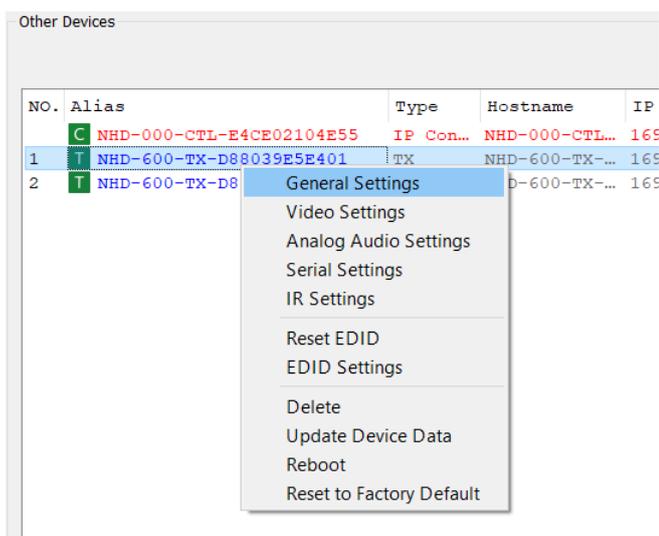
With factory default settings each NetworkHD device is listed in Console with an alias value that matches the generic Hostname and MAC address of the device. Reconfiguring aliases on NetworkHD devices is important for the following reasons:

1. The encoders and decoders can be given an index value that corresponds to the system's design, e.g. Input 1, Input 2, Output 1, Output 2.
2. The devices can be given user-friendly names that relate to their connected source or display, e.g. BD-DVD, Media Player, Office TV, Bar Display
3. The WyreStorm supplied control system drivers enumerate the encoder and decoder by alias and require a predefined alias prefix.

If using a third-party control system driver from WyreStorm, alias names should start with INn or OUTn where n is a number 1 or higher. The alias names can also include a - followed by display or source information. For example, a complete alias could look like **IN1-AppleTV** or **OUT1-ConferenceTV**.

To adjust device aliases, perform the following.

1. Right click a decoder or encoder and select General Settings
2. Enter in the desired alias
3. Click Apply for the alias to take effect.



Note: Aliases can be set to encoders and decoders. If using a third-party control system driver from WyreStorm alias names should start with INn- or OUTn- where n is the index number used to enumerate the order of devices within a control driver. For example, a complete Alias could be IN1-AppleTV or OUT2-LoungeTV.

Video Adjustments

NetworkHD components offer various video-related adjustments. These adjustments can be configured per encoder or decoder or in bulk using Batch Commands.

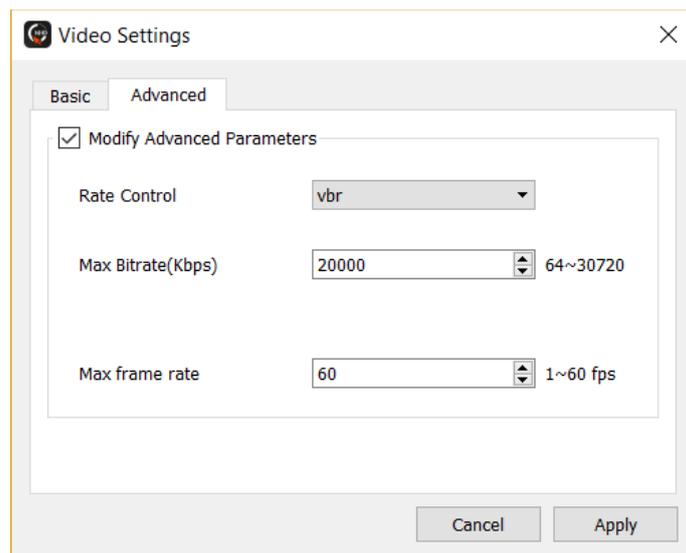
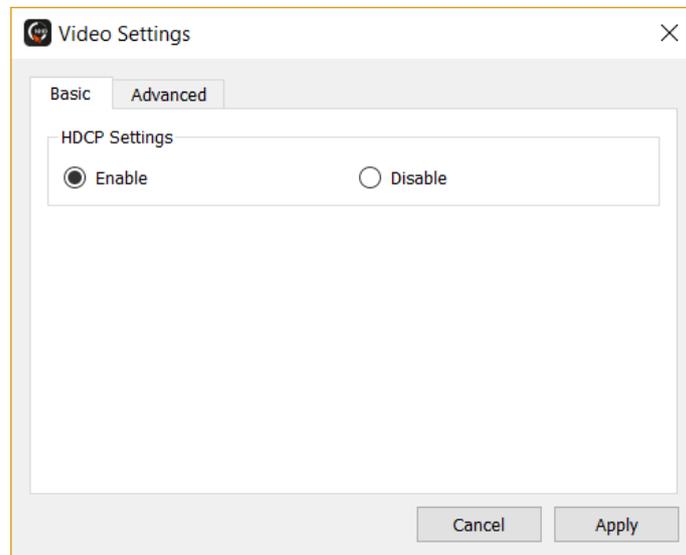
Note: The video adjustments will be different depending on the Series of NetworkHD devices.

To perform video adjustments per encoder or decoder, perform the following.

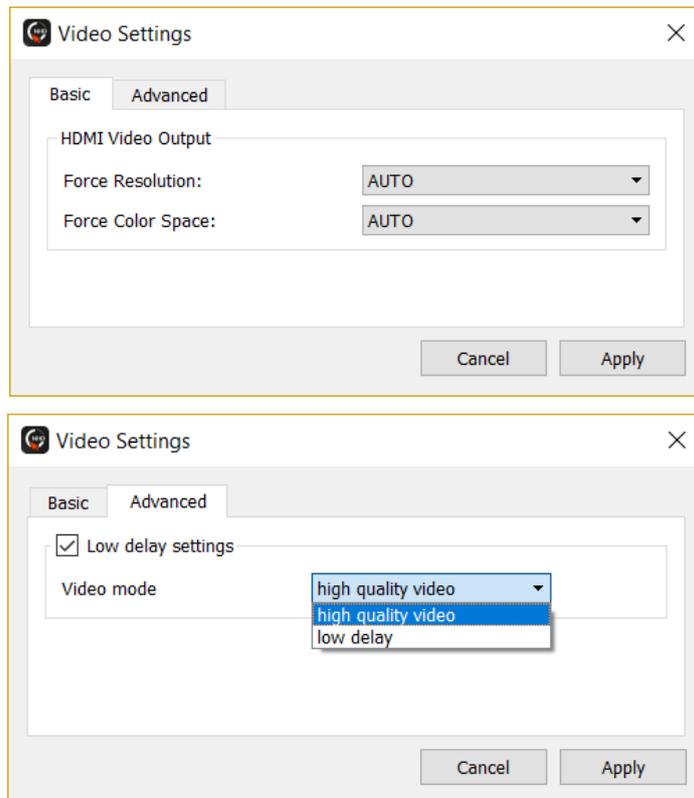
Right click an encoder or decoder and click **Video Settings** within the context menu.

NetworkHD 100 and 200 Series – H.264 Video Settings

H.264 Encoder Video Settings



H.264 Decoder Video Settings

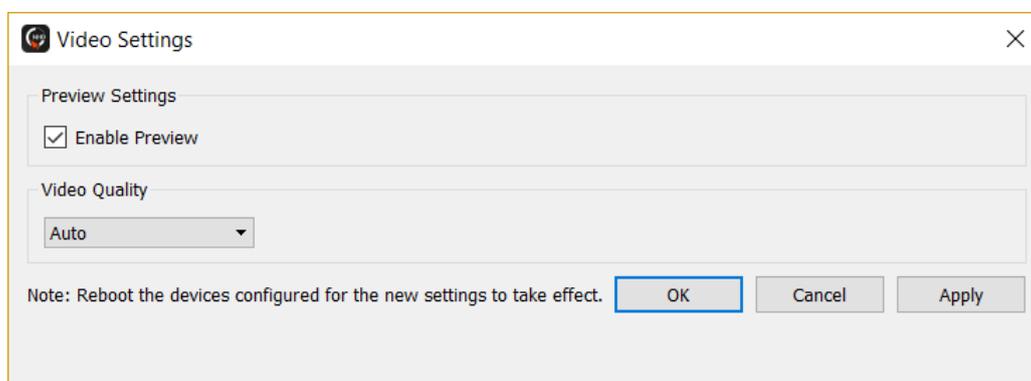


100 & 200 series decoders offer either high quality or low delay video modes. Each mode has its appropriate use. High quality mode is the default setting and is typically used where video quality is a priority. High quality mode ensures that you are achieving the best possible image on a display but will increase source to display latency.

Low delay mode will decrease the source to display latency. This mode is typically configured in a presentation scenario where the video needs to be more instantly reactive to changes, e.g. when using a source remote control. Image quality will be decreased in order to achieve a lower latency.

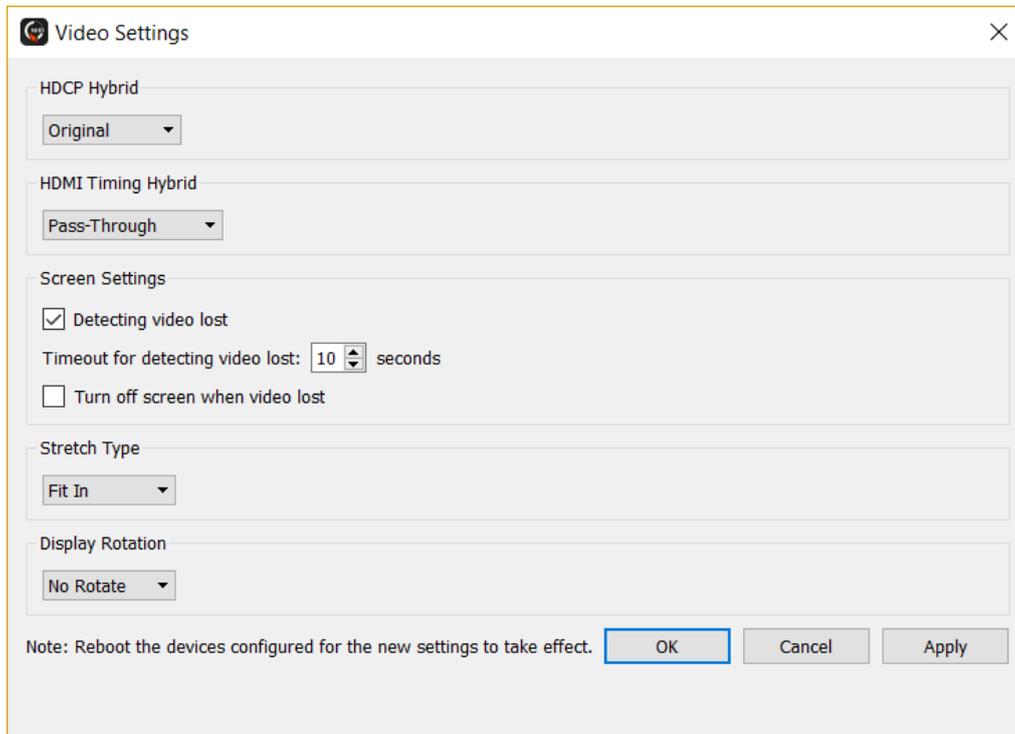
NetworkHD 400 Series – JPEG 2000 Video Settings

JPEG 2000 Encoder Video Settings



400 Series encoders offer a video quality setting that can be manually adjusted to a value between 0 and 5. This is a balance between bias towards frame encode quality (0) or bias toward encoder frame synchronization (5). Auto mode lets the encoder decide which value to assign dynamically based on video content.

JPEG 2000 Decoder Video Settings



400 Series decoders offer a number of settings:

- **HDCP Hybrid**
The video source connected to an encoder may be using HDCP. When a decoder decodes the stream to a connected display the HDCP version can be maintained or forced to a specific version.
For example, if a source device connected to an encoder is sending 4K content encrypted with HDCP v2.2 and the decoder is connected to a display that is only 1080p HDCP v1.x capable, the HDCP version at the RX can be managed.
- **HDMI Timing Hybrid**
This adjusts the scaler settings at the decoder for both resolution and frame-rate. Use this setting to adjust the decoder's video output to a display where the display might not be compatible with the original source video.
- **Screen Settings**
The decoder can detect when live video content is either not being generated by the video source or when the stream from an encoder is interrupted.
Use these settings to adjust the time period before the decoder displays the Idle image or activates the Standby command for a display.
- **Stretch Type**
This can be used to adjust the behaviour of the decoder when the attached display aspect ratio is different to that of the source video.
- **Display Rotation**
The decoder video output can be rotated so that it can be used with displays mounted in portrait or upside-down.

NetworkHD 600 Series – SDVoE Video Settings

SDVoE Encoder Video Settings

Video Settings

Input
HDMI

HDCP Support
Enable Disable HDCP2.2 Support

Multiview
Bandwidth Adjust Mode: Main stream first

Main Stream
 Divide Framerate By 2 CAUTION - Only enable for 60/50Hz sources
 Disable main stream / matrix uses Multiview stream

Multiview Stream
Image Scale 128 X 128
 Divide Framerate By 2 CAUTION - Only enable for 60/50Hz sources
 Enable Multiview stream

Stream Bandwidth
OK

Note: Multiview stream cannot be used for RX Genlock or Videowall modes. OK Cancel Apply

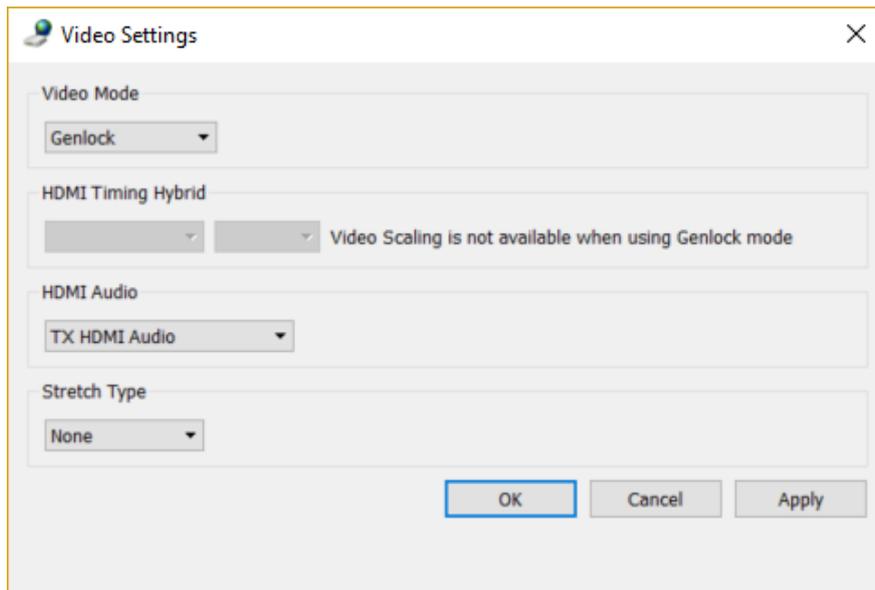
600 Series encoders offer a number of settings:

- Input
The HDMI or DP ports can be selected or set to automatic mode
- HDCP Support
Support for HDCP encrypted content can be defined.
- Multiview
The SDVoE encoder platform has a finite bandwidth that can be used at the Ethernet output – this is around 10Gb/s maximum. When Multiview is enabled on a decoder a secondary video stream is used from an encoder. The combined bandwidth of both streams could exceed the 10Gb/s limit if not managed correctly. WyreStorm's stream bandwidth management engine manages this dynamically so that exceeding bandwidth limitations are mitigated.
The stream bandwidth management for use with Multiview at a decoder has 3 options for defining the preferred behaviour of the encoder's video streams. This engages a set of rules that govern dynamic adjustment of source stream parameters depending on how the streams are being used at a decoder in Multiview mode.
Depending on the intended mode-of-operation, the dynamic source stream bandwidth management engine can either favour the Multiview video stream, balance the main and Multiview streams with equal preference or favour the main video stream.

Automatic adjustments to bandwidth on either stream can be monitored under the Main Stream and Multiview Stream sections.

The Stream Bandwidth section will indicate if further manual intervention is required and aids troubleshooting.

SDVoE Decoder Video Settings



600 Series decoders offer a number of settings:

- Video Mode
The decoder video output can either match the source content exactly or adjust the video output timing in different ways:

Genlock: Match the decoder's video output to the source video exactly, including all resolution, frame-rate, format model, colour space, color depth and HDMI/DP control/information data exactly. This mode can be used to exactly match the source for use with extended attributes, such as HDR or WCG.

Genlock Scaling: This is the same as Genlock but will allow the adjustment of video resolution only. Use this to force the decoder's video resolution output irrespective of the source video resolution.

Fast Switch: This will engage the SDVoE decoder's Fast Switch video output mode and enable adjustment of both resolution and frame rate. The decoder video output will always use RGB video format with 8 bit color.
- HDMI Timing Hybrid
Depending on the Video Mode setting, the decoder's scaler engine will offer resolution or frame rate adjustments. Use the value Auto to allow the decoder to make the appropriate adjustments automatically based on reading the attached display's EDID table.
- HDMI Audio
NetworkHD encoders simultaneously offer 3 audio streams. The appropriate audio stream to be embedded on the decoder's HDMI output can be selected. Where the source connected to a TX is using multichannel audio (LPCM) the decoder can utilise a stereo downmix option.
- Stretch Type
When using Fast Switch mode, this can be used to adjust the behaviour of the decoder when the attached display aspect ratio is different to that of the source video.

Video settings for a large number of encoders and decoders can be adjusted using Batch Commands.

4. Select Batch Commands from the main menu.
5. Click the Video tab and select H.264 for 100 & 200 series or JPEG 2000 for 400 series.
6. From the device list check any appropriate devices.
7. Adjust any suitable settings and click Apply.

Audio Adjustments

NetworkHD components offer various audio-related adjustments. These adjustments can be configured per encoder or decoder or in bulk using Batch Commands.

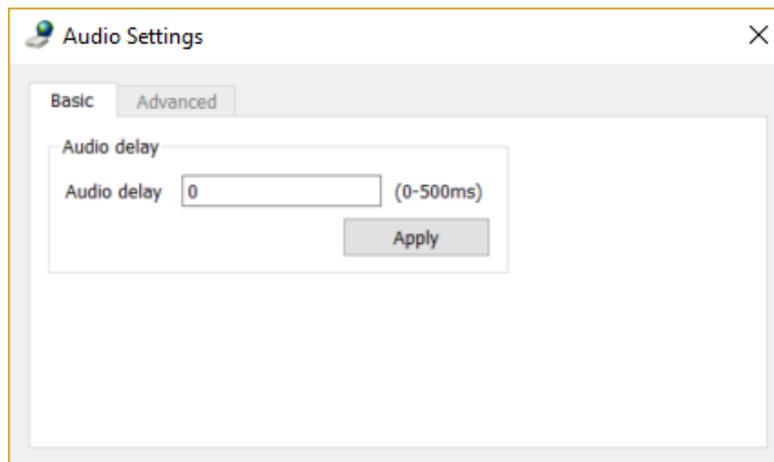
Note: The audio adjustments will be different depending on the Series of NetworkHD devices.

To perform audio adjustments per encoder or decoder, perform the following.

Right click an encoder or decoder and click **Audio Settings** within the context menu.

NetworkHD 100 and 200 Series – H.264 Audio Settings

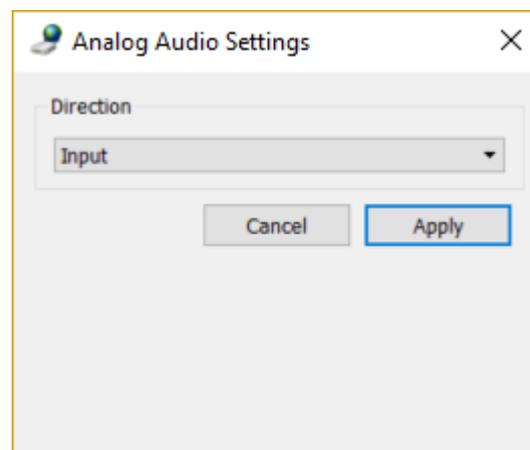
H.264 Encoder and Decoder Audio Settings



100 and 200 Series encoders/decoders offer an audio delay adjustment to be implemented. The total delay of the audio from source to display will be the sum of the values entered in the encoder and decoder.

NetworkHD 600 Series – SDVoE Audio Settings

SDVoE Encoder Audio Settings

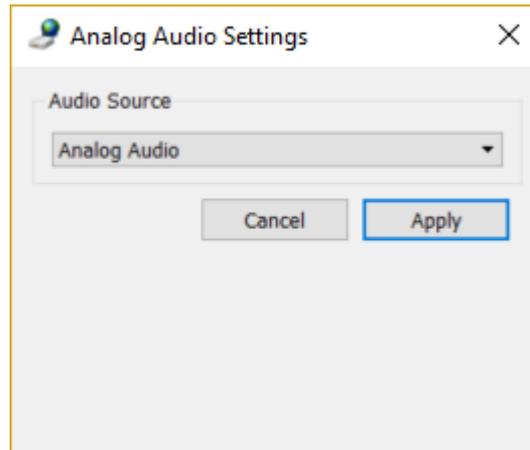


600 Series encoders offer a mode selection for the analog audio port.

Input mode allows the analog port to be connected to stereo analog audio sources. The encoder will offer this as an independent audio stream that can be selected at a decoder.

Output mode allows the analog port to output stereo audio for connection to further audio equipment. This mode will output source audio de-embedded from the encoder's HDMI/DP input port. Downmixing is supported for multichannel PCM audio.

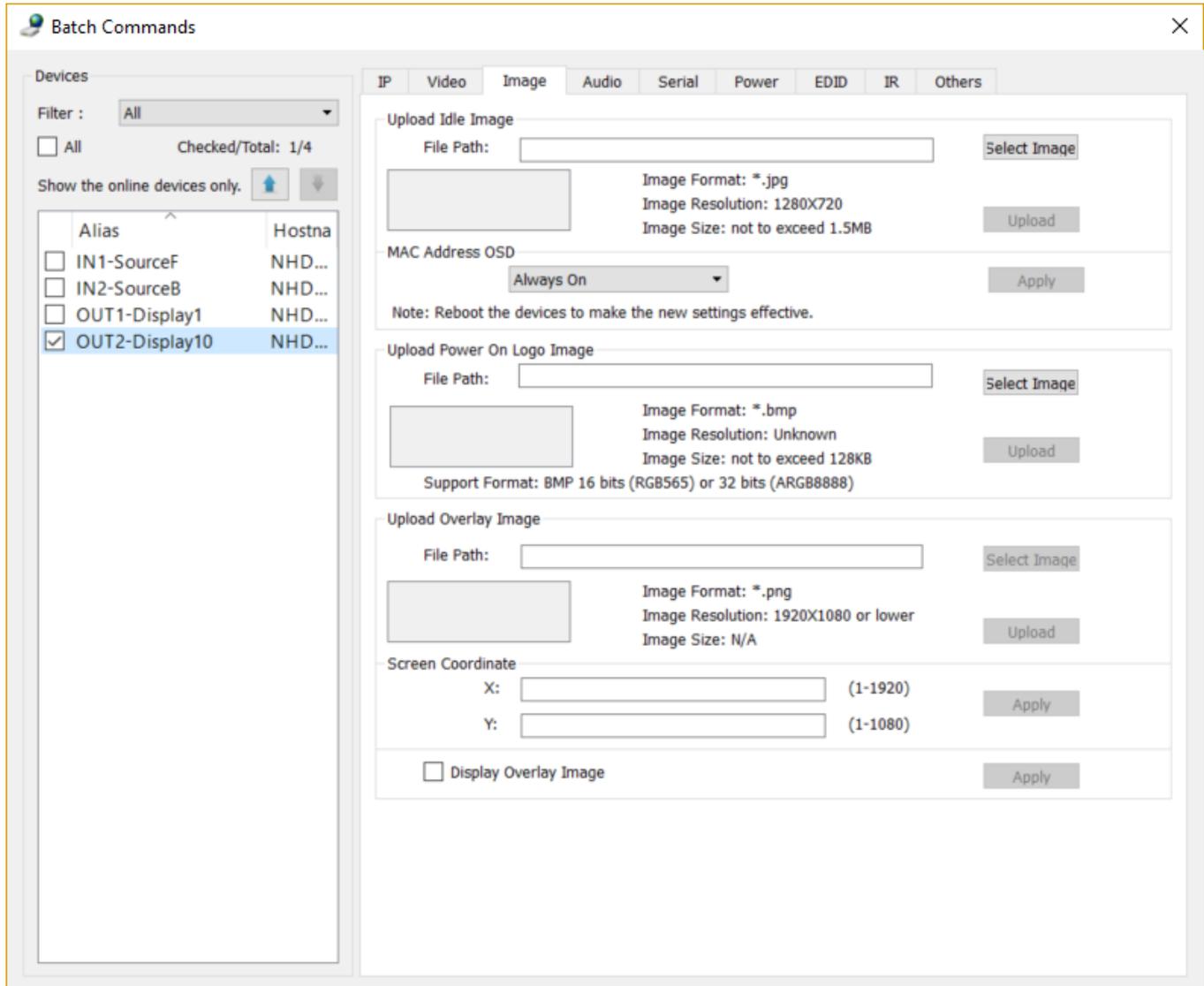
SDVoE Decoder Audio Settings



600 Series decoders offer an audio stream selection when connected to an encoder to output on the decoder's analog audio port. This can be either the encoder's analog audio input or the encoder's HDMI/DP audio input. Downmixing is supported for multichannel PCM audio.

NetworkHD Idle and Overlay Images

The Batch Commands window presents an Image tab under which various decoder image settings can be adjusted.



- Upload Idle Image
The Idle image is presented to a decoder's connected display should active video not be present from an encoder. This could be for the following reasons:
 1. The decoder is not assigned to an encoder
 2. The source device is not outputting video, e.g. it is in standby
 3. The decoder cannot reach the encoder due to a networking issue

In one of these situations the decoder will display the Idle image. WyreStorm decoders ship with a stock image but this can be replaced with a customized image where appropriate.

Note: The NetworkHD 600 Series does not support an Idle image

- Upload Power On Logo Image
The Power On Logo image is presented to the decoder's connected display when the decoder is executing its boot up sequence. WyreStorm decoders ship with a stock image but this can be replaced with a customized image where appropriate

Note: The Power On Logo image is only supported on NetworkHD 400 Series

- Upload Overlay Image

An image can be uploaded to a decoder to be displayed on top of the main video stream.

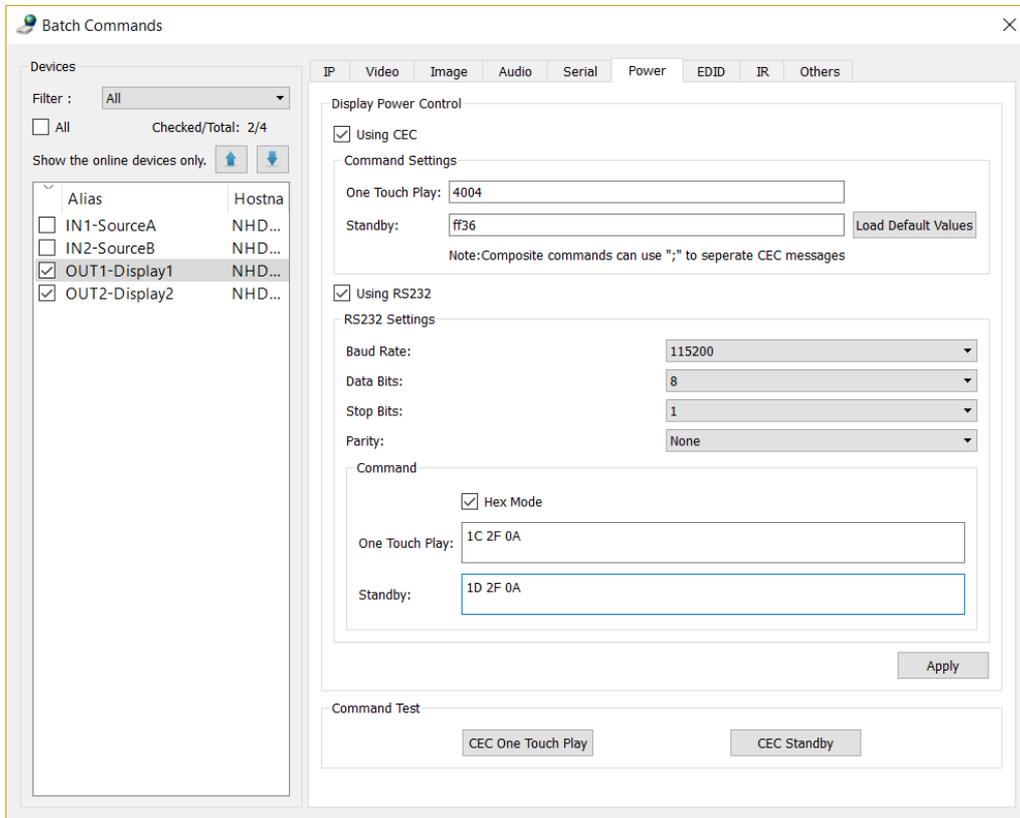
Note: Overlay images are only supported on NetworkHD 100 and 200 Series.

Configuring CEC & RS-232 Control

The Batch Commands window can be used to configure decoders to send CEC or RS-232 commands to the attached displays. These commands can be triggered from the NetworkHD Touch app when the power on or off buttons are pressed. It is also a useful tool for verifying and testing CEC or RS-232 commands to connected displays.

CEC control can be found on most modern displays. If the display being controlled doesn't have CEC capability, then RS-232 can be used as an alternative.

8. From the Batch Commands window select the Power tab.



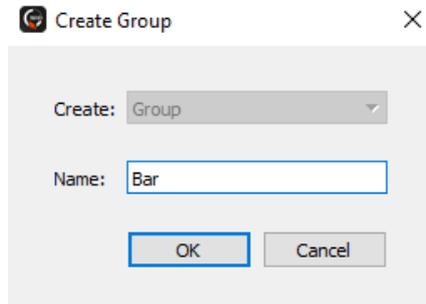
9. Select decoders from the list at the left. You can then choose to program these decoders to send CEC or RS-232 by marking the CEC or RS232 check boxes respectively.
10. For CEC control either load the default CEC commands or insert a custom CEC byte string.
11. For RS-232 control adjust the RS-232 Settings for the target display(s) and enter in the serial commands in the One Touch Play and Standby boxes respectively. It is important to note if the format of the display's command should be represented with Hex notation, rather than ASCII notation.

Creating Groups

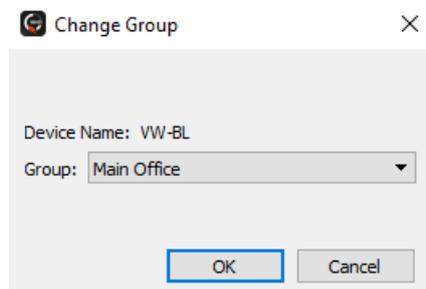
Decoders can be organized in groups. These groups represent rooms, areas or video walls in the building. Each group can have any number of decoders as members. For example, for a sports bar you can create a group for the Bar, Dining and Waiting areas and another for the main video wall. These groups only appear on the main screen of NetworkHD Touch and can have custom icons (these are configured in the app).

By default, all devices are added to the Ungrouped Group

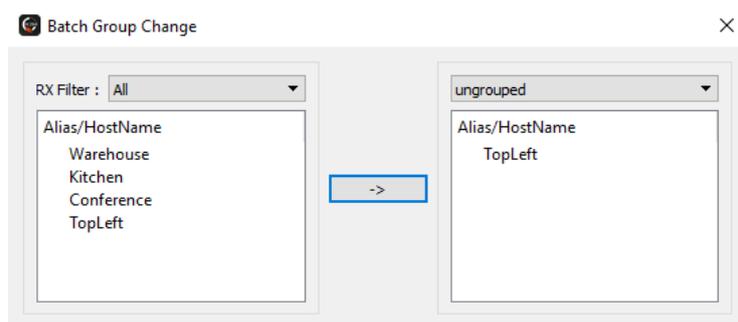
1. Create a group by pressing All Groups in the RX area and then press Create Group button in the central area. In the pop up, enter a name and press OK.



2. Add decoders to the group by right clicking them, select Change Group and then select the desired group.



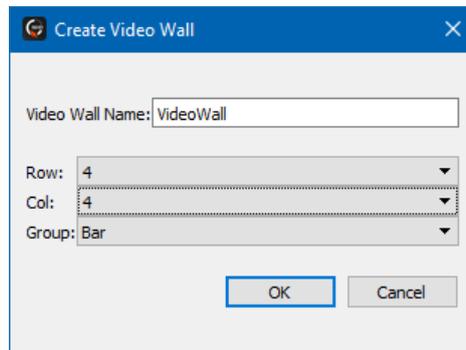
Bulk decoder group assignments can be accomplished by selecting the Batch Group Change option.



Creating Video Walls

Video walls are only possible with NetworkHD 210 decoder, 400 or 600 Series decoders. The decoders assigned to a video wall must be a member of a group.

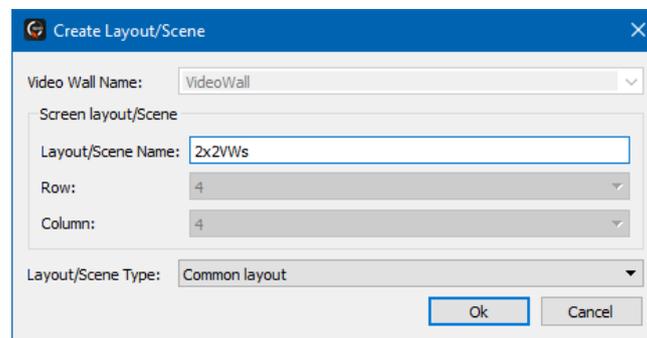
1. If not done already, create a group.
2. Select a group and then press the Create VW button.
3. Give the video wall a name and choose its size.



Each video wall can have multiple scenes. Scenes dictate the configuration for a video wall – for example a 4x4 video wall could contain a scene in which all 16 displays combine into a single image, while another scene consists of four 2x2 video walls. The possibilities are endless and the user can switch between these scenes at the touch of a button.

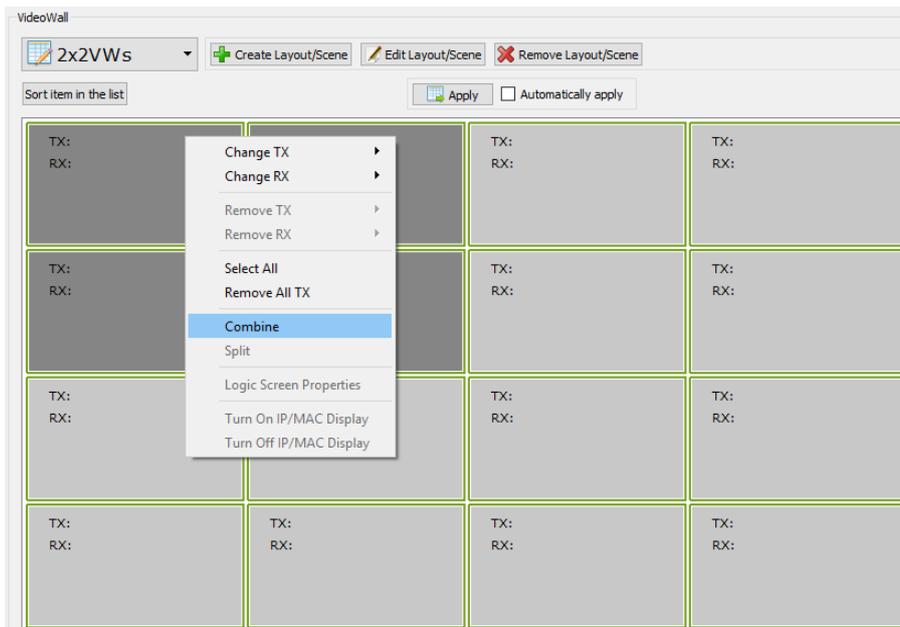
4. To create a scene within the video wall, press the Create Scene/Layout button and name it.

Note: Scene names must be alphanumeric and cannot include spaces or special characters (!@£\$%^*\<+ etc.)

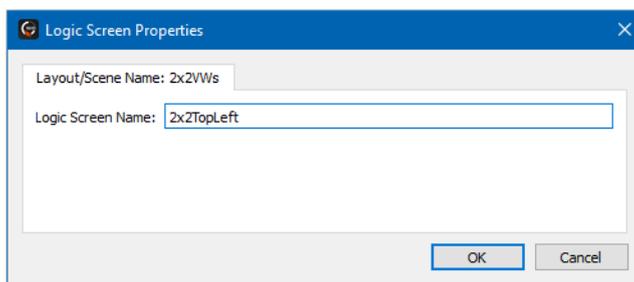


5. Once a Scene has been created screens can be combined to create the video wall. For example, to create a 2x2 image in a video wall hold the PC's CTRL button and select 4 displays.
6. Right click one of the selected displays and choose the option to **Combine**.

Note: Video walls must be a complete shape – ie. 2x1 or 2x2, 3x3 etc – They cannot be L or T shaped etc. It is recommended that walls have the same number of columns as rows so that video stretching does not occur.



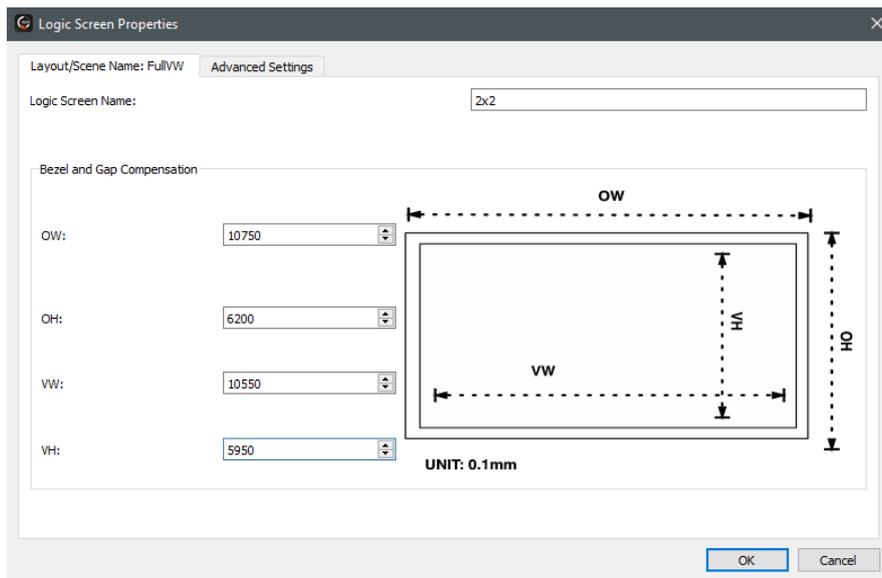
7. If using NetworkHD 200 series, the following prompt will appear asking for a Layout name. In this example, the 2x2 image could be called 2x2TopLeft.
8. Enter in a name and click the Ok button. When finished continue to step 11



If using NetworkHD 400 or 600 Series a different window will appear asking to adjust for display bezels. It is not always necessary to adjust for display bezels. However, if parts of the video image are being cut off, display measurements should be made to compensate appropriately

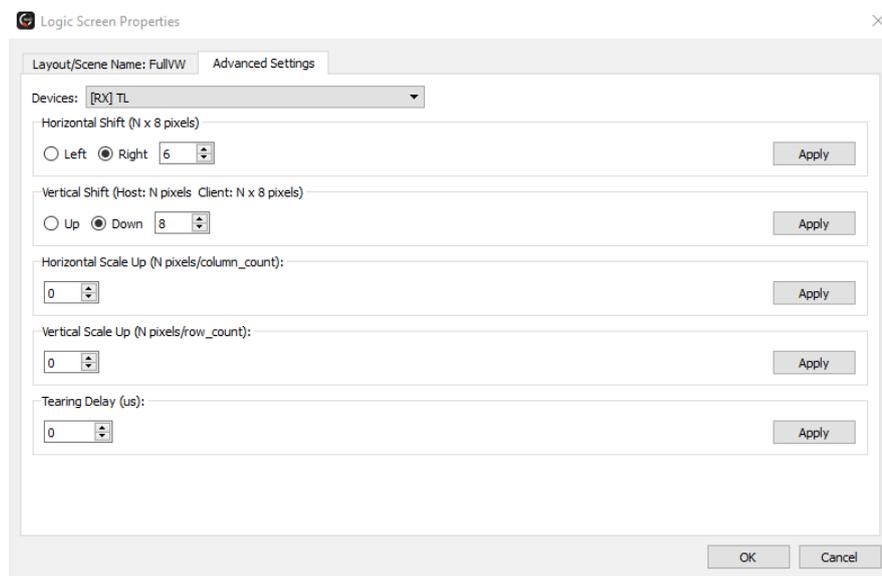
9. Start by giving the Layout a name.

10. Measure the OW (outer width), OH (outer height), VW (viewable width) and VH (viewable height) of a single screen which is part of the video wall. Measurements should be recorded in millimeters and then multiplied by 10. For example, if the OW (outer width) of a display is 900mm, 900x10=9000. Once calculated, 9000 would be entered into the OW field. Repeat this process for all dimensions.

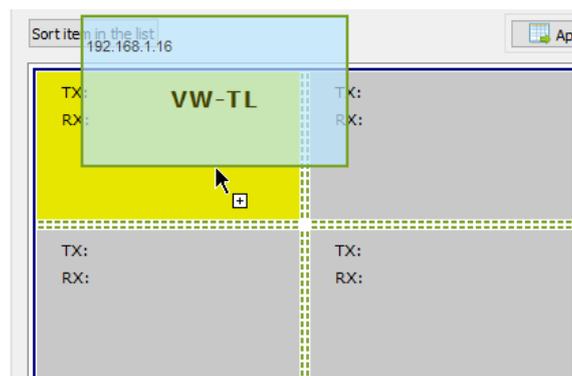


Each section of a video wall allows for the video image to be independently adjusted manually, if using the 400 Series. To do this select the Advanced Settings tab.

11. Select a decoder and enter a value in the appropriate field. All values entered will be multiplied by 8



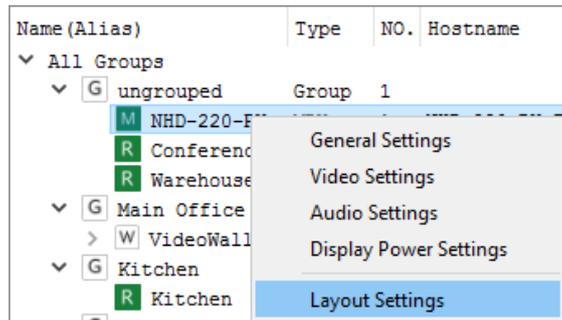
12. To populate the displays, drag and drop decoders and an encoder to the layout to build the video wall.



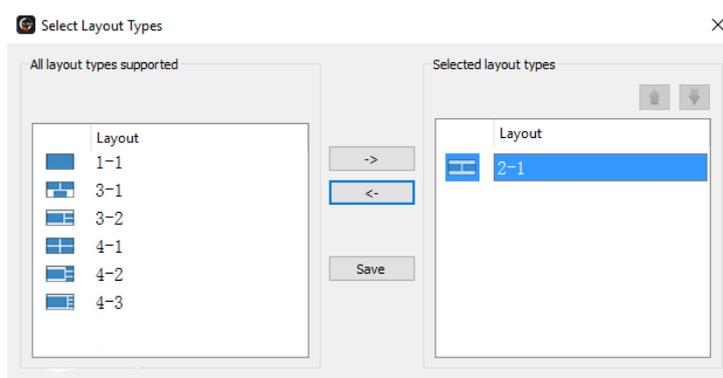
Configuring Multiview Decoders

The NHD-220-RX, NHD-250-RX and NHD-600-RX can be used as a multi-view decoder allowing multiple video streams to be shown on a single display simultaneously in a number of different layouts. To adjust which layouts are accessible in the NetworkHD Touch app or to create default source assignments perform the following.

1. Right click a NetworkHD Multiview-capable decoder and choose Layout Settings.



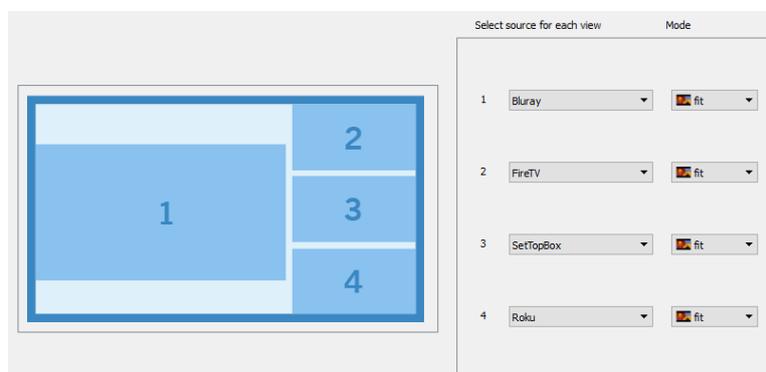
2. Click the drop down menu and choose Edit
3. Select the desired layouts to be accessible from the Touch app



4. Click the Save button

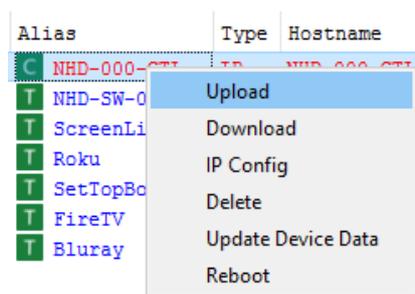
To assign default encoders to multi-view layouts perform the following.

1. Select a layout from the drop down menu.
2. Select a source for each location in the multi-view layout.
3. Select a default audio source TX.
4. Click the Save button.



Uploading Configurations to the NHD-000-CTL

When you have completed creating all required groups, video walls and layouts you can upload the configuration to the CTL directly from the Console software. Simply right click the CTL in the **Other Devices** section and press **Upload**. This will upload the configurations you have created in the Console Software to the configuration file of the CTL.



Once the configuration file has been uploaded to the CTL you can then open the NetworkHD Touch application or begin to configure a third-party control system.

Preview Streams

NetworkHD encoders generate a unicast MPEG preview stream. This stream can be accessed by control systems to provide live video feedback of connected sources.

Note: The NHD 600 Series does not support preview streams.

In order for any device to access an encoder's preview stream it must either exist in the same IP address range as the encoder or a route to it must exist. In most NetworkHD installations, encoders and decoders exist in a separate IP range as the control/Wi-Fi network. It may be necessary to change the configuration of the network so that the encoders, decoders, CTL and any network routers or access points are part of the same IP address range as the device accessing the preview stream or configure appropriate routing between different subnets/VLANs.

The following steps show how to access and configure an encoder's preview stream using the latest version of Google Chrome running on a Windows PC.

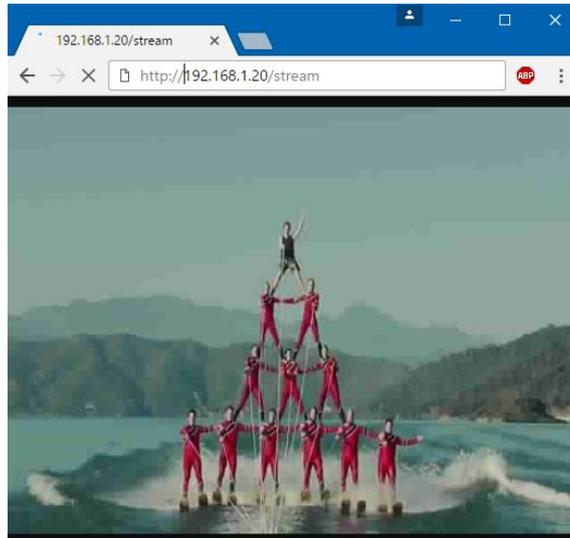
1. Connect a PC to the same network switch as the NetworkHD encoders by using a category cable.
2. Assign the PC's IP address into the same range as the encoder(s). By default, this will be in the **169.254.x.x** range with a subnet mask of **255.255.0.0**.
3. Run the WyreStorm Management Suite and start the NetworkHD Console software.
4. Hit the search button located at the top left of the Console. All available NetworkHD components along with their IP addresses will populate. NetworkHD encoders appear at the right of the Console in the Other Devices section.

NO.	Alias	Type	Hostname	IP	Version
	C NHD-000-CTL...	IP ...	NHD-000-CTL-E4C...	192.168.1.25	v1.13/v7
1	T ScreenLink	TX	NHD-200-TX-70B3...	192.168.1.23	v2.11.3
2	T Roku	TX	NHD-200-TX-E4CE...	192.168.1.19	v2.11.3
3	T SetTopBox	TX	NHD-200-TX-E4CE...	192.168.1.20	v2.11.3
4	T FireTV	TX	NHD-200-TX-E4CE...	192.168.1.21	v2.11.3
5	T Bluray	TX	NHD-200-TX-70B3...	192.168.1.22	v2.11.3

Note: The WyreStorm Management Suite is only available on Windows OS. If using a Mac computer, network scanning software can be used to find encoders and their IP addresses. The NetworkHD Console is required if adjusting IP addresses.

5. Choose an encoder from the list and note its IP address.

6. Open Google Chrome and type the following address into the URL: **http://<Encoder_IP_Address>/stream**



Note: Google Chrome is not required to access the preview stream. Most modern web browsers support the codec to access the preview stream. VLC Media Player can also be used, from the **Media Menu** select **Open Network Stream**. The preview stream's quality can be adjusted on the 100 & 200 series by appending the URL as follows. Accepted values for RESOLUTION, FPS & BITRATE are listed in the table.

Note: Adjustments to preview stream quality are only available on the 100 & 200 series TX and cannot be adjusted on the NHD-400-TX.

- <http://192.168.1.55/stream?resolution=RESOLUTION&fps=FPS&bitrate=BITRATE>

RESOLUTION	CIF 480P 720x480 1280x720
FPS	1 - 30
BITRATE	128 – 2000 (kbps)

Example URL: <http://192.168.1.55/stream?resolution=CIF&fps=10&bitrate=256>

Encoders also generate a still jpg or bmp source preview image which can be used by control systems that support consistent refresh, such as WyreStorm's Enado. The URLs to access this stream are listed below.

NHD-100 & 200 Encoders: TXIPADDR/capture.jpg

NHD-400 Encoder: TXIPADDR/capture.jpg **OR** TXIPADDR/capture.bmp

Example URL: 192.168.1.242/capture.jpg

Note: WyreStorm cannot guarantee all control systems support the decoding of NetworkHD MPEG preview stream. Contact the control system's manufacturer for detailed information.

Setting an encoder's preview stream to its maximum values could overload the processor. This will cause severe video performance issues. Always test settings in a real-world environment.

The preview stream is a unicast signal. This means every device that accesses the stream will add to the encoder's processor load. Stress testing should be performed to ensure the main H.264 stream is not adversely affected.

WyreStorm recommends no more than 5 receivers/preview panels per encoder stream.

The quality query string is optional and does not need to be sent to access the preview stream. Once set, the quality query does not need to be resent.

Troubleshooting

No Audio or Video

- Verify the network switch has been configured 100% per appropriate guide.
- Verify TX and RX units show online, either in the NHD-000-CTL Web UI or Console software.
- Ensure TX to RX assignments have been made.
- Check that the display is powered on and the correct input is selected
- Check that the source device is powered on and is sending an A/V signal

Sluggish or Unresponsive System

- Commonly caused by an improperly configured network switch. A broadcast loop could be occurring or multicast traffic is being directed incorrectly.

If no devices are discovered when a search is performed follow these steps:

- Ensure all NetworkHD Components are running the latest available firmware from the products downloads section at wyrestorm.com
- Ensure the Software is allowed through the Windows firewall by checking the firewall settings and allowed applications
- Ensure that your PCs IP address is in the same range as NetworkHD components
- Reboot your PC

NetworkHD Touch or a 3rd party control system is not properly controlling the system:

- Ensure the Console configurations have been uploaded into the NHD-000-CTL
- The NHD-000-CTL is in the same IP range as the control system.
- If IP addresses have been adjusted ensure all devices have been configured properly

Cannot Connect to the NHD-000-CTL

- Ensure both the Power and Status LEDs are solid.
- Perform a factory reset by holding the reset button for 5 seconds.

Note: Resetting the CTL will cause it to lose all TX and RX alias information.

Alias Cannot Be Set

- If a device Alias cannot be set, another device may have been previously connected with the same Alias - ensure that the old device is offline and use the X in the CTL matrix to remove its record from the CTL.

Contacting Technical Support

Should further clarification of the content of this manual or assistance on troubleshooting be required, please contact WyreStorm technical support.

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Document Revision History

v5.0.0 – March 2019	
Network Connections	Added note regarding proper use of ports on the CTL Updated content regarding the NHD-600 for improved clarity
NHD-000-CTL Controller Network Ports	Added section to better explain the use of CTL ports
System Configuration	Updated content in all sub sections for improved clarity on configuring an NHD system.
v4.0 – January 2019	
Rack Mounting	Added NHD-140-RACK-1U
Network Connections	New Section
NetworkHD Console Software	Renamed Section Updated Important Note before proceeding
Configuring NHD-400 v2 and NHD-600 IR	Added note about feature availability
v3.1 – August 2018	
Rack Mounting	Removed reference to discontinued NHD-000-RACK and NHD-000-RACK2 Added reference to NHD-000-RACK4 which replaces these 2 racks.
v3.0 – April 2018	
Various	Added content to support the NHD-600 as noted throughout document.
Multiview Modes	Added note regarding this feature not being available on v1 of NHD-600.
Video Wall Features	Added note regarding this feature not being available on v1 of NHD-600.
v1.0 – March 2018	
All Sections	Initial Release

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