User Guide

Network Video Adaptor

Model NVA XXX

P/N 0270000##

Revision A

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1.1 Operation Manual

This user operation manual will demonstrate how to configure various settings on NVA, how to perform demonstrations of product functionality, and provides basic troubleshooting steps.

1.1.1 Requirements

1.1.1.1 SOFTWARE

The following software has been tested as functional with NVA:

Internet Explorer 7 (http://www.microsoft.com/windows/downloads/ie/getitnow.mspx)

Firefox 3 (http://www.getfirefox.com)

VLC 0.9.9 (http://www.videolan.org/vlc) with the Mozilla Plug-in

Bonjour (http://www.apple.com/downloads/macosx/apple/windows/bonjourforwindows.html) (*optional*)

BonjourFoxy (http://andrew.tj.id.au/projects/bonjourfoxy/) (*optional*)

1.1.1.2 HARDWARE

The following hardware is optional, but has been tested as functional with NVA:

Philips DVD Player (Model DVP-5992)

Western Digital WD TV HD Media Player (Model WDAVN00)

AirLink Power over Ethernet (PoE) 8 port Fast Ethernet Network Switch (Model ASW308P)

1.1.2 Precautions

- Use either Power over Ethernet (PoE) or an external power supply to power the device; do **not** plug an external power supply and a connection from a PoE-capable network switch into the device simultaneously. Additionally, if the device is being powered with an external power supply and a PoE switch is also used for network connectivity, ensure that the device is plugged into a non-PoE capable port on the switch.

1.1.3 Known Issues

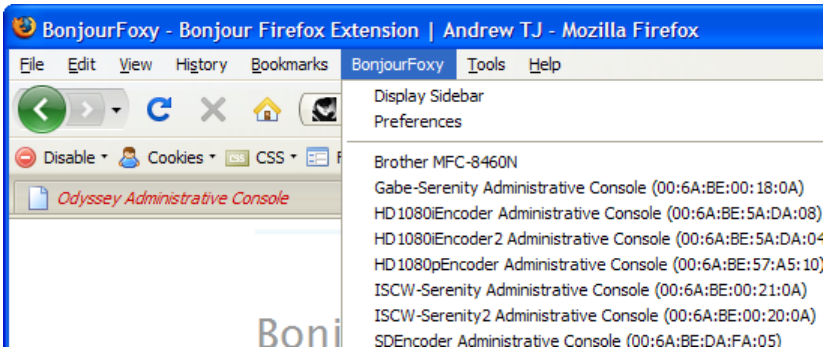
- The only way to prevent the Camera Name from being displayed on the live, reconstructed preview, or streamed video is to delete the text shown for the Camera Name in the Video Encoder Settings section of the Web UI
- When NVA is operating as an HD Decoder, and settings are changed on the HD Encoder source (e.g. another NVA), the unit acting as an HD Decoder must have the Codec reset to synchronize to the new settings
- When NVA is operating as an SD or HD Decoder, and a firmware upgrade is attempted, the firmware upgrade will most likely fail. The mode should be changed to an SD or HD Encoder in order to perform the firmware upgrade, and changed back once the update is complete.
- NVA should not be left on the Info page in the Web UI for extended periods of time; it may be necessary to reboot the device under certain conditions to restore full operation.

1.1.4 Device Operation

1.1.4.1 SERVICE DISCOVERY OF WEB USER INTERFACE

If Bonjour (for Internet Explorer) or BonjourFoxy (for Firefox) are installed on your system (listed as optional items under the Software Requirements section of this user guide), it is easy to discover and browse to the Web User Interface (Web UI) administration page for NVA by using Zero Configuration Service Discovery.

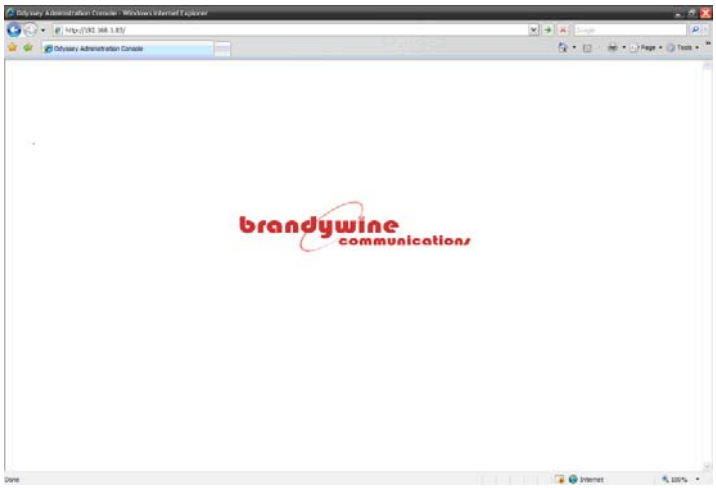
1. From within the Firefox web browser, select the BonjourFoxy menu item as shown:



2. A listing should be present for one or more NVA devices, depending upon your setup. Simply click the entry corresponding to the device you wish to configure and the Web UI will be loaded, without having to manually enter the IP address of the device into the address bar in Firefox.

1.1.4.2 LOGGING IN TO THE WEB USER INTERFACE

The Web User Interface (Web UI) login prompt is shown below:



The default username and password for access to the Web UI are “root” and “root”, respectively.

1.1.4.3 CONFIGURING NVA

1.1.4.3.1 Foreword

When changes are made to NVA settings in the Web UI, the screen should briefly flicker and show a transparent overlay. It will not be possible to make additional settings changes or to click other buttons in the Web UI while these settings are being saved. Also, a dialog box stating “Please Wait…” will appear in the upper right hand corner while the settings are being saved.

If the settings were able to be saved successfully, the transparent overlay will disappear and a dialog box that reads “Success!” will appear in the upper right hand corner.

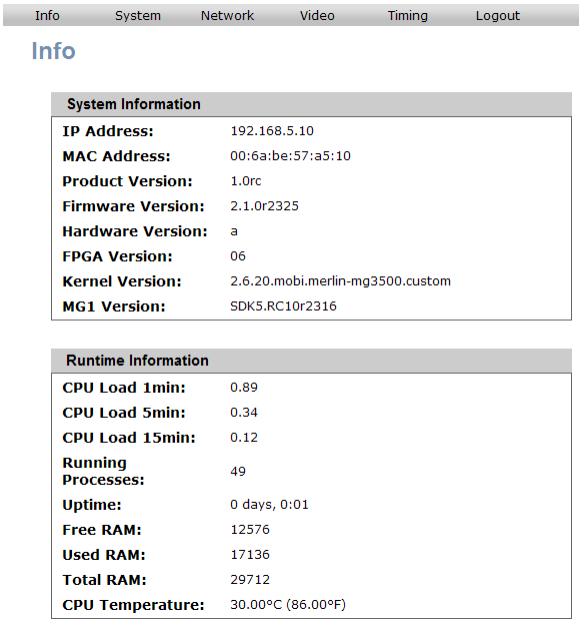
If the settings were not successfully applied (e.g. due to an incorrect value entered for a setting), the transparent overlay will disappear and an error message will be displayed in red; also, specific settings on the web page with values that need to be corrected will be highlighted. Please correct the settings as indicated before attempting to save the settings again.

1.1.4.3.2 Info

The **Info** menu group contains two items that provide general information about the NVA unit, and general diagnostic information on the Composite video inputs.

1.1.4.3.2.1 Info

The Info page is initially seen when you first log into the Web UI. A sample Info page is shown below:



Useful information is presented on this page, including the current IP address of the NVA unit, how long it has been running ("Uptime"), and the readout from the temperature sensor on NVA ("CPU Temperature").

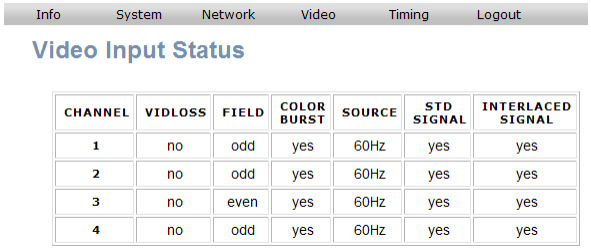
The information in the **Runtime Information** section will dynamically update itself without having to manually refresh the page.

Also listed are the Product, Firmware, Hardware, FPGA, and MG1 versions. This information will be necessary when an issue is encountered and support is requested to help troubleshoot and resolve the issue.

1.1.4.3.2.2 Video Input Status

NOTE: This item is only applicable to an NVA operating as an Encoder in Composite video mode. Although this option appears when NVA is operating in HDMI or Component video modes, or when it is operating as a Decoder, it should not be used in those circumstances.

When NVA is operating as an Encoder in SD (Composite) video input mode, the Video Input Status page will give general diagnostic information on each of the four Composite video inputs, similar to that shown below:



CHANNEL	VIDLOSS	FIELD	COLOR BURST	SOURCE	STD SIGNAL	INTERLACED SIGNAL
1	no	odd	yes	60Hz	yes	yes
2	no	odd	yes	60Hz	yes	yes
3	no	even	yes	60Hz	yes	yes
4	no	odd	yes	60Hz	yes	yes

The most useful information is the “VIDLOSS” parameter, which can assist in troubleshooting; if VIDLOSS shows “yes” for any of the four video inputs, check the analog video source connected to that particular input.

Additionally, the “SOURCE” parameter will identify whether an NTSC (60 Hz) or PAL (50 Hz) video standard is detected on that particular video input; the value in this column should match the video source that is plugged into the video input channel.

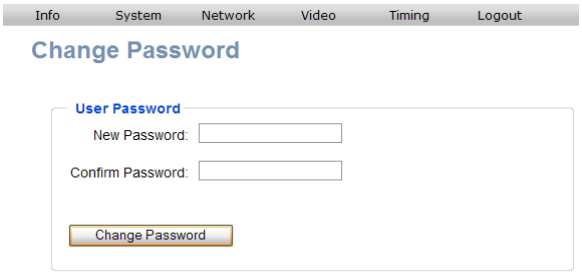
1.1.4.3.3 System

The **System** menu group contains four items that allow general NVA device maintenance, such as firmware upgrades and device reboots.

1.1.4.3.3.1 Password Change

This option will allow the password to be changed for the user account which is currently being used to access the Web UI.

1. Select **System**, then **Password Change** from the menu in the Web UI.
2. Enter the new, identical password in both text boxes, as shown below:



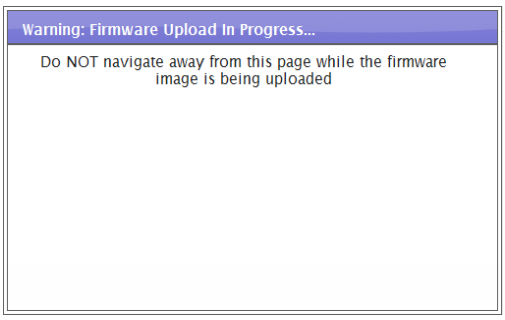
3. Click the “Change Password” button

The password will be changed for any future login attempts.

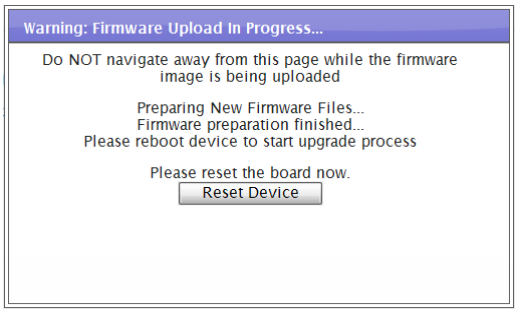
1.1.4.3.3.2 Firmware Upgrade

Firmware upgrade involves two components: an *upload* component, and an *update* component. In the upload component, a new firmware image file is first uploaded using the Web UI. In the update component, the device is reset after the upload is complete, and the new firmware image file is copied into flash memory.

1. Select **System**, then **Firmware Upgrade** from the menu in the Web UI.
2. Click the **Browse** button to select the firmware image provided. After confirming the image, a dialog menu similar to that shown below will appear:



3. Once the firmware upload process begins, it may take as long as 8-10 minutes for the upload to complete. Do not attempt to leave this web page or perform other functions with the unit during this time.
4. Once the firmware upload process is complete, a message will appear in the dialog box prompting to reset the unit so that the upgrade may be completed, as shown below:



5. The unit will take approximately 4 minutes to load the firmware image into flash memory and to restart itself after the reset button is clicked in the Web UI.
6. Once both components of the firmware upgrade have completed, the web page should automatically redirect to the login page. After logging in successfully, the new firmware version should be indicated on the **Info** page of the Web UI.

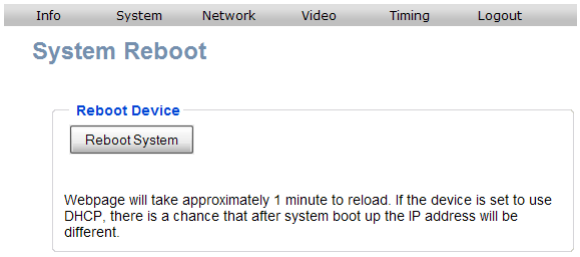
NOTE: If NVA is set to use a Static IP address, and a firmware upgrade is performed, the IP address settings may be lost and it may revert to a Dynamic IP address. In this case, the web page will not automatically redirect since the IP address has change. Additionally, all previous settings will need to be reconfigured on the NVA unit after the upgrade is complete.

CAUTION: if a firmware upgrade is attempted while operating as an SD or HD Decoder, it is possible that the firmware upgrade may fail. Please see the note under the Known Issues section of this document.

1.1.4.3.3.3 System Reboot

The System Reboot function is used to manually reset the NVA for certain circumstances (e.g. a setting has been changed that requires a manual reset to take effect, etc.).

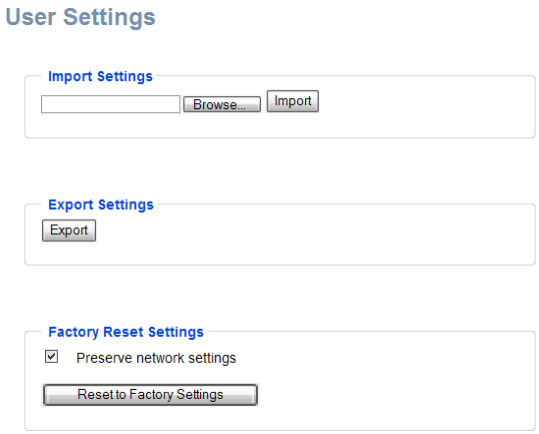
1. Select **System**, then **System Reboot** from the menu in the Web UI.
2. Click the **Reboot System** button to manually reboot NVA, as shown below:



3. The web page should automatically redirect to the login page once the device has finished rebooting.

1.1.4.3.3.4 User Settings

The User Settings page allows the device settings from NVA to be imported, exported, or reset to factory defaults; the page should appear similar to that shown below:



Import Settings

To import a previously-exported settings file to NVA, click the "Browse" button to locate the settings file on the client computer system that is being used to access the NVA Web UI, and then click the "Import" button to upload the settings to NVA.

NOTE: After the settings are uploaded, NVA must be rebooted to allow the new settings to take effect.

Export Settings

The "Export" button is used to save a copy of the current NVA settings (e.g. Video settings, Network settings, etc.) to a file on the client computer system that is being used to access NVA. This settings file may also be used for troubleshooting purposes – in the event that an error occurs, an export of the current settings may be requested to help facilitate remote troubleshooting and diagnostics.

Once the "Export" button is clicked, a prompt to save the settings file will appear in the web browser on the client system. You may rename this file (e.g. adding a date or other descriptive text) if so desired.

Factory Reset Settings

The “Reset to Factory Settings” button is used to restore all NVA settings (e.g. Video settings, Network settings, etc.) to their factory default configuration.
There are two reset methods. The first (and default method) method is to reset all settings *except* for the Network settings (i.e. device IP address, subnet mask, and gateway, the device hostname, and the device Zero Configuration Friendly Name). This method is selected by leaving the “Preserve Network Settings” checkbox selected prior to pressing the “Reset to Factory Defaults” button.
The second method will reset all device settings, including the network settings. In this case, if NVA was set to use a Static IP address, it will revert to DHCP and will no longer be reachable at the existing IP address until it is reconfigured after the factory reset is complete. To perform this full reset, deselect the “Preset Network Settings” checkbox prior to pressing the “Reset to Factory Defaults” button.

Regardless of which method is used, the device must be restarted at the end of the factory reset process to allow the device to operate with its new settings; a prompt will appear in the Web UI to indicate when the device should be restarted.

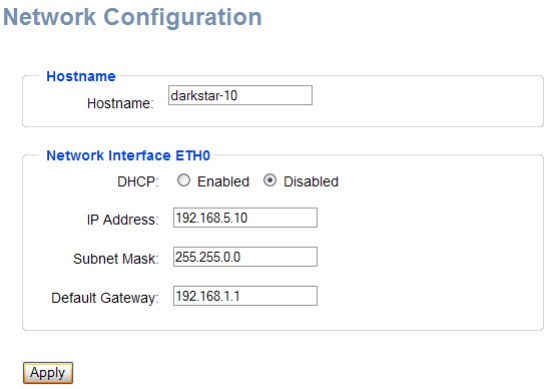
1.1.4.3.4 Network

The **Network** menu group contains two items that allow configuration of the network settings used by NVA, including IP address and the Zero Configuration friendly name.

1.1.4.3.4.1 Configuration

The **Configuration** page allows configuration of the network settings used by NVA.

Select **Network**, then **Configuration** from the menu in the Web UI; the page will appear similar to that shown below:



Hostname

The default hostname is the product name (“NVA”). A new hostname may be configured, of up to 63 characters in length. The hostname value can have numbers, letters, or the dash (“-“) character only.

NOTE: Changing this value will not take effect until after the NVA device is rebooted.

Network Interface ETH0

There are two methods available for the assignment of an IP address and related settings to NVA.

The default method is to use DHCP, and the radio button for DHCP will be set to “Enabled”.

While in this state, the IP Address, Subnet Mask, and Default Gateway values are provided by a DHCP server on the network. The values provided by the DHCP server will be shown in faint letters on a light grey background; these fields can not be modified by the user while DHCP is active, and the values shown are merely for informational purposes.

When the radio button for the DHCP setting is set to “Disabled”, then it is possible to assign a Static IP Address, Subnet Mask and Default Gateway.

NOTE: Changing this value takes effect immediately, so it will be necessary to manually specify the new IP address to continue to access the Web UI on NVA.

After changes have been made, click the “Apply” button. Changes to the settings will take place as noted above.

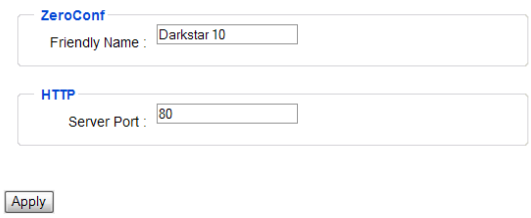
NOTE: When Static IP address values are used and DHCP is set to “Disabled”, the values for IP Address, Subnet Mask, and Default Gateway may appear blank under Internet Explorer. Click the “Disabled” button, or the “Enabled” button followed by the “Disabled” button to show the actual values. Do not attempt to make any changes while the values are not displayed, as the settings will not be applied successfully.

CAUTION: no network-level validation is performed on the values entered for the IP Address, Subnet Mask, and Default Gateway to ensure that the user-supplied values are correct. If values are entered which create incompatible network settings, this would prevent proper device operation (e.g. specifying a Subnet Mask that is too restrictive or that does not match the existing network setup, or specifying a Default Gateway that is outside the allowed range for the given IP Address and Subnet Mask). Please ensure that the values supplied are correct.

1.1.4.3.4.2 Services

The **Services** page allows configuration of the network services offered by NVA, including the Zero Configuration Friendly Name, and the port used by the web (HTTP) server on the device.

Select **Network**, then **Services** from the menu in the Web UI; the page will appear similar to that shown below:



Zero Configuration Networking Friendly Name

The **Zero Configuration Networking Friendly Name** is displayed by software clients such as Bonjour and BonjourFoxy (listed as optional software in the Requirements section of this user guide). This friendly name value can be up to 63 characters in length, and should be used to uniquely identify the NVA device. The default value is simply the product name ("NVA").

This is especially useful in a situation where multiple units may be on the same network so that they may be easily distinguished from each other. If multiple units exist on the network, and they are all using the default value, their Zero Configuration Friendly Names will appear with a number in parentheses, such as "NVA (1)" or "NVA (2)".

The Friendly Name will appear as a prefix to advertisements for both the Web UI on NVA, and at the beginning of any advertisements for streams when operating in Encoder mode (e.g. for an NVA operating as an SD Encoder, four encoder stream advertisements would be seen, each using the Friendly Name, while an NVA operating as an HD Encoder would advertise a single stream with its specific Friendly Name).

NVA devices operating as Decoders will show an advertisement for their Web UI, but will not show any stream advertisements.

NOTE: Changing this value will not take effect until after the NVA device is rebooted.

Web Server (HTTP) Port

The **Web Server (HTTP) Port** value indicates what TCP port is used by the web (HTTP) server on NVA to allow interaction with the Web UI. The default value is 80. It should not be necessary to change this value from the default unless specific network or security requirements are present (e.g. firewall or router port blocking).

NOTE: Changing this value takes effect immediately, so it will be necessary to manually specify the new HTTP port to continue accessing the Web UI on NVA. This is typically specified in the web browser by typing the IP address followed by a colon, e.g. http://192.168.6.9:8080 if the port value was changed from "80" to "8080".

CAUTION: changing the value of the HTTP Server Port to a value which conflicts with another network service running on NVA can render the device unusable. Unless this value must be changed (e.g. to allow

access to NVA through a port on a hardware firewall or router), it is suggested that it be left at the default of 80.

After changes have been made, click the “Apply” button. Changes to the settings will take place as noted above.

1.1.4.3.5 Video

The **Video** menu group contains items that allow configuration of the video input, output, encoding and decoding settings used by NVA.

1.1.4.3.5.1 Video Settings

The first video configuration step which should be performed on NVA is to specify its basic mode of operation (whether it is acting as an Encoder or a Decoder) and to specify what type of video inputs it is receiving, as well as what video outputs it should display on a directly-attached display.

After logging in to the device, select the **Video** menu item in the Web UI, and then select the **Video Settings** menu item to configure these various options. The options available in these different modes are described below.

1.1.4.3.5.1.1 Codec Settings

The Codec Settings menu allows you to specify whether NVA is acting as an Encoder or a Decoder.

1. In the **Codec Settings** section, select either “Encoder” or “Decoder” from the drop-down menu of the **Codec Mode** item , depending on the desired operational mode of the NVA
2. Click the “Apply” button in the **Codec Settings** section to change the mode
3. After approximately 10 seconds NVA will be operating in the specified mode

The **Codec Settings** menu also allows you to restart the Codec chip after making changes to certain settings. Circumstances in which the Codec chip would need to be restarted will be specified in the manual where applicable.

1. In the **Codec Settings** section, click the “Restart” button
2. After approximately 10 seconds the Codec restart process should be complete

1.1.4.3.5.1.2 Video Input Settings

The next configuration step which should be performed on NVA is to specify what type of video input is being encoded or decoded.

Encoder

When NVA is configured as an Encoder, settings, for the Video Input (that will be captured by NVA) and the Video Output (for a local video monitor attached directly to the Encoder) must be configured.

Video Input Settings

Four distinct Video Input modes are available when NVA is configured as an Encoder: Composite, HDMI, Component (YUV) and Component (RGB). Each of these separate modes has a range of resolutions available while in that mode. The list of compatible resolutions based on the mode is shown below:

Resolution *Video Input Mode*	**480i**	**720p**	**1080i**	**1080p**	**1280x1024p60**
Composite	Supported				
HDMI		Supported	Supported	Supported	
Component (YUV)		Supported	Supported		
Component (RGB)					Supported

These modes are configured with two drop-down lists in the **Video Input Settings** section, as shown below:

1. In the **Video Input Settings** section, select the mode that will be used from the **Video Input Mode** drop-down menu
2. In the **Video Input Settings** section, select the resolution that will be used from the **Video Input Resolution** drop-down menu
3. Click the “Apply” button in the **Video Input Settings** section to save the selected mode and resolution
4. After approximately 10 seconds NVA will be operating as an Encoder with the specified settings

After the Video Input Settings have been selected, the Video Output Settings is used to determine how video will be displayed on a locally-connected monitor.

The Video Output Settings options that are presented in the Web UI will allow NVA to operate in two different output modes, depending on the NVA's hardware capabilities.

The first mode uses both the HDMI output as the main display, and provides a spot monitor through the Composite video output ("1080 HDMI Output with Composite Spot Monitor").

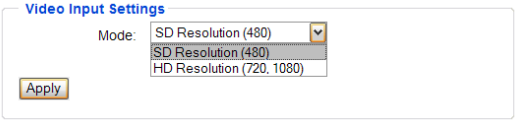
The second mode uses the Composite video output as the primary output, and disables the HDMI output ("Composite Output ONLY").

Choosing one of these two modes will yield different combinations of layouts that are available for both the HDMI and Composite outputs.

As an example of the layout combinations available, when the Video Input is set to Composite with a resolution of 480i, and the Video Output mode is set to "1080 HDMI Output with Composite Spot Monitor", then the layout option available for the HDMI screen is "2x2 LIVE", and the layout options for the Spot Monitor (Composite Out) screen are "Turn Spot Monitor Off", "Full Screen (Channel 1)", "Full Screen (Channel 2)", "Full Screen (Channel 3)", "Full Screen (Channel 4)", and "Display Color Bars".

Decoder

If NVA is configured as a Decoder, the **Video Input Settings** menu will have a slightly different appearance, as shown below:



1. For decoding Standard Definition (SD) streams (e.g. 480i), then the **Video Input Mode** option should be configured as "SD Resolution (480i)".
2. For decoding High Definition (HD) streams (e.g. 720p, 1080i, 1080p, or 1280x1024p), then the **Video Input Mode** option should be configured as "HD Resolution (720, 1080)".
3. Click the "Apply" button in the **Video Input Settings** section to save the selected mode and resolution
4. After approximately 10 seconds NVA will be operating as a Decoder with the specified settings

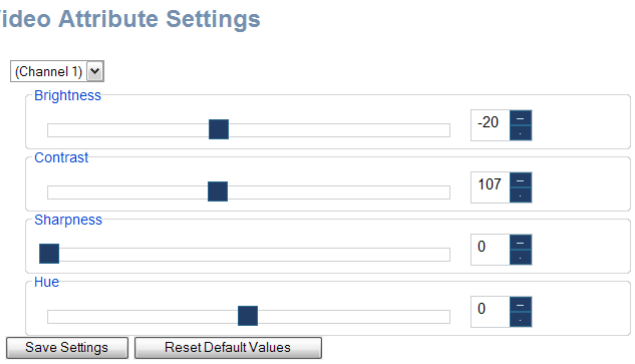
1.1.4.3.5.2 Video Attribute Settings

SD Mode

NOTE: This item is only applicable to an NVA operating as an Encoder in Composite video mode. This option will not appear when NVA is operating in HDMI mode.

When NVA is operating as an Encoder in Composite video mode, the Brightness, Contrast, Sharpness, and Hue can be independently adjusted for each of the four Composite video inputs.

1. Select the **Video** menu item in the Web UI, and then select the **Video Attributes** menu item
2. Select the Composite video channel to adjust from the drop-down menu item, as shown below:



3. The four slider bars for each of the settings will initially be grayed out; after approximately 5 seconds, a slider will appear on each bar
4. One attribute may be adjusted at a time by clicking on the slider and holding the mouse button while dragging to the desired position, and then releasing the mouse button; after the mouse button is released, all four slider bars will temporarily turn grey while the setting is applied
5. Any changes made to these values should be immediately viewable on an external display

By default, these adjustments will only persist while the NVA device is powered on. When it is restarted or turned off, these settings will be lost.

To save the settings made to a specific Composite video input, click the “Save Settings” button while that input is selected. This must be performed for each of the four video inputs if you wish to save new settings for each channel so that they persist across a reboot or power loss.

To restore the Video Attribute settings to their default values on a particular channel, select the channel from the drop-down list and click the “Reset to Default Values” button. After several seconds, all four sliders should return to their factory default values. This must be performed for each channel if you wish all four channels to return to their default values.

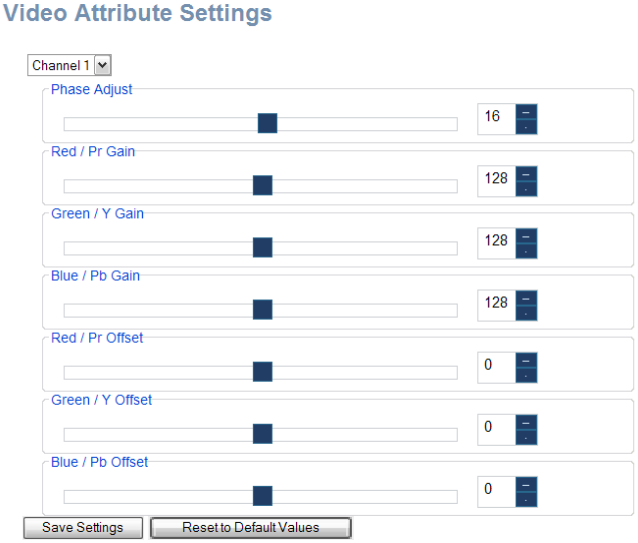
Additionally, this reset to the factory default state will only persist while the NVA device is powered on; to save these factory default values, you must click the “Save Settings” button after you have clicked the “Reset to Default Values” button and the sliders are no longer grayed out.

Finally, these values will not have any effect on the displayed video when NVA is configured as a Decoder; while they can be adjusted while in this state, any changes will only be observed when the NVA is configured to act as an Encoder.

HD Mode

When NVA is operating as an Encoder in Composite video mode, the Brightness, Contrast, Sharpness, and Hue can be independently adjusted for each of the four Composite video inputs.

1. Select the **Video** menu item in the Web UI, and then select the **Video Attributes** menu item
2. Only a single video channel will be present in the drop-down menu, as shown below:



3. The slider bars for each of the settings will initially be grayed out; after approximately 5 seconds, a slider will appear on each bar
4. One attribute may be adjusted at a time by clicking on the slider and holding the mouse button while dragging to the desired position, and then releasing the mouse button; after the mouse button is released, all four slider bars will temporarily turn grey while the setting is applied
5. Any changes made to these values should be immediately viewable on an external display

By default, these adjustments will only persist while the NVA device is powered on. When it is restarted or turned off, these settings will be lost.

To save the settings made for the Component video input, click the “Save Settings” button while that input is selected.

To restore the Video Attribute settings to their default values, click the “Reset to Default Values” button. After several seconds, all sliders should return to their factory default values.

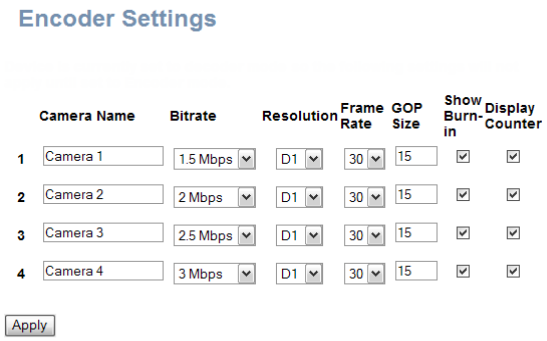
Additionally, this reset to the factory default state will only persist while the NVA device is powered on; to save these factory default values, you must click the “Save Settings” button after you have clicked the “Reset to Default Values” button and the sliders are no longer grayed out.

Finally, these values will not have any effect on the displayed video when NVA is configured as a Decoder; while they can be adjusted while in this state, any changes will only be observed when the NVA is configured to act as an Encoder.

1.1.4.3.5.3 Video Encoder Settings

SD Mode

To change the settings used for video streams for an NVA in Encoder mode with SD (Composite) video sources, select the **Video** menu, and then select the **Encoder Settings** menu item. The page should appear similar to that below:



Using the drop-down selection lists and the text fields for the Camera Names, make any changes to the bitrate, frame rate, and GOP (Group of Pictures) values. The Show Burn-in selection box indicates whether the Camera Name should be should be shown on the video stream for that particular channel. The Display Counter selection box indicates whether the local time and date on the NVA device should be shown on the video stream.

When you have selected the choices for the four video inputs, click the “Apply” button.

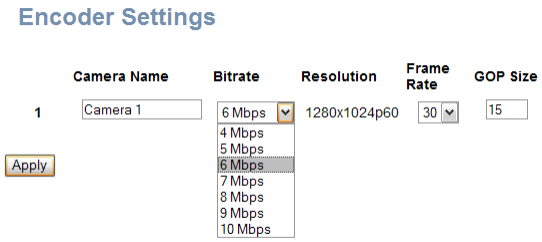
The changes should be reflected immediately (e.g. if you are viewing a video stream in VLC, you should notice a drop in the bitrate if a lower value was selected in this menu).

*NOTE: The value for Resolution **must** be left at D1 and cannot be changed.*

NOTE: If values below 30 frames per second (fps) are selected, then the video will have a “jumpy” appearance when viewed in Reconstructed Preview modes. Additionally, streams with frame rates below 30 fps may have difficulty being viewed on an NVA configured as a Decoder.

HD Mode

To change the settings used for encoded video streams for an NVA in Encoder mode with HD (HDMI or Component) video sources, select the **Video** menu, and then select the **Encoder Settings** menu item. The page should appear with just a single video channel, similar to that below:



Using the drop-down selection lists and the text field for the Camera Name, make any desired changes to the bitrate, frame rate, and GOP (Group of Pictures) values, and click the “Apply” button.

The changes will take effect after approximately 10 seconds, and during this time the HD stream will be unavailable (changing settings on the HD stream automatically causes a restart of the Codec). After this time has passed, you should be able to re-open the same stream in VLC, and the new values chosen should be reflected.

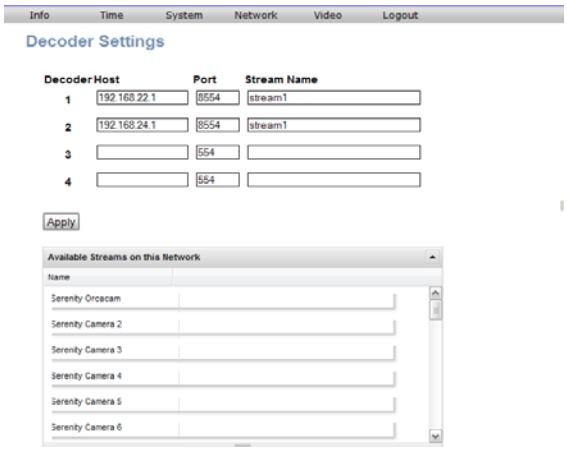
NOTE: Streams with frame rates below 30 fps may have difficulty being viewed on an NVA configured as a Decoder.

1.1.4.3.5.4 Decoder Stream

SD Mode

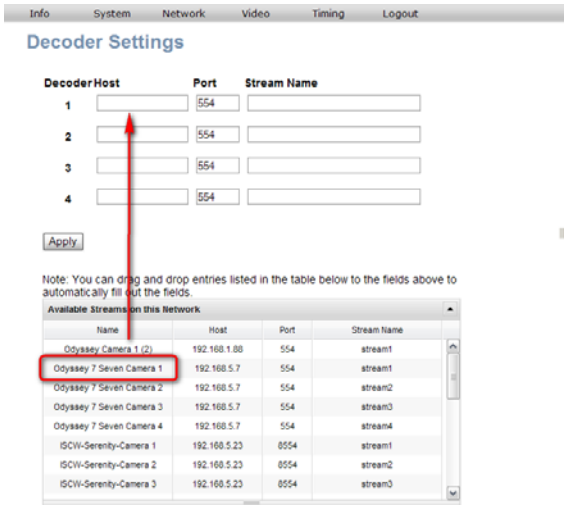
This section describes the configuration of the video streams received by an NVA running in Decoder mode, where the encoded video streams are from SD (Composite) video sources.

1. Select the **Video** menu, and then select the **Decoder Stream** menu item. The page should appear similar to that below:



2. The “Available Streams on this Network” section lists the Zero Configuration Service Discovery “friendly name” of video streams that were discovered by the NVA unit. Left click on one of the listed streams and hold the left mouse button; a hand icon should appear where the stream was clicked, and will remain as long as the left mouse button is held down.

3. Drag the selected stream to one of the four text entry fields in the **Host** section, and release the left mouse button, as shown below:

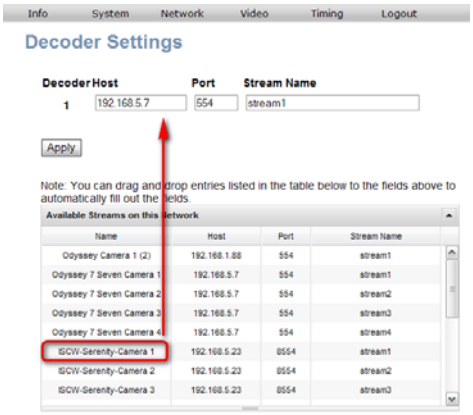


4. Click the “Apply” button. After 10 to 15 seconds, video should be streaming and shown on the HDMI output for the selected video channel cameo where the video stream was dropped.

HD Mode

This section describes the configuration of the video streams received by an NVA running in Decoder mode, where the encoded video streams are from HD (Component or HDMI) video sources.

Steps for selecting a video stream are identical to those described above in the SD Mode section. However, only a single field will be available for dragging and dropping streams onto, as shown below:



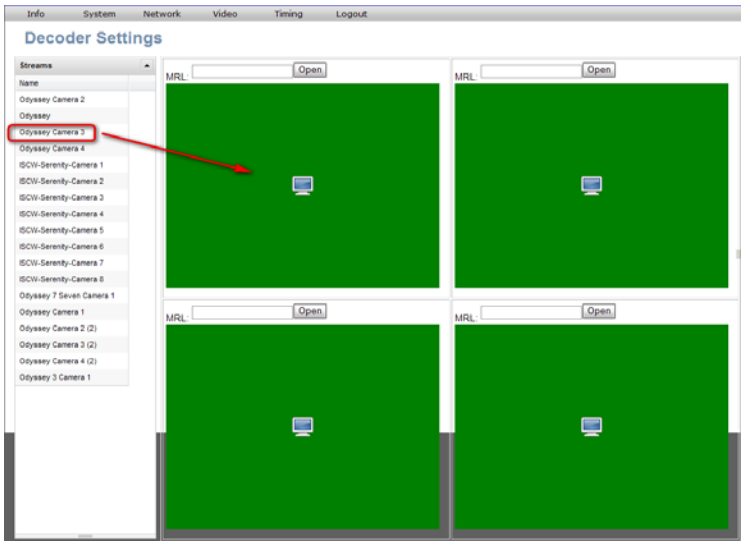
When acting as a Decoder in HD mode, NVA can receive HD streams from another NVA, and it can also receive SD streams from another NVA or Serenity. However, optimal video quality in this mode will be seen when used with HD Encoder sources.

*NOTE: If any video settings are changed (e.g. bitrate, frame rate, etc.) on the HD Encoder side, these will not be reflected immediately on the NVA acting as an HD Decoder; instead, the decoded video will appear to freeze on the display connected to the HD Decoder. From the Web UI of the HD Decoder, select the **Video** menu, then the **Video Settings** menu item, and click the “Restart” button in the **Codec Settings** section to allow the new settings to reflect on the HD Decoder unit and to resume stream decoding.*

1.1.4.3.5.5 Live Video

This page requires that the appropriate VLC add-on has been installed for your web browser (either the VLC ActiveX control for Internet Explorer, or the VLC Plug-in Firefox, respectively).

1. Select the **Video** menu, and then select the **Live Video** menu item. The page should appear similar to that below:



2. The “Streams” section on the left lists the Zero Configuration Service Discovery “friendly name” of video streams that were discovered by the NVA unit. Left click on one of the listed streams and hold the left mouse button; a hand icon should appear where the stream was clicked, and will remain as long as the left mouse button is held down.

3. Drag the selected stream to one of the four green display areas on the right hand of the screen, and release the left mouse button

4. The display area on which the stream was dropped should change from green to black; click the “Open” button, and after 10 to 15 seconds, video should be streaming and shown in the selected display area

*NOTE: Since the decoding of any video streams on the **Live Video** page is performed on your client computer system and not on NVA, trying to open too many video streams can result in unexpected behavior on your system. It is best to only open 1 or 2 video streams at most, and to only open SD video streams.*

1.1.4.3.6 Reference

The **Reference** menu group allows configuration of the available time synchronization methods on NVA, and consists of a single page (**Reference Settings**).

1.1.4.3.6.1 Reference Settings

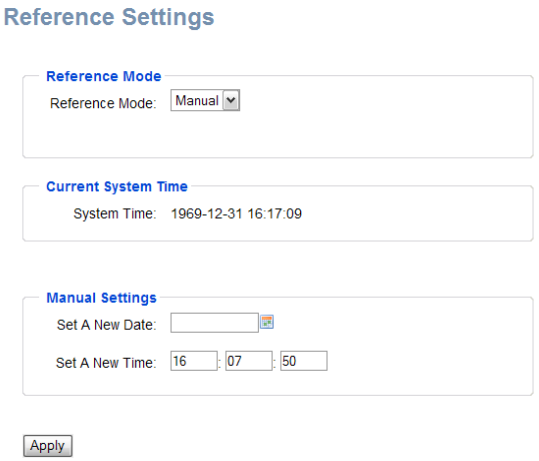
There are currently two options for setting the time on NVA: Manual, and NTP. These options are selected using the **Reference Mode** drop-down list, and will immediately change NVA's timing mode when chosen.

NOTE: The NTP settings may be configured immediately, but NTP synchronization will not take effect until after NVA is manually reset.

When set to Manual, you may specify the exact date and time that you wish NVA to use. When set to NTP, you may specify what NTP server you wish NVA to synchronize with, and how often you wish the synchronization to occur.

1.1.4.3.6.1.1 Manual

The Manual Time Setting Mode should appear similar to that shown below:

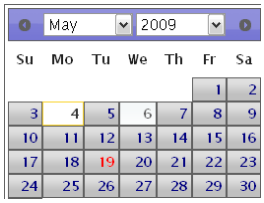


The **System Time** field will show the current date and time on NVA. This field cannot be modified by the user. However, it will dynamically update itself, and will reflect any changes the user may make by setting new dates and times.

The **Set A New Date** field will automatically fill itself with the current date on NVA. There are two options for choosing a new date: manual date entry, or using the Calendar widget.

To manually enter a date, type the new date in the form of two digits for month, two digits for the day, and four digits for the year, all separated by forward slash characters (i.e. MM/DD/YYYY); be sure to include leading zeros for the month and day.

To use the calendar widget, simply click on the small calendar icon to the right of the manual entry field. The calendar widget will display on the page similar to that shown below:



The following Calendar widget features are illustrated in the above image:

- The current date on the client system (i.e. the computer from which you are accessing the Web UI on NVA) is indicated with black text on a white background and a yellow highlighted border.
- The date currently set on the NVA device (if different from the date on the client system) is indicated with dark grey text on a white background and a dark grey border.
- A new day in the currently-displayed month may be selected by hovering over the chosen date; the text for that date will change from purple to red.
- A new month and year may be selected individually from the drop-down lists; additionally, months and years may be cycled through in chronological order using the left and right arrow buttons at the top of the calendar.

The **Set A New Time** field has three separate text entry fields; from left to right these fields correspond to the hour, minute, and second values, respectively. As with the date field, these values will automatically be filled based on the current time on NVA. A 24 hour clock format is used for these fields.

To manually enter a new time, enter a new value for each of the fields. Allowed values for the hour field are 00 through 23; allowed values for the minute and second fields are 00 through 59.

NOTE: Be sure to include two zeros rather than leaving a field blank. For example, to set the time to 12:15:35 AM, enter "00", "15", and "35" into the hour, minute, and second fields, respectively. To set the time to 6:00:03 PM, enter "18", "00", and "03" for the hour, minute, and second fields.

Once all selected settings are complete, click the "Apply" button to update both the time and the date on NVA.

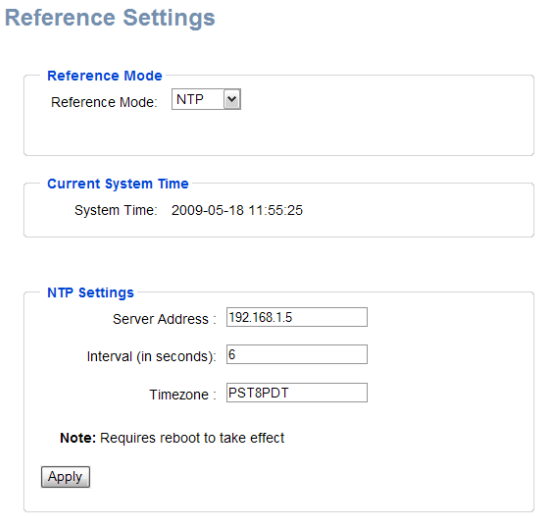
NOTE: This manual time value may be lost if a battery is not present on the NVA device; in this case, the time will need to be reset after each power cycle or reboot.

1.1.4.3.6.1.2 NTP

When the **Time Setting Mode** is set to NTP, you may specify the NTP server that you wish NVA to use for time synchronization.

These NTP server settings are persistent across reboots and power cycles, and will continue to be used each time that NVA is powered on until they are changed or a different timing method is selected.

The NTP options will appear similar to that shown below:



Server Address

This value specifies the IP address of the NTP server that NVA should use to synchronize its clock.

Interval

The Interval value can be any value in the range of 4 to 14, and determines approximately how often NVA will update itself with the NTP server. The default interval value is 6.

The table below shows the range of values for the interval parameter, and the corresponding NTP update time value in seconds, minutes, or hours:

Interval value	**Approximate NTP update time(hours, minutes, or seconds)**
4	16 seconds
5	32 seconds
6	64 seconds

7	2.13 minutes (128 seconds)
8	4.27 minutes (256 seconds)
9	8.53 minutes (512 seconds)
10	17.07 minutes (1024 seconds)
11	34.13 minutes (2048 seconds)
12	1.14 hours (4096 seconds)
13	2.28 hours (8192 seconds)
14	4.55 hours (16384 seconds)

Timezone

This value specifies the time zone that should be used on NVA. The default time zone value is PST8PDT.

After modifying these values to match your desired settings, click the “Apply” button.

NOTE: A manual restart of NVA is required to allow the modified NTP server settings to take effect.

1.1.4.4 DEMONSTRATION (SD MODE)

1.1.4.4.1 Live Video Cameos

NOTE: This demonstration is applicable when the NVA is acting as an Encoder.

1. Connect one or more analog video sources using the BNC video in connectors, and an external display using either the HDMI or the BNC video out (spot monitor) connection.
2. Configure the device to Composite input mode.
3. (*optional*) Change between Live and Reconstructed Preview modes (only relevant if using an HDMI-connected external display).
4. (*optional*) Change the spot monitor output channel between various input channels, if desired (only relevant if using a BNC-connected external display).

1.1.4.4.2 Live Streaming Video

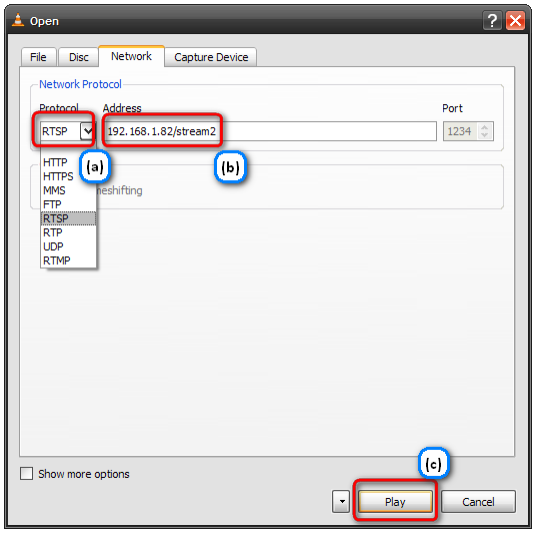
NOTE: This demonstration is applicable when the NVA is acting as an Encoder.

Four video streams are available for viewing in VLC when the device is in Composite Mode and is acting as an Encoder. The four analog video inputs are accessible in the following form:

rtsp://ip.address/stream***N***

N is a number between 1 and 4, depending on the Composite video input to be viewed (e.g. rtsp://192.168.1.82/stream2 would correspond to the stream for the second Composite video input).

From VLC, select **Media**, then **Open Network**; at the dialog box (shown below), select **RTSP** from the drop-down list for the **Protocol** (a), enter the stream address of the input you wish to view in the **Address** field (b), then click **Play** (c).

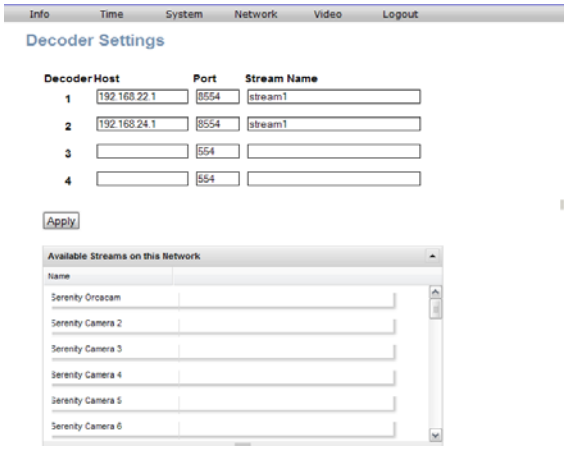


1.1.4.4.3 Decoding Streaming Video

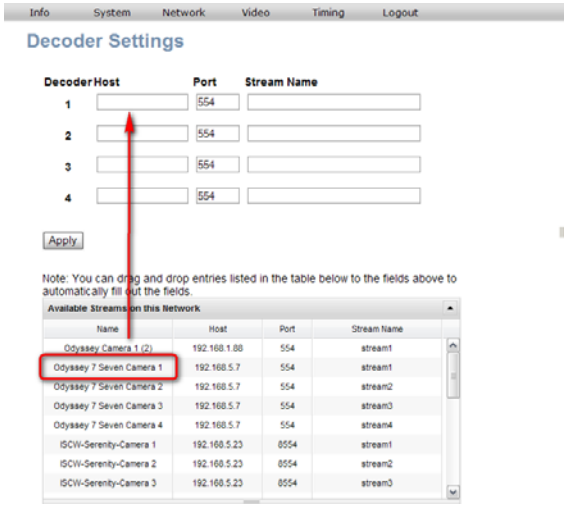
NOTE: This demonstration is only applicable when the NVA is acting as a Decoder from another Encoder source (e.g. NVA or Serenity).

Up to four video streams may be decoded by NVA when the device is in SD Mode and is acting as a Decoder.

1. Connect an external display using the HDMI video output connection.
2. Configure the device to **Decoder** mode and **SD** input mode, as described in the *Changing Device Settings* section.
3. Select the **Video** menu, and then select the **Decoder Stream** menu item. The page should appear similar to that below:



4. The “Available Streams on this Network” section lists the Zero Configuration Service Discovery “friendly name” of video streams that were discovered by the NVA unit. Left click on one of the listed streams and hold the left mouse button; a hand icon should appear where the stream was clicked, and will remain as long as the left mouse button is held down.
5. Drag the selected stream to one of the four text entry fields in the **Decoder Host** section, and release the left mouse button, as shown below:



6. Click the “Apply” button. After 10 to 15 seconds, video should be streaming and shown on the HDMI output for the selected video channel cameo where the video stream was dropped.

NOTE: Display of more than one decoded stream at a time may show a significant amount of latency between the streams.

1.1.4.5 DEMONSTRATION (HD MODE)

1.1.4.5.1 Live Video Cameos

NOTE: This demonstration is applicable when the NVA is acting as an Encoder.

1. Connect an HD video source and an external display using the HDMI connections.

   NOTE: If a DVD player is used as the source, the DVD disc used must not have HDCP present on the disc or it will not work properly with the device

2. Configure the device to HD input mode, and select the appropriate input format (720p, 1080i or 1080p) depending on your source

1.1.4.5.2 Live Streaming Video

NOTE: This demonstration is applicable when the NVA is acting as an Encoder.

A single video stream is available for viewing in VLC when the device is in HD Mode. The HD video input is accessible at the following address:

rtsp://ip.address/stream1

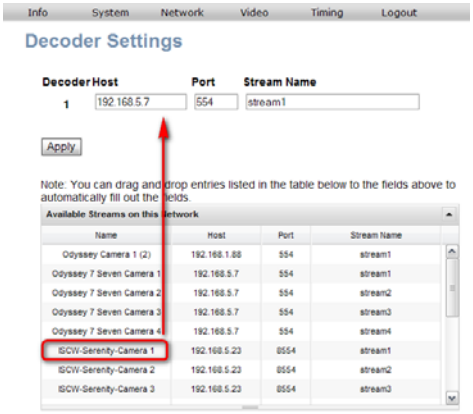
Configuration of VLC is similar to that shown in the *DEMONSTRATION (SD MODE)* section of this guide.

1.1.4.5.3 Decoding Streaming Video

NOTE: This demonstration is only applicable when the NVA is acting as a Decoder from another Encoder source (e.g. NVA or Serenity).

A single video stream may be decoded by NVA when the device is in HD Mode and is acting as a Decoder.

1. Connect an external display using the HDMI video output connection.
2. Configure the device to **Decoder** mode and **HD** input mode, as described in the *Changing Device Settings* section.
3. Select the **Video** menu, and then select the **Decoder Stream** menu item
4. Steps for selecting a video stream are identical to those shown in the DEMONSTRATION (SD MODE) section of this guide. However, only a single field will be available for dragging and dropping streams onto, as shown below:



When acting as a Decoder in HD mode, NVA can receive HD streams from another NVA, and it can also receive SD streams from another NVA or Serenity. However, optimal video quality in this mode will only be seen when used with HD Encoder sources.

NOTE: If video settings are changed (e.g. bitrate, frame rate, etc.) on the HD Encoder side, these will not be reflected immediately on the NVA acting as an HD Decoder. From the Web UI of the HD Decoder, select the ***Video*** *menu, then the* ***Video Settings*** *menu item, and click the "Restart" button in the* ***Codec Settings*** *section to allow the new settings to reflect on the HD Decoder unit.*

1.1.5 Troubleshooting

1.1.5.1 General

- If issues are encountered in trying to access NVA, including but not limited to Web UI connectivity or streaming video connectivity, please verify that any software firewalls are disabled on the client system that is attempting to connect.
- If hardware firewalls or other filtering devices are present on the network between NVA and the client system, try moving the NVA device to a new network location that is not filtered by these devices.
- If general issues are encountered while trying to stream video to or from NVA, or to display video through HD or SD displays, please examine the text listed for the "FPGA Version" on the Info page in the Web UI. If the text does not display a number (e.g. "06") and instead reads "c2, subaddress 0" or other text, remove power to the NVA board, wait several seconds, and then restore power. Be sure to actually remove the power source; do not simply perform a reboot, as a reboot without removing power will not address this particular issue.

1.1.5.2 Live Video

- If a blue screen is seen on the HDMI output of an NVA acting as an Encoder in HD mode, please check the configuration on the HDMI source.

  Many video sources (especially DVD players) will use an "Auto" setting for their HDMI output. If the video source is set to an Auto mode, it will not work properly with NVA.
  Prior to connecting this to the input of an NVA acting as an Encoder, you should manually set the HDMI output of the video source to 720p, 1080i or 1080p, depending on the mode in which you wish to use the NVA as an Encoder.

  Also, verify that the Video Input mode chosen on NVA matches the output mode of the HD video source.

1.1.5.3 Streaming Video

1.1.5.3.1 Encoder

If NVA is acting as an Encoder for streaming video, and the video stream is not displayed at the remote stream recipient (e.g. VLC software client), try the following steps:

1. Restart the stream recipient (close and re-open VLC), and reconnect to the Encoder.
2. If step 1 does not display streaming video from the Encoder, then restart the Codec on the Encoder (as described in the Changing Device Settings / Codec Settings section); wait approximately 10 to 15 seconds, then re-open the video stream recipient.
3. If the above two steps above do not restore streaming video from the Encoder, then reset the unit by power cycling NVA (remove the network cable if powered using PoE, or the external power adapter), allow the unit to boot up, and try again.

1.1.5.3.2 Decoder

If NVA is acting as a Decoder for streaming video, and the video displayed on the monitor has frozen, or if the screen is black with no video, try the following steps:

1. Select a different video source in the Web UI of the Decoder, if different streaming video sources are available on the network.
2. If no additional sources are available on the network, then restart the Codec on the Decoder (as described in the Changing Device Settings / Codec Settings section); wait approximately 10 to 15 seconds, and video should begin to stream again.
3. If the above two steps do not restore video on the streaming Decoder, then restart the Codec on the Encoder, wait approximately 5 seconds, and then restart the Codec on the Decoder. Video should begin to stream again after 10 to 15 seconds.
4. If the above two steps above do not restore video on the streaming Decoder, then reset the unit by power cycling the Decoder (remove the network cable if powered using PoE, or the external power adapter).
5. Finally, if video is still not being received on the streaming Decoder, then power cycle both the Encoder and Decoder units, and try again.

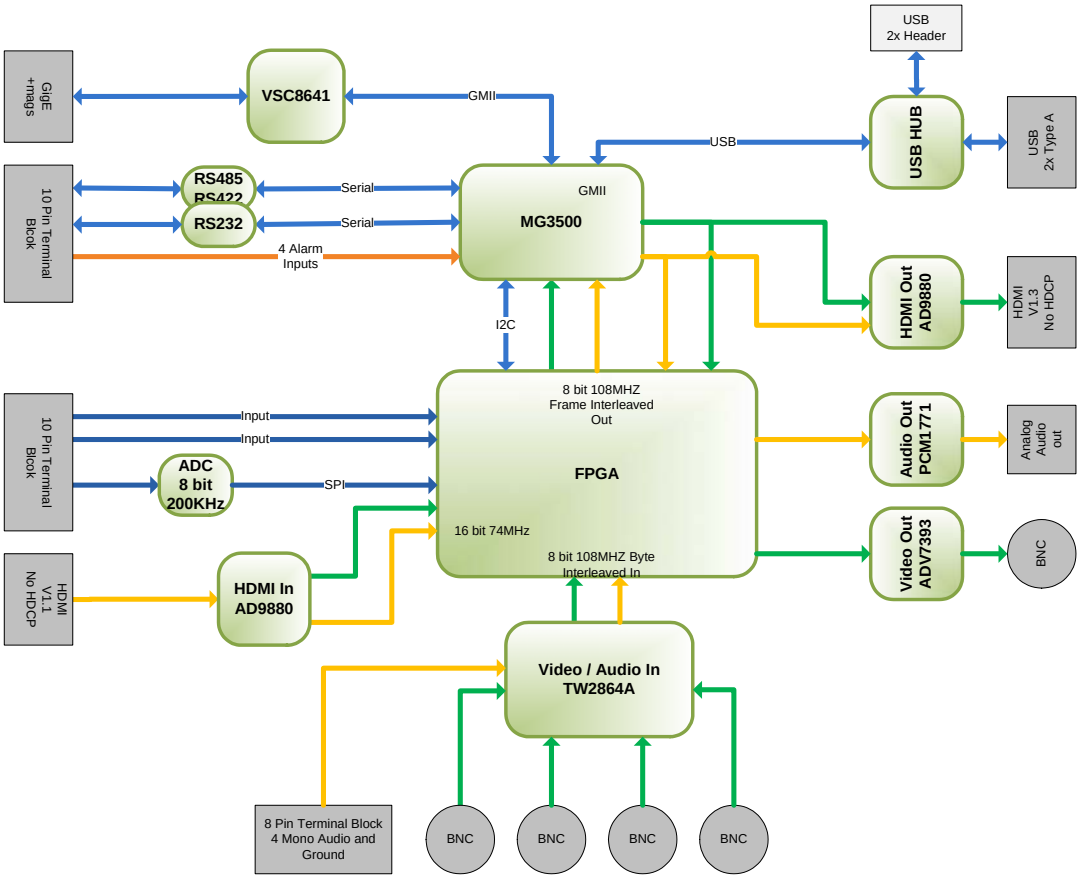
Product Specification

Description

The NVA is designed to encode and decode video while accepting input from high accuracy time sources. By default the NVA can have up to four SD video inputs and one spot monitor output. Optionally, HDMI Inputs and Outputs may be added to support resolutions up to 1080i60. The device can also be powered over Ethernet with the optional PoE module.

Features

- Mobilygen MG3500 Compression SoC
- Techwell TW2864 Audio / Video Decoder
- Four SD video Inputs
- Four Mono Audio Inputs
- 1 SD Video Output
- 1 Stereo Analog Audio Output
- Optional HDMI Audio / Video Input
- Optional HDMI Audio / Video Output
- Optional PoE module



Product Information	This document contains information for a new product. Btrandywine Communications reserves the right to modify this product without notice.

1.2 Specifications Overview

The NVA is based around the Mobilygen MG3500 video compression SOC. The MG3500 integrates an HD H.264 codec with an ARM9 processor along with several other peripherals. This allows compressing, recording and streaming a full 120 D1 frames/second providing 30fps, D1 DVD quality video on 4 video channels. NVA incorporates industry-first features like real time, full resolution, High Profile H.264 compression on each channel, a Hi Def 1080i HDMI video input and output. NVA is controlled using a built in web server and standard web browser software, from any network connected location. No additional software clients are needed on the PC, just a standard web browser. Remote upgrade for the firmware is also available through the built in web interface. Audio and Video can be captured to and played back from an optional removable USB device, such as a USB-HDD or USB Flash. The USB interface can also be used for input controls such as a mouse and/or keyboard in conjunction with the OSD.

Mobilygen MG3500

The MG3500 is a state of the art Video Codec SoC that combines a H.264 high profile codec with an ARM 9 processor and other peripherals.

Techwell TW2864

The TW2864A combines four video ADCs and four audio ADCs into a single chip and outputs the video and audio interleaved on one BT656 bus and one I2S bus.

Altera Cyclone III FPGA

NVA includes a 16K LE FPGA with a 16 bit 512Mb DDR2 memory attached. The FPGA controls and converts the video input including the 4 SDs and HD inputs. The FPGA also has the ability to output video to the spot output.

Ethernet Interface

The NVA has one Gigabit Ethernet port used for streaming video to and from the host. It is also used to configure the device.

USB

Next to the Ethernet port are two external and two internal USB ports. The two internal ports are connected to headers.

Signal Inputs

There are four signal inputs that can be used as alarms or event triggers. Each input is level adjusted and debounced.

SD Audio / Video Inputs

BNC connectors P1-4 provide the four NTSC/PAL composite video inputs. The Audio Terminal Block provides four audio inputs. Both audio and video are routed to the TW2864 where they are converted to Byte Interleaved BT656 and sent to the FPGA.

SD Audio / Video Output

A BNC connector and Mini-jack provide the video and audio output. The video output can be configured to be a spot monitor displaying live video, remote video, or for video playback. The audio output is amplified and connects directly to headphones or powered speakers.

HDMI Input

The AD9880 is an HDMI codec that supports HD video up to 1080p and Stereo audio.

HDMI Output

The AD9889B is an HDMI codec that supports HD video up to 1080p and Stereo audio.

PoE

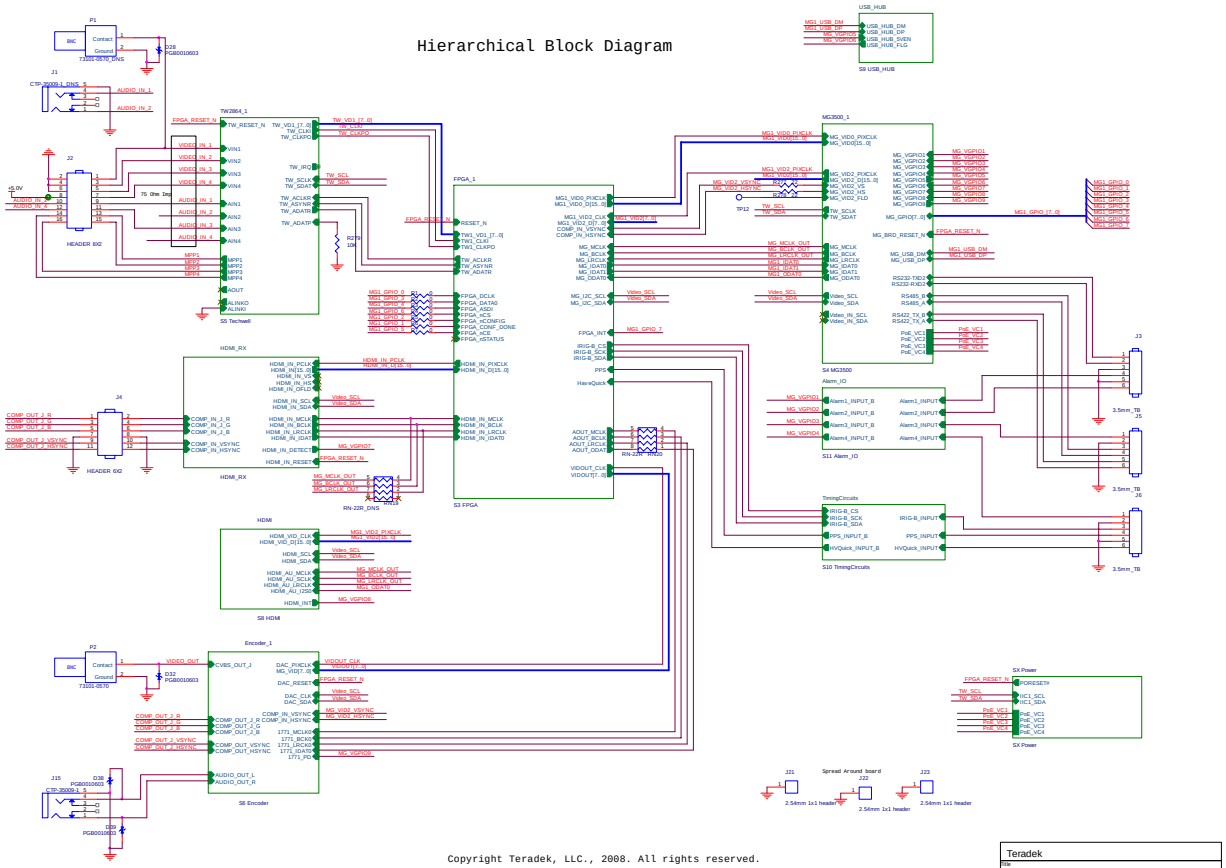
An optional PoE module can be added to power the device over the Ethernet cable.

LED Function Indicators

TBD

1.3 PCB Layout

1.4 Schematic Top



1.5 Connector Pin Outs

Ethernet

A standard Cat5 RJ45 with multiple LEDs will be used. The LED color can be changed with different part numbers. The connector also shares the same foot print across multiple manufacturers.

USB

There is a 2x stacked USB Type A connector on the edge. The connector also shares the same foot print across multiple manufacturers.

Terminal Block

There are three 6-pin Terminal blocks on the I/O side of the board next to the USB and Ethernet ports. A 3.5mm size Terminal block was selected for the small size and availability of a mating screw clamp module.

TB1

Pin Name	Group	Function
RS232TX	RS232	Serial Commutations Transmit
RS232RX	RS232	Serial Commutations Receive
GND	RS232	Serial Communications Ground
Alarm In 1	Alarm	Alarm Input 1
GND	Alarm	Alarm Input Ground pin
Alarm In 2	Alarm	Alarm Input 2

TB2

Pin Name	Group	Function
Alarm In 3	Alarm	Alarm Input 3
GND	Alarm	Alarm Input Ground pin
RS485B/RS422RXB	RS485/422	RS485 transmit / receive differential signals. In RS422 mode these 2 pins are the receiving differential signals
RS485A/RS422RXA	RS485/422	
RS422TXB	RS485/422	RS422 Transmit differential signals.
RS422TXA	RS485/422	

TB3

Pin Name	Group	Function
Alarm In 4	Alarm	Alarm Input 4
GND	Alarm/Timing	Alarm Input Ground pin or Timing input ground pin
ADC Input	Input	
Input	Input	
GND	Input	
Input	Input	

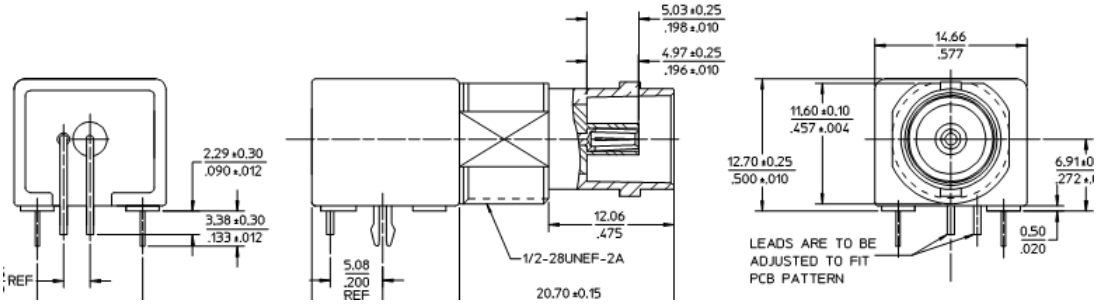
Power

There is a single 2-pin Terminal block on the I/O side of the board next to the I/O Terminal Blocks. A 5mm size Terminal block was selected to prevent accidental connection of power to I/O signals.

Pin Name	Group	Function
+VIN	DC Power	DC voltage input. +9v to +48V max
GND	DC Power	Power input ground

SD Video I/O

BNC connectors are used for the SD video input and outputs. There will be one SD output for a spot monitor and one SD input into video 1 so the board can be used as a single channel encoder when the video input daughter board is not used.

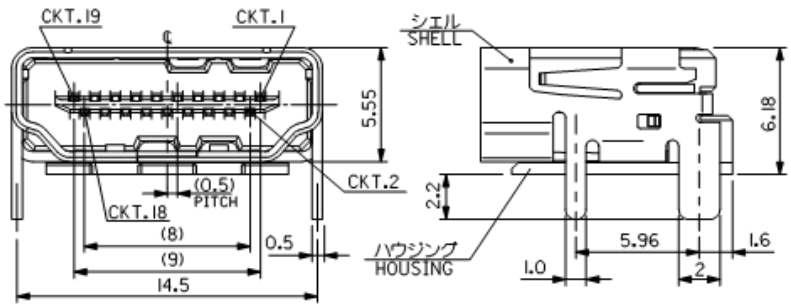


Audio I/O

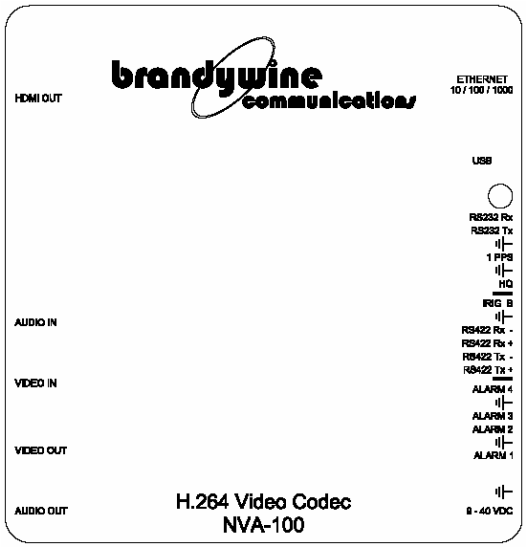
There are two mini stereo headphone jacks for stereo output and stereo input. The daughter board will have an 8-pin terminal block similar to the I/O terminal blocks for four mono audio inputs. The stereo input will be used when the device is setup as a single encoder. The Stereo output is amplified and the use of headphones is possible.

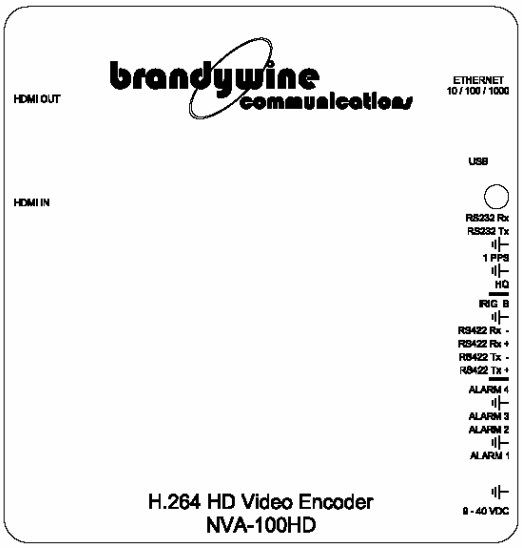
HD Video I/O

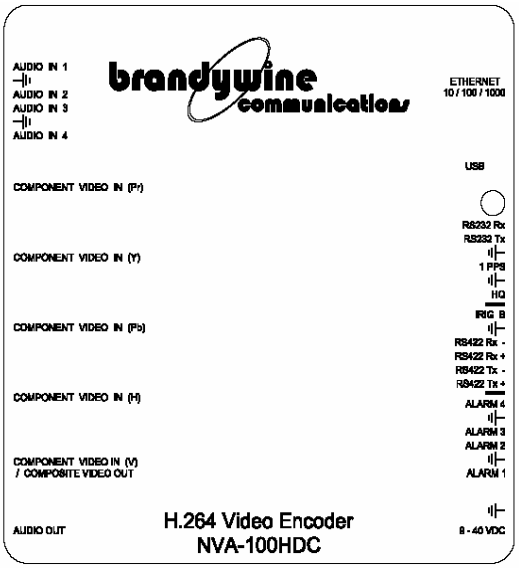
There is one HDMI input connector and one HDMI output connector. A Molex 500254-1927 is used for both of the HDMI connectors. If the daughter board is used then the HDMI connectors will not be installed.

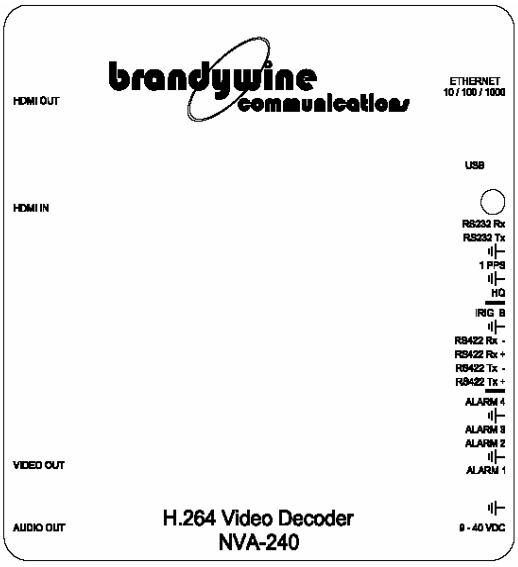


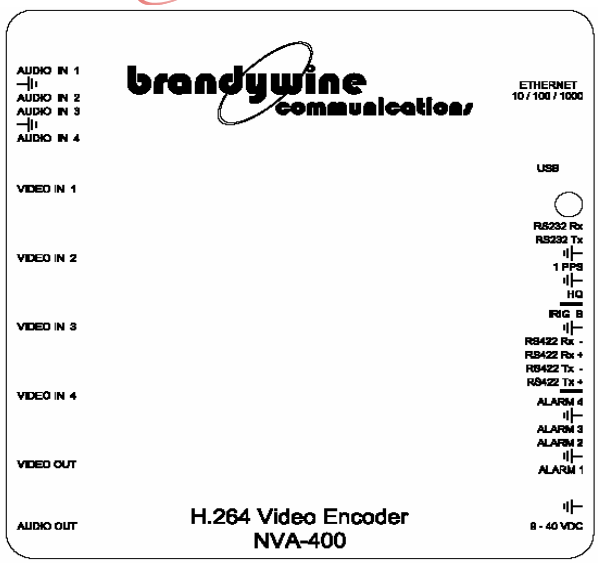
Different Models of the NVA showing connectors










AUDIO IN 1
AUDIO IN 2
AUDIO IN 3
AUDIO IN 4
VIDEO IN 1
VIDEO IN 2
VIDEO IN 3
VIDEO IN 4
VIDEO OUT
AUDIO OUT
brandywine communications
H.264 Video Encoder
NVA-400
ETHERNET
10 / 100 / 1000
USB
RS232 Rx
RS232 Tx
1 PPS
HQ
IRIG B
RS422 Rx -
RS422 Rx +
RS422 Tx -
RS422 Tx +
ALARM 4
ALARM 3
ALARM 2
ALARM 1
9 - 40 VDC