EQT-1616-3G-C

EQT 12G/3G/HD Router

User Manual

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Version 1.0, May 2021

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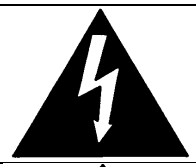
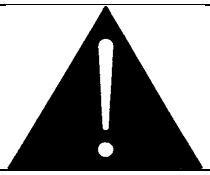
IMPORTANT SAFETY INSTRUCTIONS

	The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

- Read this information
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING
TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE

WARNING
DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS ARE PLACED ON THE EQUIPMENT

WARNING
TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE

WARNING
THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	First release (based on FW B538)	May 2021

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1. OVERVIEW

EQT-1616-3G-C is a revolutionary design enclosed in a compact 1RU frame, capable of high-level integrated functionalities and routing of up to 16 input and 16 output 12Gbps signals, using unique serviceable rear modules, on serviceable sub-modules. This is a compact, feature full routing solution with main and redundant power supplies, designed with mission-critical 24/7 applications in mind.

EQT-1616-3G-C uses format-independent data paths to support digital signals from 1.5Gbps to 12Gbps. It boasts forward-looking hardware to support integrated functionalities, such as multiplexing single-link 4K to quad-link UHD and de-multiplexing quad-link UHD to single-link 4K, plus other feature key-enabled functionalities. Among these functionalities, clean and quiet switching is an enable key-feature that provides for all 16 outputs seamless video and “popless” audio switching. This is ideal for use in master control UHD applications as a bypass router or as a simple Master Control router itself, supporting four quad-link 3G-SDI deterministically routed or 16 single-link 12G-SDI clean and quiet switching paths.

MADI is another software enabled feature key, which activates two auxiliary I/O ports dedicated to 64 channels of MADI audio, allowing them to be shuffled into the 16 output video bus as embedded audio.

The EQT-1616-3G-C can be controlled by Evertz’ customizable front panel CP2402E, by Ethernet, Serial and GPIO ports, as well as by a third-party interface. It is also VistaLINK® PRO capable, offering remote monitoring, control and configuration capabilities via Simple Network Management Protocol (SNMP).

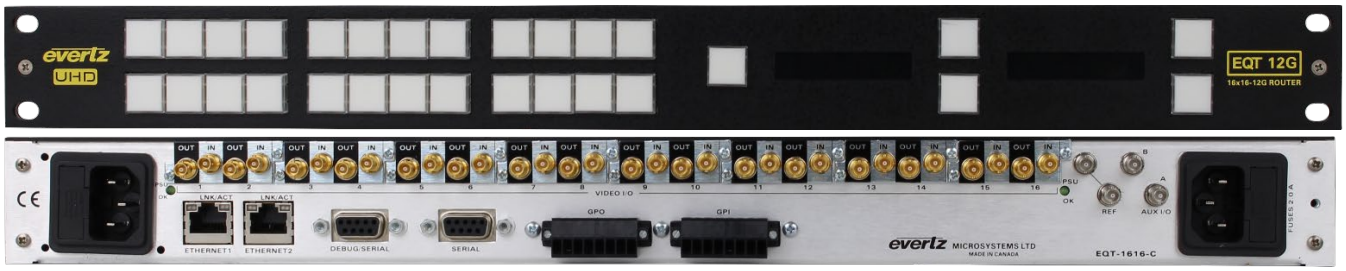


Figure 1-1 : EQT-1616-3G-C Front and Rear View

Configuration
EQT-1616-3G-C is housed in a 1RU frame. I/O consists of 16 HDBNC inputs connectors and 16 HDBNC output connectors.

Expansion
EQT-1616-3G-C utilizes HDBNCs for the I/O and can be populated with modules of 2x2 (2 inputs and 2 outputs). It can accommodate up to 8 modules (total of 16 inputs and 16 outputs).

Technical
EQT-1616-3G-C offers full 12Gbps bandwidth to handle uncompressed UHD single-link signals. Automatic bit rate detection on the input equalizer allows any mix of 12G, 3G, and HD signals in the same unit. All outputs are user-configurable.
The EQT router has a number of control options:

- **Local Control Panel:** Physical buttons on the front panel of EQT that provide easy access to all crosspoints
- **Remote Control Panel:** Provides remote access to all crosspoints via Ethernet or Serial connection
- **External Third Party Control**: EQT-1616-3G-C can be controlled remotely via an external third party control device, such as an automation system, via Ethernet, Serial, or GPIO control

Power Supply

The EQT-1616-3G-C router is equipped with an internal main and redundant power supply.

Features & Benefits

- Supports HD–SDI, 3G–SDI, 12G–SDI and 2SI Quad–link 3G–SDI
- 2SI 12G–SDI to Quad–link 3G–SDI translation, 2SI Quad–link 3G–SDI to 12G–SDI translation
- Embedding/de-embedding mono shuffling and MADI IO
- Evertz' Clean and Quite Switch key-enable per port
- Multiple control options:
  - Front Panel (CP2402E)
  - Remote Control Panel (through serial RS232/RS422)
  - Quatz and Third-Party Protocols
  - Ethernet Ports
  - GPIO ports
- Locally hosted web page for monitoring, control and configuration
- Full VistaLINK® PRO Command & Control, SNMP
- Main and redundant power supplies with separate AC connections
- Units can be genlocked, therefore SMPTE VBI or clean and quiet switch can be achieved for inputs that are locked and timed in regards to reference.

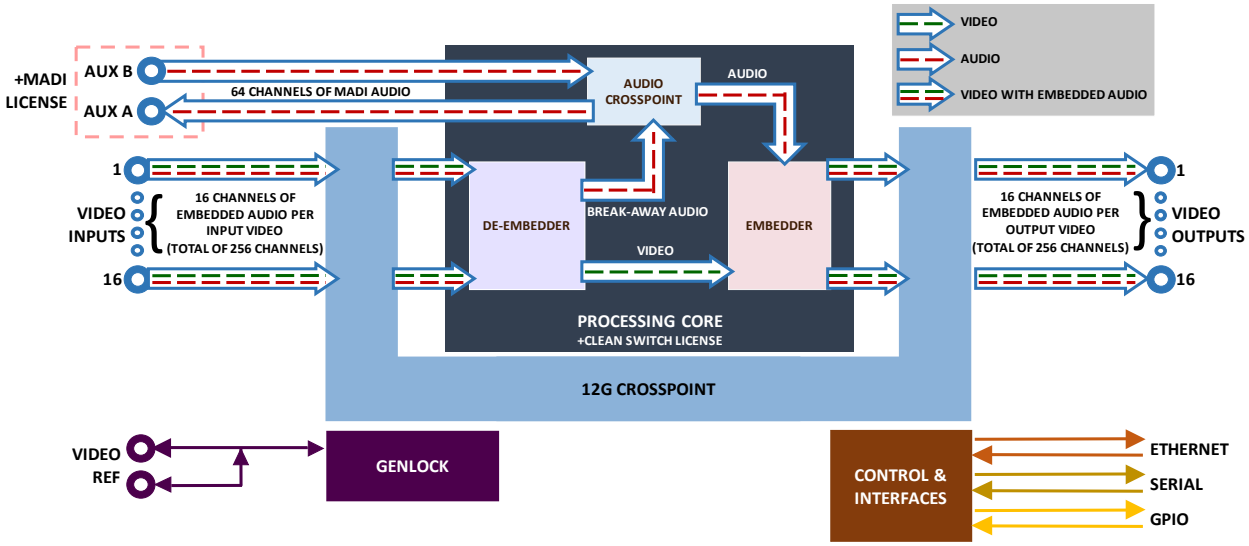


Figure 1-2 : EQT-1616-3G-C Block Diagram

2. INSTALLATION

2.1. UNPACKING

Remove the equipment carefully from the box and look it over. Any error should be reported to your supplier immediately. Save all the packing material after unpacking the equipment as this could be useful in the future if it's needed to return the unit for maintenance.

Check each item supplied for transit damage. Any damage should be reported in detail to your supplier. You must state the serial number of the unit, which can be found on the rear of the frame. Check that power cords supplied are suitable for your country and the equipment is compatible with your main (line) voltage. Note that remote panels are mains powered and must also be checked.

2.2. PHYSICAL INSTALLATION

2.2.1. Router Frames

All units are designed for mounting in standard 19" equipment racks. The depth of the frame is 345mm. In addition, allowance must be made to accommodate the various cables and connectors that are to be installed at the rear of the frame.

2.2.2. Remote Panels

Ethernet remote panels are designed to fit into standard 19" equipment racks and can be mounted at any angle.

2.3. REAR PANEL CONNECTIONS

Figure 2-1 : EQT-1616-3G-C Rear View

2.3.1. Video Inputs & Outputs

I/O ports on the back of the frame consists of HDBNC connectors. The device supports coaxial cable. A high quality coax cable such as Belden 1694 should be used for optimum performance.

It is both important and good practice that cables are properly supported and not hanging from the connectors as this can put unnecessary stress on the connectors and possibly reduces their working life.

2.3.2. Serial Connections

The rear panel of the EQT has two D-Sub female serial number connectors. This section refers to the DB-9 port labelled DEBUG/SERIAL. The EQT supports Quartz protocol commands over the serial port. For information regarding Quartz protocol, contact Evertz service.
The pin-out for the DEBUG/SERIAL port is shown in Table 2-1.

RS232 9-WAY FEMALE D-TYPE	
PIN #	**SIGNAL**
1	NA
2	TXD
3	RXD
4	NA
5	GND
6	NA
7	RTS
8	CTS
9	NA

Table 2-1 : RS-232 Pin-Out

As an option it is possible to convert the serial port to RS422 with the following pin-out, as shown in Table 2-2.

RS422 9-WAY FEMALE D-TYPE	
PIN #	**SIGNAL**
1	NA
2	Tx-
3	Rx+
4	NA
5	GND
6	NA
7	Tx+
8	Rx-
9	NA

Table 2-2 : RS-422 Pin-Out

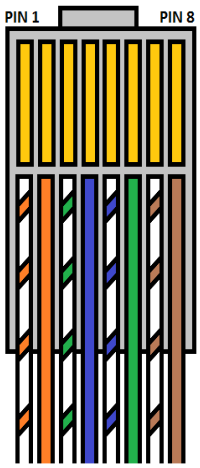
2.3.3. Ethernet Connections

There are two RJ-45 network connectors on the rear panel. The RJ-45 connectors are Ethernet ports used for monitoring and control of the system. See Section 4.4.1 for information on connecting to an Ethernet network. See section 4.2.1 for information on configuring the network address of the router.

2.3.3.1. Connecting to an Ethernet Network

The EQT uses 10Base-T (10 Mbps), 100Base-TX (100 Mbps), or Gigabit (1 Gbps) twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5

UTP cable is required. The cable must be 'straight-through' with an RJ-45 connector at each end. Establish the network connection by plugging one end of the cable into the RJ-45 receptacle of the EQT and the other end into a port of the supporting hub.
The straight-through RJ-45 cable can be purchased or can be constructed using the pin-out information in Table 2-3. A colour-coded wiring table is provided in Table 3 for the current RJ-45 standards (AT&T 258A or EIA/TIA 258B colour-coding shown). Also refer to the notes following the table for additional wiring guide information.



Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10Base-T or 100Base-T
1	Tx+	White/Green	White/Orange	X
2	Tx-	White or Green/White	Orange or Orange/White	X
3	Rx+	White/Orange	White/Green	X
4	N/A	Blue or Blue/White	Blue or Blue/White	Not used (required)
5	N/A	White/Blue	White/Blue	Not used (required)
6	Rx-	Orange or Orange/White	Green or Green/White	X
7	N/A	White/Brown	White/Brown	Not used (required)
8	N/A	Brown or Brown/White	Brown or Brown/White	Not used (required)

Table 2-3 : Standard RJ-45 Wiring Color Codes

Some cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ-45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory they be present in the cable.
- 10Base-T and 100Base-T use the same pins (a crossover cable made for one will also work with the other).
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

The maximum cable run between the router and the supporting hub is 300 feet (90 meters). The maximum combined cable run between any two end points (eg. Router and PC/laptop via network hub) is 375 feet (205 meters).

Devices on the Ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. Each Ethernet connector on the rear panel is fitted with two LEDs to monitor the Ethernet connection.

10/100: This amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT: This dual-purpose green LED indicates that the EQT has established a valid linkage to its hub, and whether the EQT is sending or receiving data. This LED will be ON when the EQT has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will be OFF if there is no valid connection.

2.3.4. GPI and GPO

There are two 8-pin Phoenix connectors on the EQT's rear. Each connector has programmable General Purpose Inputs (GPI) and Programmable General Outputs (GPO) as shown in Table 2-4 and Table 2-6.

The GPIs are Opto-isolated inputs that can be powered from an external source or from the frame as depicted in Figure 2-2.

The GPOs are relay contacts that are normally closed when the power to the router is off as detailed in Figure 2-3.

Pin #	Name	Description
1	VEXT	External voltage input power opto-isolators
2	GND	Router chassis ground
3	VINT	Protected +5 volts output from router
4	GPI1	General Purpose Input 1
5	GPI2	General Purpose Input 2
6	GPI3	General Purpose Input 3
7	GPI4	General Purpose Input 4
8	GND	Router chassis ground

Table 2-4 : GPI Connector Pin-out

Maximum GPI Voltage	+24 Volts DC
Voltage to Turn GPI on	>+2.0 Volts DC
Voltage to Turn GPI off	< +1.0 Volts DC
GPI Current Limiting	~15mA

Table 2-5 : Rear GPI Electrical Specifications

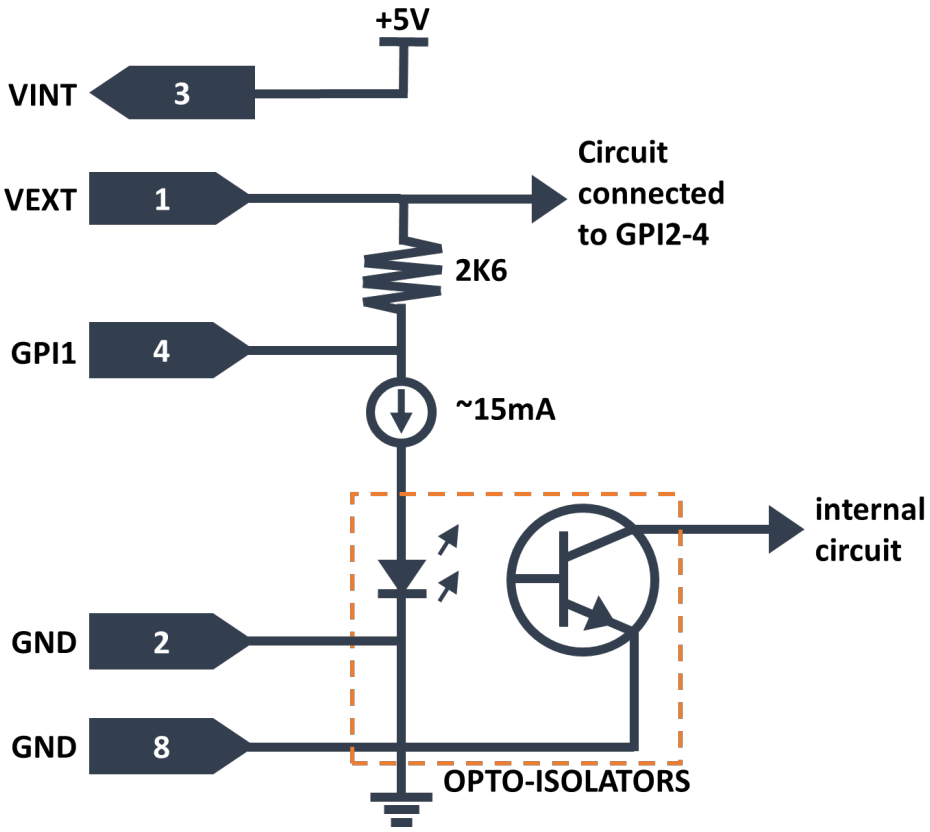


Figure 2-2 : General Purpose Input Schematic

Pin #	Name	Description
1	GPO1 C	General Purpose Output 1 Common Contact
2	GPO1 NC	General Purpose Output 1 Normally Closed Contact
3	GPO2 C	General Purpose Output 2 Common Contact
4	GPO2 NC	General Purpose Output 2 Normally Closed Contact
5	GPO3 C	General Purpose Output 3 Common Contact
6	GPO3 NC	General Purpose Output 3 Normally Closed Contact
7	GPO4 C	General Purpose Output 4 Common Contact
8	GPO4 NC	General Purpose Output 4 Normally Closed Contact

Table 2-6 : GPO Connector Pin-out

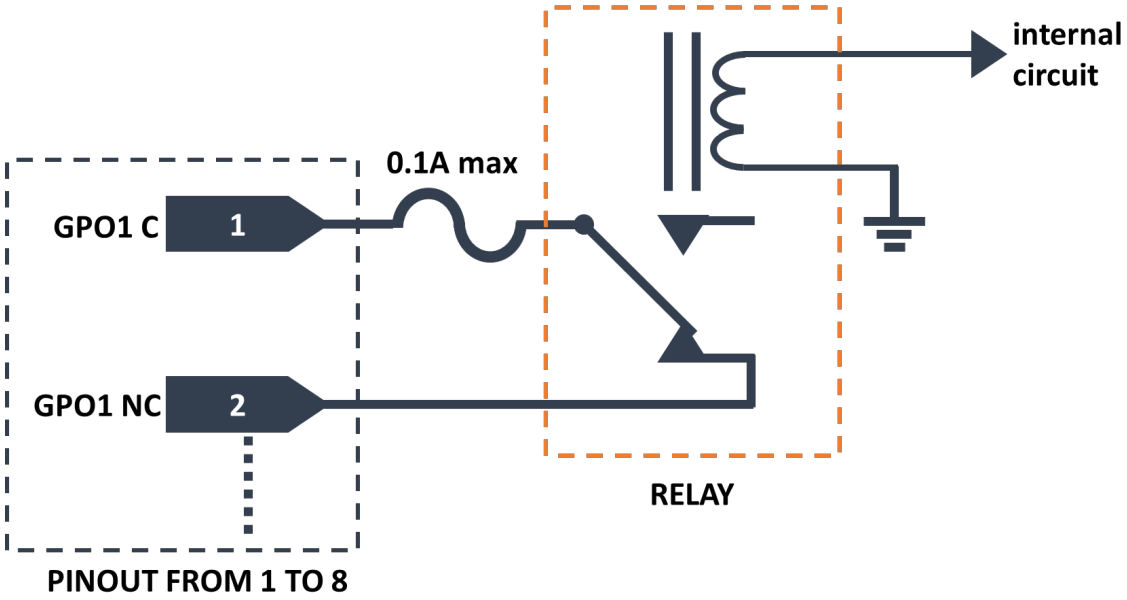


Figure 2-3 : General Purpose Output Schematic

2.3.5. Reference

2.3.5.1. Video Reference

There must be an analog reference present to ensure that the crosspoint changes occur during the field-blanking interval. If the reference is missing, then the routing will occur asynchronously.

The EQT-1616-3G-C is capable of performing clean and quiet switching on all 16 outputs with a feature key installed. In order to activate this functionality, the router requires to receive bi-level reference (NTSC or PAL). Also, the signal sources need to be of the same standard and frequency. These sources must lock to the same reference and be timed to within ±1/2 line with respect to the reference as well.

NOTE: There are two reference connectors on the device's rear: one is an input reference and the other is a reference loop out.

NOTE: The device must be rebooted in order for Clean Switch changes to take effect.

2.3.6. Power Supply

The EQT router power supplies operate on 100 to 240 volts AC at 50 or 60 Hz and automatically sense the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the rear panel. The power cord should be a minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 meters in length.

CAUTION – TO REDUCE THE RISK OF ELECTRIC SHOCK, EARTHING OF THE EARTH PIN OF THE MAINS PLUGS MUST BE MAINTAINED

The power entry modules contain a standard IEC power inlet connector and an EMI line filter. A separate fuse holder is located inside the power supply module.

2.3.7. Fuse Rating

EQT-1616-3G-C uses T2AH250V fuses.

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3. SPECIFICATION

3.1. CONFIGURATION

Inputs	Fixed at 16
Outputs	Fixed at 16
Redundant Protection	Redundant Power Supply

3.2. VIDEO INPUTS

Standards	SMPTE 292M, SMPTE424M, SMPTE 2082
Signal Level	800mV_{p-p}
Impedance	75Ω terminating
Performance	Submodule and cable length dependent

3.3. VIDEO OUTPUTS

Signals Supported	SMPTE 292M, SMPTE424M, SMPTE 2082
Signal Level	800mV_{p-p}
Impedance	75Ω terminating
Performance	Submodule dependent

3.4. REFERENCE TIMING

Switching Reference	Analog 525/625 bi-level looping
Connector	DIN 1.0/2.3
Signal Level	1Vp-p ± 3dB
Impedance	75Ω
Switching Line	Line 7 (HD/3G/12G)

3.5. CONTROL

Serial	RS422/232: 1x DB-9 Female
Ethernet	10/100Base-T, 2x RJ-45
Protocol	Quartz, SNMP, Probel SW-P-02&08 and GVG SMS7000
GPIO	Two 8-pin Phoenix connectors. Dry contact only, opto-isolated GPI

3.6. PHYSICAL

Height	1.75” (44.5mm) 1RU
Width	19” (483mm) 19” Rack Mount
Depth (FP)	14.25“ (362mm) over hinges and connectors
Weight	3.4kg (7.5Lbs)
Operating Temperature	0°C to 40°C
Cooling	Fan –cooled, left to right

3.7. ELECTRICAL

Input Voltage	Auto-ranging 100-240V AC, 50/60Hz
Input Power	130W 1R

4. OPERATION

4.1. SYSTEM OVERVIEW

The EQT router is a matrix router that provides a simple, cost-effective solution for small router applications. The EQT-1616-3G-C consists of 16 equalized inputs and 16 reclocked outputs. Each input and each output are interfaced through a common crosspoint that is controlled by the main processing unit.

The processing unit interfaces the various control options such as Ethernet and serial with the crosspoint, allowing full control of the routing resources. The processing unit also provides a video reference to the crosspoint to maintain clean switching on the switch line.

The major components of the EQT router are shown below in Figure 4-1.

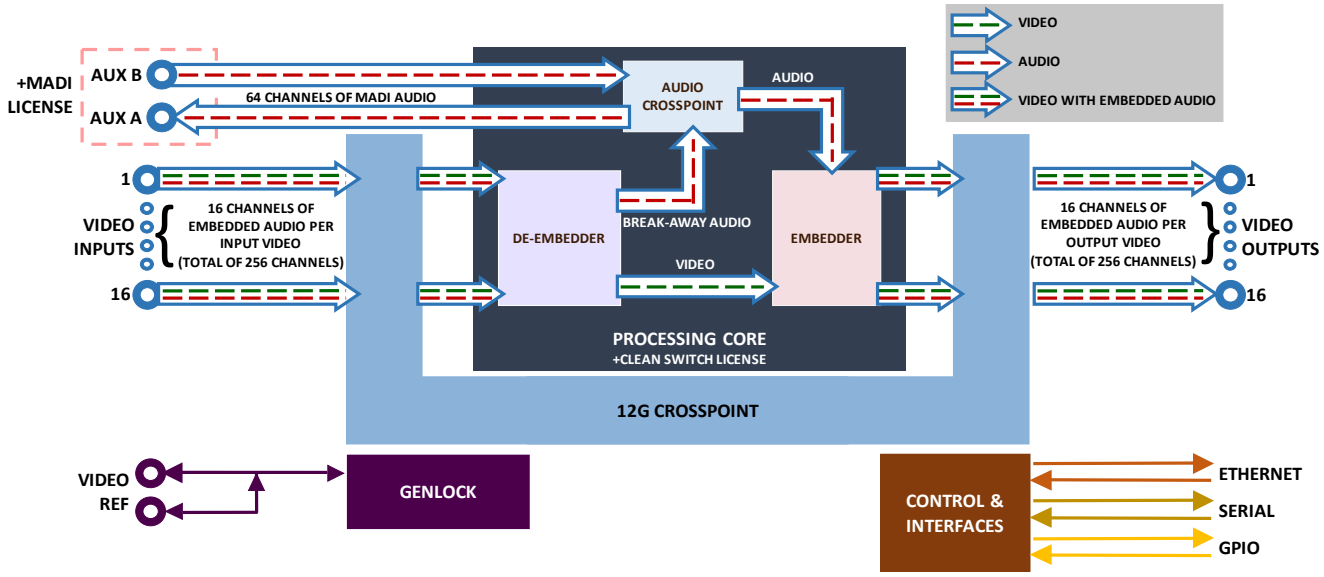

Figure 4-1 : EQT Clean Switch Block Diagram

4.1.1. Front View

The EQT features a built-in CP-2402E remote control panel that can be configured in the same way as other panels.

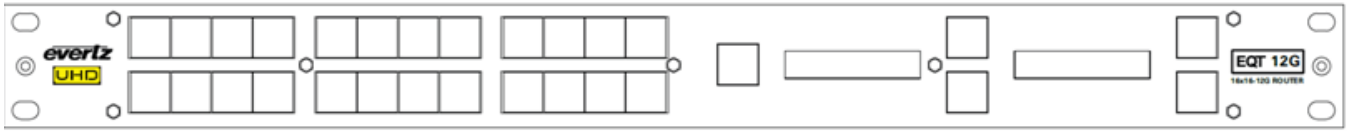

Figure 4-2 : Front View of EQT Clean Switch with Control Panel

4.1.2. Rear View

There are a number of communication connections on the rear of the EQT frame. Figure 4-3 identifies all the connectors on the rear panel. These connectors provide access to the various communications facilities of the EQT router, such as control and video status monitoring.

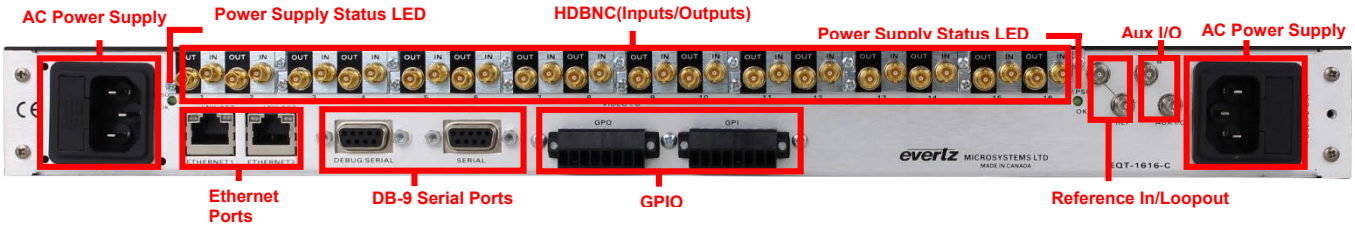

Figure 4-3 : Rear Communication Connections on EQT-1616-3G-C Rear Plates

4.2. SYSTEM CONFIGURATION

4.2.1. Setting the IP Address

The EQT-1616-3G-C consists of two individual components, Router and Control Panel, that each have their own IP address. These components can be accessed through either Ethernet or Serial ports, both on the rear panel of the device.
When shipped from factory, the default IP addresses of the devices are as follows:
Router Component (EQT): 192.168.245.17
Control Panel Component: 192.168.245.18

4.2.1.1. To change the IP address of the components via Ethernet

For the EQT:

1. Telnet to port 23 of the EQT IP address
2. Log in using login/password combination **`customer/customer`**
3. Once the configuration menu is displayed, select the Network Setup menu
4. Follow the on-screen instructions to set the IP address, subnet mask, gateway, and broadcast address
5. Make sure to select the option to Save and Exit when changes are complete
6. Wait 30 seconds for changes to be applied
7. Reboot the EQT for changes to take effect

For the Control Panel:

1. Telnet to port 23 of the Front Panel IP address
2. Once the configuration menu is displayed, select the Network Setup menu
3. Follow the on-screen instructions to set the IP address, subnet mask, gateway, and broadcast address
4. Make sure to select the option to Save and Exit when changes are complete
5. Wait 30 seconds for changes to be applied
6. Reboot the EQT for changes to take effect

4.2.1.2. To change the IP address of the components via Serial connection

For the EQT:

1. Connect a DB-9 cable to the DEBUG/SERIAL port on the rear of the router
2. Set connection parameters as follows:

Speed	115200
Data	8-bit
Parity	None
Stop Bits	1 bit
Flow Control	None

3. When prompted, log in with login/password combination **`customer/customer`**
4. Once the configuration menu is displayed, select the Network Setup menu
5. Follow the on-screen instructions to set the IP address, subnet mask, gateway, and broadcast address
6. Make sure to select the option to Save and Exit when changes are complete
7. Wait 30 seconds for changes to be applied
8. Reboot the EQT for changes to take effect

For the Control Panel:

1. Connect a DB-9 cable to the SERIAL port on the rear of the router
2. Set connection parameters as follows:

Speed	115200
Data	8-bit
Parity	None
Stop Bits	1 bit
Flow Control	None

3. Once the configuration menu is displayed, select the Network Setup menu
4. Follow the on-screen instructions to set the IP address, subnet mask, gateway, and broadcast address
5. Make sure to select the option to Save and Exit when changes are complete
6. Wait 30 seconds for changes to be applied
7. Reboot the EQT for changes to take effect

NOTE: The device must be rebooted in order for network changes to take effect.

4.2.2. Accessing the Configuration and Monitoring Menu

The EQT router contains a configuration and monitoring menu that allows the user to change some internal settings of the device and to monitor various components on the router. Before accessing the configuration and monitoring menu via Ethernet, the IP address of the device must be set.

The configuration and monitoring menu can be accessed using the Telnet network protocol or a Serial connection.

If there is a problem communicating over Ethernet, the user should check that there is a network connection to the router from a PC command prompt by typing *ping* followed by the IP address (example – *ping 192.168.245.17*). If there is no reply from the device using the *ping* command, check the network settings using the telnet/serial menu.

All menu items can be accessed using the number listed beside the menu item. Once in a menu, use the numbers beside the items to set the value. Follow the on-screen instructions to set the value of the parameter, and then save and exit the configuration.

When all desired changes have been made, exit the Telnet session by hitting CTRL+] or closing the Telnet session window.

Ethernet

The EQT uses port 23 as its default Telnet port which allows control and monitoring to be achieved from a PC using the Telnet function. Using an telnet client, Telnet into the configuration and monitoring menus of the device by typing *telnet* followed by the IP address of the EQT, and then followed by 23 (example – *telnet 192.168.245.17 23*).

Serial

Connect a serial cable between the PC and the DEBUG/SERIAL port on the EQT. Set connection parameters as follows:

Speed	115200
Data	8-bit
Parity	None
Stop Bits	1 bit
Flow Control	None

Use the login/password combination **customer/customer** to log in.

4.2.3. Configuration and Monitoring Menu

The following chart provides a brief description of the menus that are accessible through the configuration and monitoring option.

(1) Network Setup	Configuration of network settings
(2) SNMP Setup	Configuration of Simple Network Management Protocol settings
(3) Engineering Debug Tool	Debugging tool for Evertz support
(4) Built In System Test	Suite of self-tests
(5) SYSLOG configuration	Configure system logging

4.2.4. Configuring Network Settings

The *Network Setup* menus are used to configure parameters associated with the Ethernet communications of the device. The following chart provides a brief description of the items available in the *Network Setup* menu.

(1) IP Address	Sets the IP address of the device (Eth0)
(2) Netmask	Sets the subnet mask of the device
(3) Gateway	Sets the gateway of the device
(4) Broadcast	Sets the broadcast address of the device

NOTE: The router must be rebooted in order for network changes to take effect.

4.2.5. SNMP Setup

The *SNMP Setup* menus are used to configure parameters associated with the SNMP communications of the device. The following chart provides a brief description of the items available in the *SNMP Setup* menu.

(1) Select SNMP Get/Set Version	Sets SNMP version as SNMPv1 or SNMPv3
(2) Select SNMP Trap Version	Sets SNMP trap version as SNMPv1 or SNMPv3
(3) SNMP v1 Settings	Submenu for configuring SNMPv1 settings
(4) SNMP v3 Settings	Submenu for configuring SNMPv3 settings

SNMPv1 Settings

(1) Read Community String	Sets SNMPv1 read community string (default: public)
(2) Read/Write Community String	Sets SNMPv1 read/write community string (default: private)
(3) Trap Setup	Submenu to add/remove/modify trap IP addresses

SNMPv3 Settings

(1) SNMP v3 User Settings	Submenu to add/remove/modify SNMPv3 users
(2) SNMP v3 Trap Settings	Submenu to add/remove/modify SNMPv3 trap addresses

4.2.6. Engineering Debug Tool

The Engineering Debug Tool is intended for debugging progress. It is intended for use by Evertz staff and should not be used under normal circumstances.

4.2.7. Built In Self Test

The Built-in Self Test tool is used to test the functionality of various components on the device, such as memory and Ethernet adapters. It should not be used under normal circumstances. Running the tests in this tool may cause interruption to the device, requiring a power cycle of the device to restore full functionality.

4.2.8. SYSLOG Configuration

The SYSLOG Configuration menu is used to set logging options for debugging purposes.

4.3. SIGNAL AND SYSTEM MONITORING

The EQT router supports full signal monitoring of both inputs and outputs. It is also incorporates comprehensive system monitoring, including data rates and interior temperatures.

Monitored data is available through VistaLINK® SNMP for facility-wide monitoring systems. System status may also be monitored remotely by a network-based remote connection over TCP/IP or a direct serial connection to a PC. User-configurable GPIO are also provided for connection to an external system.

4.4. CONTROL SYSTEM

The EQT router is fully compatible with all Evertz router control panels and interfaces, including connecting to a comprehensive list of third-party control solutions.

The EQT router can be configured with the following control options: Ethernet, Serial and/or GPIO. The following sections provide more details regarding these options.

4.4.1. Controlling the EQT using Ethernet

The EQT supports Evertz control panels that have an Ethernet connection. The EQT supports Quartz protocol commands, as well as Third-Party protocols, such as SW-P-02, Probel SW-P-08 and GVG SMS7000. Therefore, any control device that supports these protocols can control the EQT via Ethernet.

NOTE: Ethernet control access to the EQT is achieved via user-defined ports as explained in Section 8.1

Section 8.1.1 describes the method used to set up the EQT for use with Ethernet control panels. Consult the instruction manual for the respective panels for information regarding their IP address setup.

4.4.2. Controlling the EQT using Serial

The rear panel of the EQT has a D-Sub female serial connector labeled DEBUG/SERIAL. The EQT supports Quartz protocol commands over the serial port (slave end). Any control device that supports Quartz protocol can control the EQT via the serial port.
For information regarding the Quartz protocol, contact Evertz service. See section 2.3.2 for a description of the pin-outs of the serial port.

4.4.3. Controlling the EQT using GPIO

There are two 8-pin Phoenix connectors on the EQT's rear, labeled GPI and GPO.
The GPIs are Opto-isolated inputs that can be powered from an external source or from the frame. The GPOs are relay contacts that are normally closed when the power to the router is off. However, once the power is on, its state can be changed to normally open – see details in the Web page (Section 6.8) or VistaLINK® (Section 7.8).

The GPI's are used to activate video bus crosspoints and can be configured to operate in two modes, Low and High level:

- Low level activation is when a ground level on the input triggers the GPI function when the opto-isolator is normally powered.
- High level activation is used to trigger the GPI function by providing a positive voltage to a GPI input. **The mode is not generally used and should not be considered a first choice.**

Also, the GPIs can be individually encoded to work independently or collectively to trigger up to four routes, with distinct sources/destinations:

- **Individual Function:** The four GPIs can trigger up to four specific routes each. Once the routes per GPI are set in the Web page (Section 6.8.1) or VistaLINK® (Section 7.8.1), each GPI can be triggered by any of the options depicted in Figure 4-4, Figure 4-5 and Figure 4-6.
- **Encoded Function:** The four GPIs can be encoded as a single integer value, allowing the associated source to be routed to a specific destination(s) set in the Web page or VistaLINK®. The bits of the integer value are identified as a source. A GPI value of 0000 Binary (GPI1 as the LSB) equated to source 1 and a value of 1111 Binary equated to source 16 – see Table 4-1 for source selecting.

FUNCTION	GPI4	GPI3	GPI2	GPI1
Source 1	0	0	0	0
Source 2	0	0	0	1
Source 3	0	0	1	0
Source 4	0	0	1	1
Source 5	0	1	0	0
Source 6	0	1	0	1
Source 7	0	1	1	0
Source 8	0	1	1	1
Source 9	1	0	0	0
Source 10	1	0	0	1
Source 11	1	0	1	0
Source 12	1	0	1	1
Source 13	1	1	0	0
Source 14	1	1	0	1
Source 15	1	1	1	0
Source 16	1	1	1	1

Table 4-1 : Standard GPI Encoding Functions

There are three methods to trigger the GPIs. The first option, the user can connect the frame supplied by +5V (VINT pin) to the VEXT pin to provide power to the GPIO opto-isolator circuitry. In this configuration, the user can activate the GPIs simply by connecting the GPI input pins to ground (see Figure 4-4). This can be done with a button, switch, relay or an open collector transistor.

Warning: Do NOT connect one frame's +5V VINT to another frame's +5V VINT.

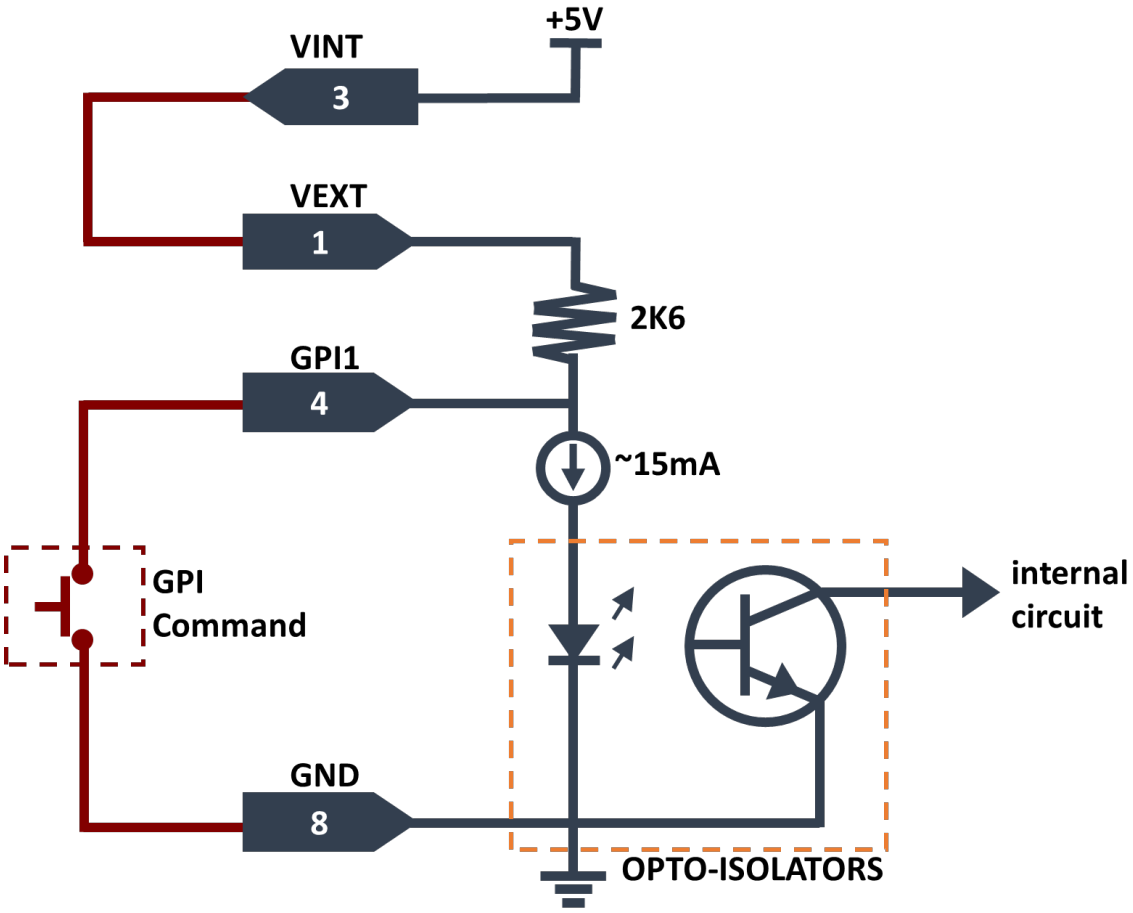

Figure 4-4 : Powering the GPI Opto-Isolators from the Router

Alternatively, an external voltage source may be applied as shown in Figure 4-5. The VEXT voltage must be greater than the voltage supplied to the GPI by at least +5V.

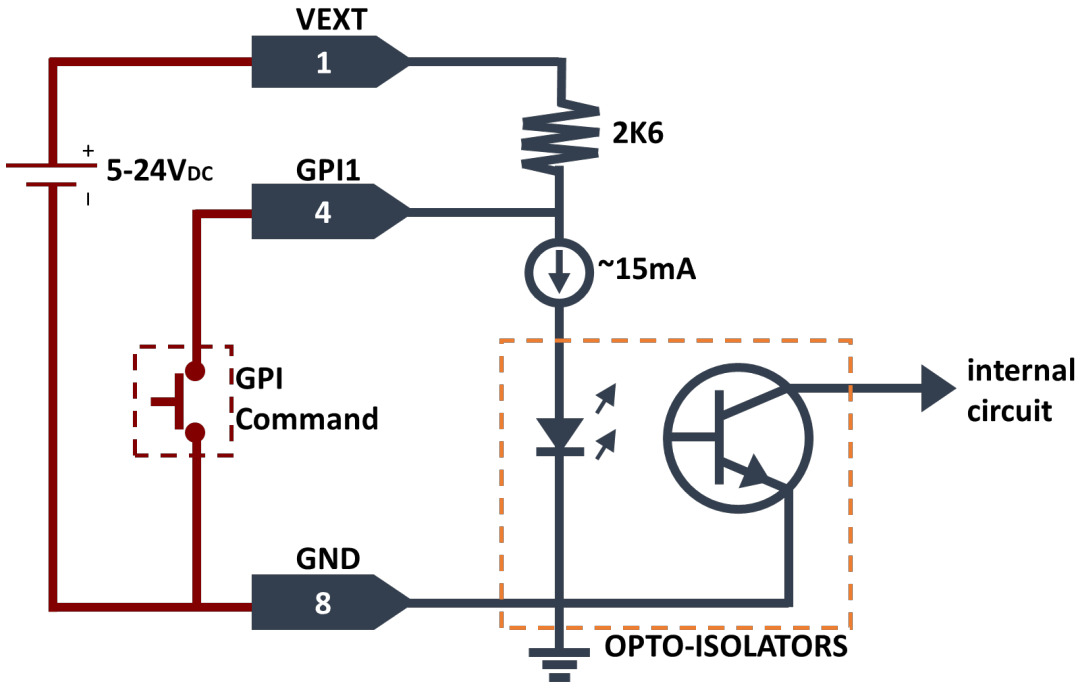

Figure 4-5 : Powering the GPI Opto-Isolators from an External Power Supply

Another option is to power the GPI pin with a signal source as it can be seen in Figure 4-6.

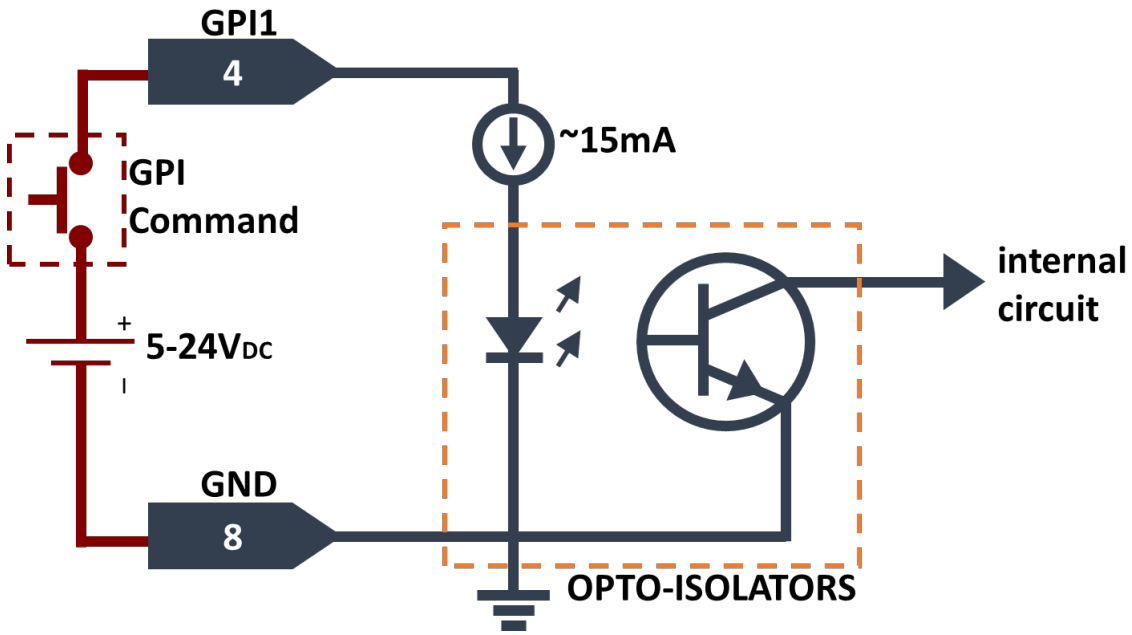

Figure 4-6 : Powering the GPI Opto-Isolators from an External Signal

The programmable GPOs are used to trigger alarms or to provide a limited tally capability. The GPOs will be in the de-energized state when the power is off, so all the contacts will be closed.
Once the GPO is enabled through the Web page (Section 6.8.2) or VistaLINK® (Section 7.8.2), the orientation can be changed from Normally Open to Normally Closed.
Also, the GPOs can be individually encoded to work independently or collectively:

- **Individual Function:** The four GPOs can be triggered independently, depending on the selected function assigned to a specific GPO set, whether it is PSU Fault, Temperature Fault, Video Src Missing and Video Route Selected (i.e.: in case, PSU Fault is attributed to GPO1, then once the fault is present, GPO1 will be triggered, from 0 to 1).
- **Encoded Function:** The four GPOs can be encoded as a single integer value, identifying the associated source of the destination set in the Web page or VistaLINK®. These bits of integer value are identified as a source. A GPO value of 0000 Binary (GPO1 as the LSB) equated to source 1 and a value of 1111 Binary equated to source 16.

FUNCTION	GPO4	GPO3	GPO2	GPO1
Source 1	0	0	0	0
Source 2	0	0	0	1
Source 3	0	0	1	0
Source 4	0	0	1	1
Source 5	0	1	0	0
Source 6	0	1	0	1
Source 7	0	1	1	0
Source 8	0	1	1	1
Source 9	1	0	0	0
Source 10	1	0	0	1
Source 11	1	0	1	0
Source 12	1	0	1	1
Source 13	1	1	0	0
Source 14	1	1	0	1
Source 15	1	1	1	0
Source 16	1	1	1	1

Table 4-2 : Standard GPO Encoding Functions

NOTE: Each GPO correlates to two physical output pins – see Table 2-6 and Figure 2-3.

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5. ADDITIONAL FEATURES

5.1. 3G VIDEO BYPASS MODULES (+3GBP2)

The +3GBP2 modules are used to maintain 3G video signal through EQT, non-stop, even with a power loss. In case power is switched off, the modules automatically replace the current route to a 'one to one route'. Once the power is back on, the previous routes are reinstated.
Each module has two HDBNC input connectors and two HDBNC outputs connectors.

5.2. 12G VIDEO MODULES (EQT-MTR-12G-2)

The EQT-MTR-12G-2 are multi-transceiver modules that are used to pass 12G video signals through EQT. These modules can only function with 12G feature key (**EQT-FK-12G)** installed.
Each module has two HDBNC input connectors and two HDBNC outputs connectors.

NOTE: +3GBP2 and EQT-MTR-12G-2 modules can be placed in the EQT-1616-3G-C and used at the same time.

5.3. CLEAN & QUIET SWITCHING (EQT-FK-CS)

The EQT-1616-3G-C is capable of performing clean and quiet switching on all 16 outputs with the **EQT-FK-12G** feature key installed.
In order to activate this functionality, the router requires to receive bi-level reference (NTSC or PAL). Also, the signal sources need to be of the same standard and frequency. These sources must lock to the same reference and be timed to within ±1/2 line with respect to the reference as well. The EQT must be rebooted after enabling or disabling in order for changes to take effect.
The Clean Switch feature also activate Clean Switch Audio and Gearbox.

5.3.1. Clean Switch Audio

The Clean Switch Audio allows independently audio shuffling between 256 channels of embedded/de-embedded audio and 64 channels of MADI audio (total of 320 channels) – ONLY if 'Break-Away' Mode is set in the Web page (Section 6.5.1) or VistaLINK® (Section 7.4.1).
In contrast, 'Follow Video' mode allows only video routes with embedded audio channels. Thus, 16 possible routes at the same time.
As demonstrated in Table 5-1, 16 audio channels are embedded in a single video bus, and each video signal pass through one of the 16 input/output ports. Additionaly, 64 channels of MADI audio pass through a single input/output port (labeled AUX).

NOTE: Clean Switch Audio must be set to 'Break-Away', in order to route the 320 audios independently.

	Audio A1	Audio A2	Audio A3	Audio A4	Audio A5	Audio A6	Audio A7	Audio A8	Audio A9	Audio A10	Audio A11	Audio A12	Audio A13	Audio A14	Audio A15	Audio A16
Video 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Video 2	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Video 3	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Video 4	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Video 5	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Video 6	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Video 7	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
Video 8	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
Video 9	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
Video 10	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Video 11	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
Video 12	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Video 13	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
Video 14	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
Video 15	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
Video 16	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256
MADI	257 - 320 (total of 64 channels)															

Table 5-1 : Audio Channels per Video and Madi Audio Channels

5.3.2. Gearbox

The Gearbox uses the two-sample interleave division method to convert quad-link 3G-SDI signals to a single-link 12G-SDI signal and vice-versa (referenced in SMPTE 2082-10). This functionality is possible only with 12G (**EQT-FK-12G)** feature-key installed.

There are 4 gearboxes on the EQT that can be enabled, which provide the below results:

- Gearbox1 enabled: the input quad-link becomes source 1 and quad-link output becomes destination 1. Therefore, only 5-16 input and output ports can pass through single-link 12G-SDI.
- Gearbox2 enabled: the input quad-link becomes source 5 and quad-link output becomes destination 5. Therefore, only 1-4 and 9-16 input and output ports can pass through single-link 12G-SDI.
- Gearbox3 enabled: the input quad-link becomes source 9 and quad-link output becomes destination 9. Therefore, only 1-8 and 13-16 input and output ports can pass through single-link 12G-SDI.
- Gearbox4 enabled: the input quad-link becomes source 13 and quad-link output becomes destination 13. Therefore, only 1-12 input and output ports can pass through single-link 12G-SDI.

NOTE: Clean Switch must be enabled to use the Gearbox feature. When Clean Switch is disabled, the controls to enable Gearbox will be hidden.

The diagram in Figure 5-1 represents an example of Gearbox2 enabled. In this case, a single-link 12G-SDI signal source, connected to input port 4, is converted into quad-link 3G-SDI signals and routed to destination 5 (5-8 output ports). At the same time, quad-link 3G-SDI signals, connected to 5-8 input ports (source 5), are converted into a single-link 12G-SDI and routed to output port 9. The blue arrows represent the possible ports that can pass through single-link 12G-SDI.

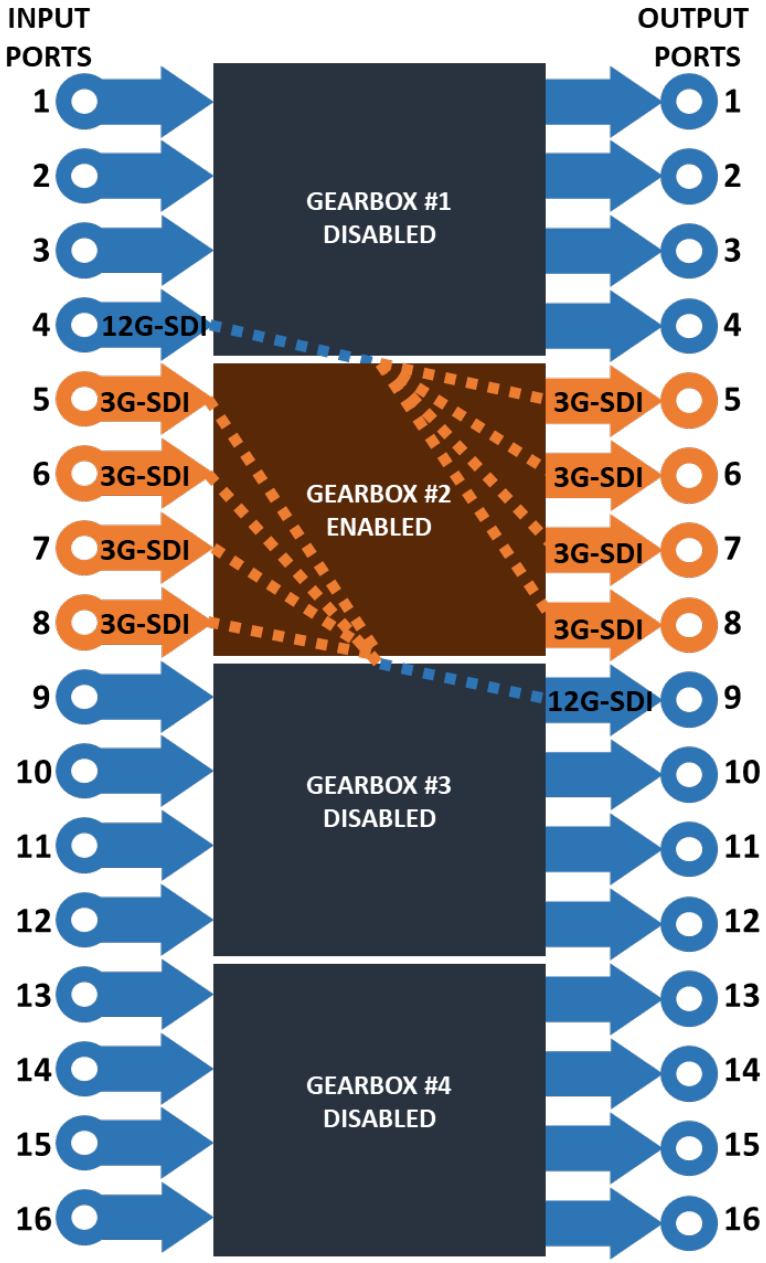

Figure 5-1 : Gearbox Diagram

5.4. MADI

The **EQT-FK-MADI** feature key activates 64 channels of MADI audio. The two auxiliary IO ports (AUX A and AUX B) are located on the device's rear.

The EQT must be rebooted after enabling or disabling any of the features previously mentioned, in order for changes to take effect.

6. WEB INTERFACE

6.1. ROUTER WEB PAGE

The EQT hosts its own web interface that can be accessed by using a web browser to navigate to the router's IP address.

6.2. FIRMWARE UPGRADE

Upgrading the EQT is done using a standard web browser on any computer that is connected to the same network. The following sections detail methods for upgrading the firmware on the EQT-1616-3G-C.

6.2.1. Upgrading EQT

The following steps are used to upgrade the EQT-1616-3G-C.

Using a standard web browser on the same network as the EQT (Mozilla Firefox is strongly recommended), browse to the IP address of the EQT. You will be prompted to enter a username and password; use the login/password combination root/evertz. After logging in, click on **'Upgrade' button,** which is located at the top of the page as seen in Figure 6-1.

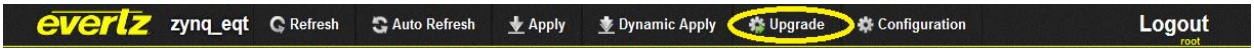

Figure 6-1 : WebEASY® - Upgrade Button on Top Menu Bar

Selecting the Upgrade tab will take the user to where the current firmware version is shown. The user needs to download the firmware image file with a *.img* file extension if the firmware version is outdated. Once a file has been selected, click the '**Upgrade'** button as shown in Figure 6-2.

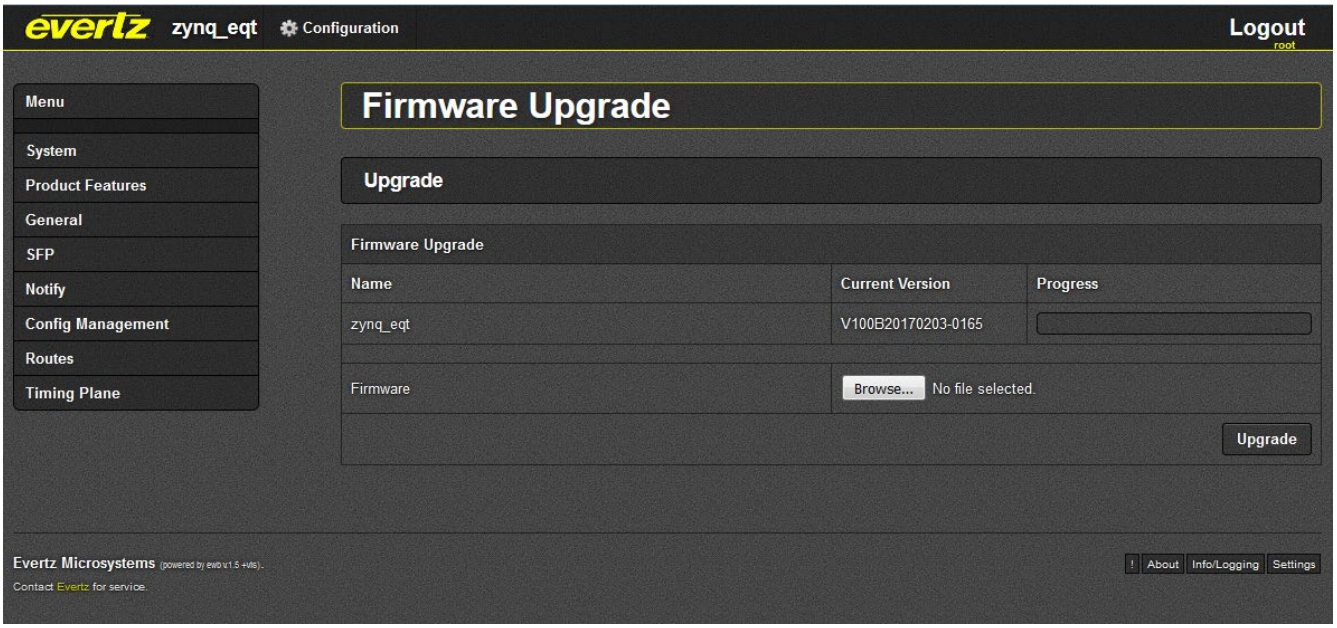

Figure 6-2 : WebEASY® - Firmware Upgrade Menu

After pressing the 'Upgrade' button, the file will be uploaded and the EQT will be upgraded. Once completed, a message indicating that the upgrade has completed will be displayed in the progress bar. The EQT will then automatically reboot itself to apply the upgrade.

6.3. SYSTEM

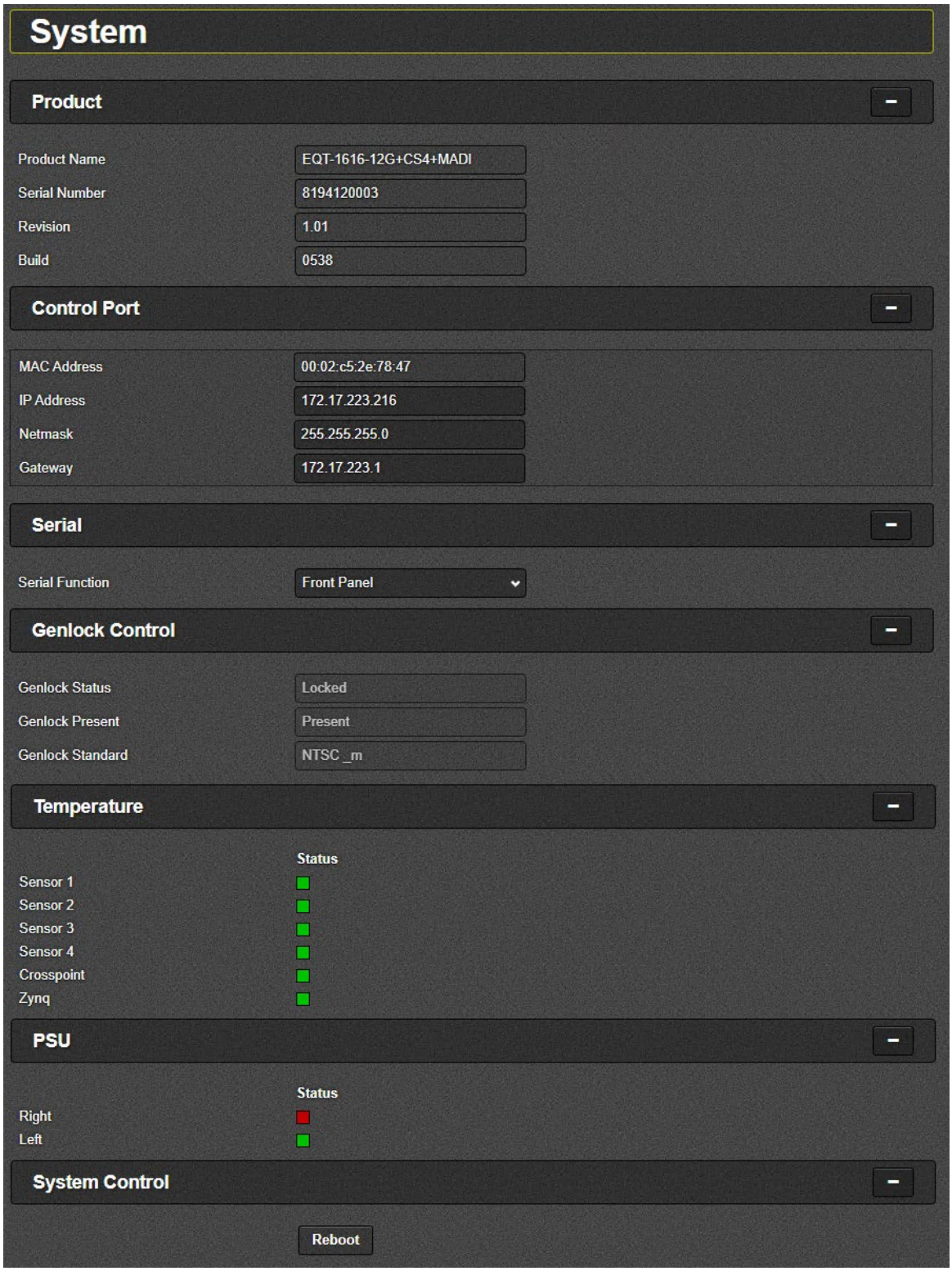

Figure 6-3 : WebEASY® - System

6.3.1. Product

Product Name: This parameter displays the name of the device.
Serial Number: This parameter displays the serial number of the device.
Revision: This parameter displays the revision of the firmware.
Build: This parameter displays the firmware version uploaded to the device.

6.3.2. Control Port

MAC Address: This parameter displays the physical address of the device.
IP Address: This field is used to set/display the IP address of the device.
Netmask: This field is used to set/display the Subnet Mask of the device.
Gateway: This field is used to set/display the Gateway of the device.

6.3.3. Serial

Serial Function: This field is used to set/display the Serial Control function, whether it is 'Front Panel', related to the front panel buttons (see details in Chapter 8, Levels section), or 'Router Control', related to the serial connector (see details in Section 4.4.2).

NOTE: The device must be rebooted in order for changes to take effect.

6.3.4. Genlock Control

Genlock Status: This parameter displays the status of Genlock, whether it is 'Locked' or 'Unlocked'.
Genlock Present: This parameter displays whether the Reference is detected by the device, which could be 'Present' or 'Not Present'.
Genlock Standard: This parameter displays the detected Reference standard, whether it is 'NTSC' or 'PAL'.

6.3.5. Temperature

Temperature Sensor 1-4: This parameter displays the temperature status of sensor 1-4, whether it is green (normal), yellow (warning) or red (critical).
Temperature Crosspoint Sensor: This parameter displays the temperature status of Crosspoint sensor, whether it is green (normal), yellow (warning) or red (critical).
Temperature Zynq Sensor: This parameter displays the temperature status of the Zynq sensor, whether it is green (normal), yellow (warning) or red (critical).

6.3.6. PSU

Right: This parameter displays the status of the right power supply, whether it is green (on) or red (off).
Left: This parameter displays the status of the left power supply, whether it is green (on) or red (off).

6.3.7. System Control

Reboot: This button allows the user to reboot the device.

6.4. PRODUCT FEATURES

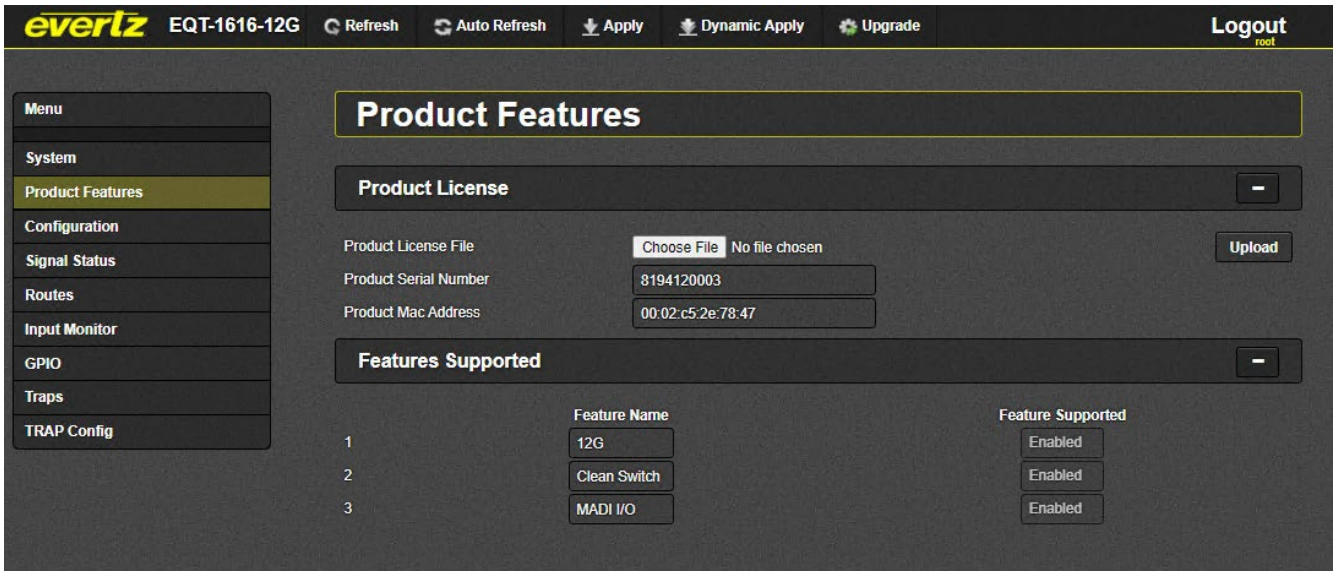

Figure 6-4 : WebEASY® - Product Features

6.4.1. Product License

Product License File: This button allows the user to select and upload a product license file.
Product Serial Number: This parameter displays the serial number of the device.
Product MAC Address: This parameter displays the MAC address of the device.

6.4.2. Feature Supported

Feature Name: This parameter displays the name of the selected feature (if installed).
Feature Supported: This parameter displays whether the selected feature is supported and enabled.

6.5. CONFIGURATION

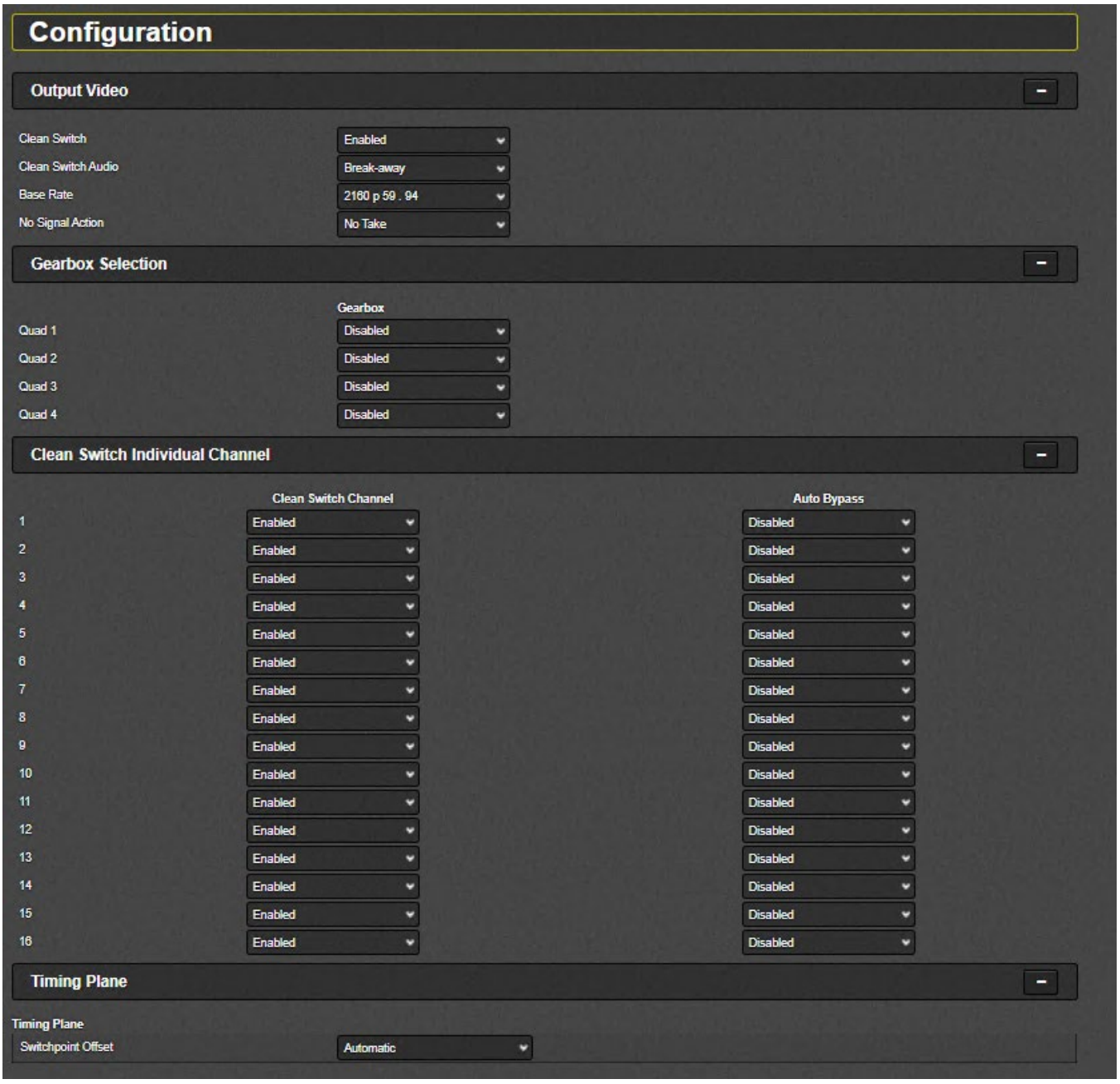

Figure 6-5 : WebEASY® - Configuration

6.5.1. Output Video

Clean Switch: This field is used to enable/disable the clean switching functionality of the device.
Clean Switch Audio: This field is used to select the clean switching audio functionality of the device, whether it is 'Follow Video', for embedded audio channels to be routed along with its respective video, or 'Break-Away', to route 320 audio channels independently of the video route.

NOTE: 'Clean Switch Audio' must be set to 'Break-Away', in order to route the embedded audio channels and MADI audio channels independently.

Base Rate: This field is used to set/display the base rate of the input signal connected to the device.
No Signal Action: This field is used to set/display the action in case there is no input signal.

NOTE: 'No Signal Action' must be set to 'Take', in order for the routes, done in Route section (6.7), to take effect.

6.5.2. Gearbox Selection

(See details in 5.1.2)
Quad 1: This parameter is used to enable/disable 1-4 input and output ports to quad-link.
Quad 2: This parameter is used to enable/disable 5-8 input and output ports to quad-link.
Quad 3: This parameter is used to enable/disable 9-12 input and output ports to quad-link.
Quad 4: This parameter is used to enable/disable 13-16 input and output ports to quad-link

NOTE: At least one of Gearboxes must be disabled to pass through a single-link 12G-SDI signal.

6.5.3. Clean Switch Individual Channel

Clean Switch Channel: This field is used to enable/disable the clean switching functionality in each channel.
Auto Clean Switch Bypass: This field is used to enable/disable the audio bypass functionality in each channel, in case the input source does **not** match the base rate.

NOTE: 'Clean Switch' must be enabled, in order to use all the above features.

6.5.4. Timing Plane

Switching Offset: This parameter is used to set/display whether Timing Plane is 'Automatic' or 'Manual'.

NOTE: The device must be rebooted in order for changes to take effect.

6.6. SIGNAL STATUS

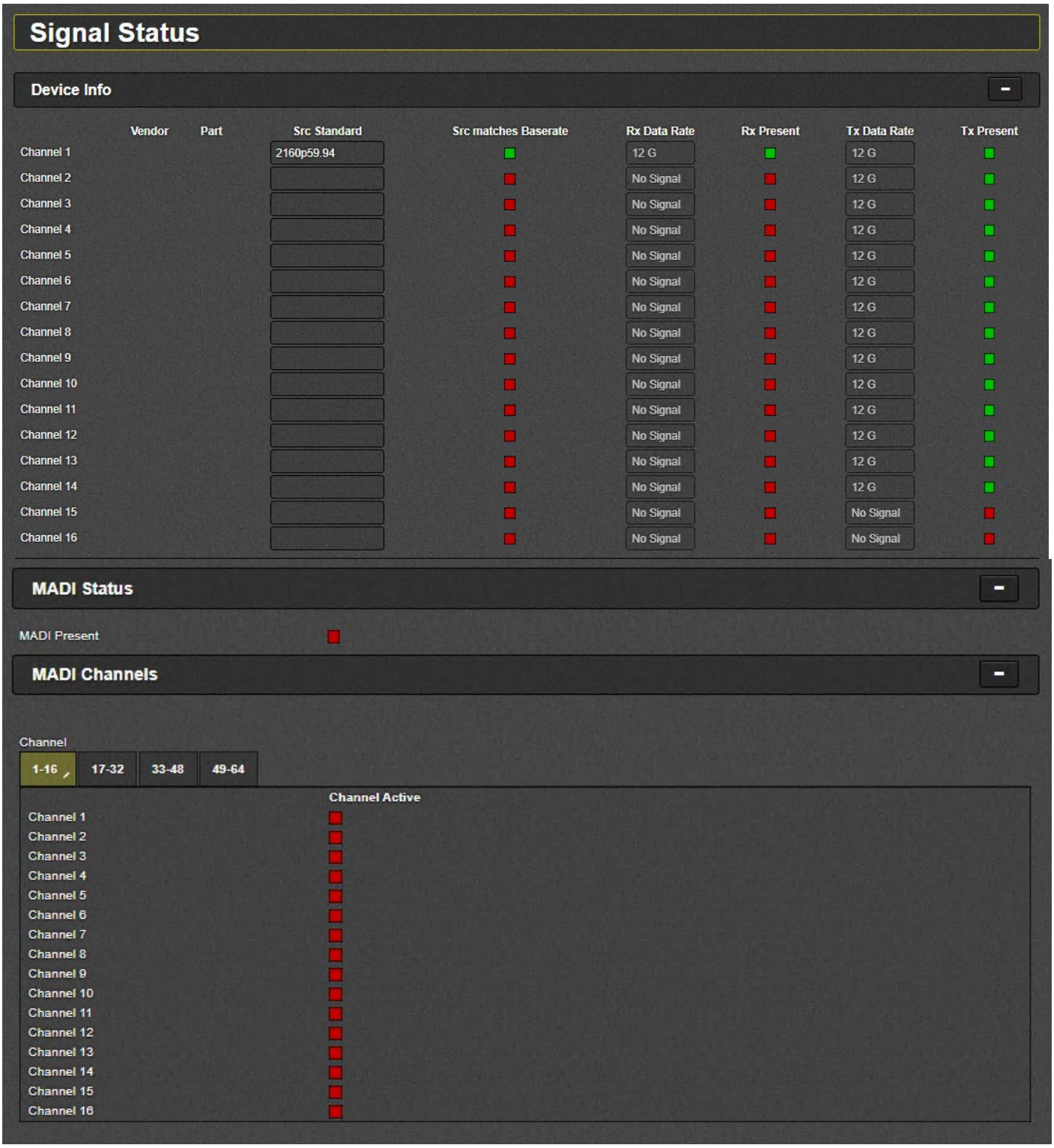

Figure 6-6 : WebEASY® - Signal Status

6.6.1. Device Info

Src Standard: This parameter displays the input signal source standard.
Src marches Baserate: This parameter detects whether the signal source base rate matches the device's base rate (green) or mismatches the device's base rate (red).
Rx Data Rate: This parameter detects/displays the input signal source.
Rx Presence: This parameter detects whether the signal source is present (green) or absent (red).
Tx Data Rate: This parameter detects/displays the output signal.
Tx Presence: This parameter detects whether the output signal is present (green) or absent (red).

6.6.2. MADI Status

MADI Presence: This parameter detects whether the MADI audio is present (green) or absent (red).
MADI Channels: This parameter detects whether the MADI audio is active (green) or inactive (red) in each channel.

6.7. ROUTES

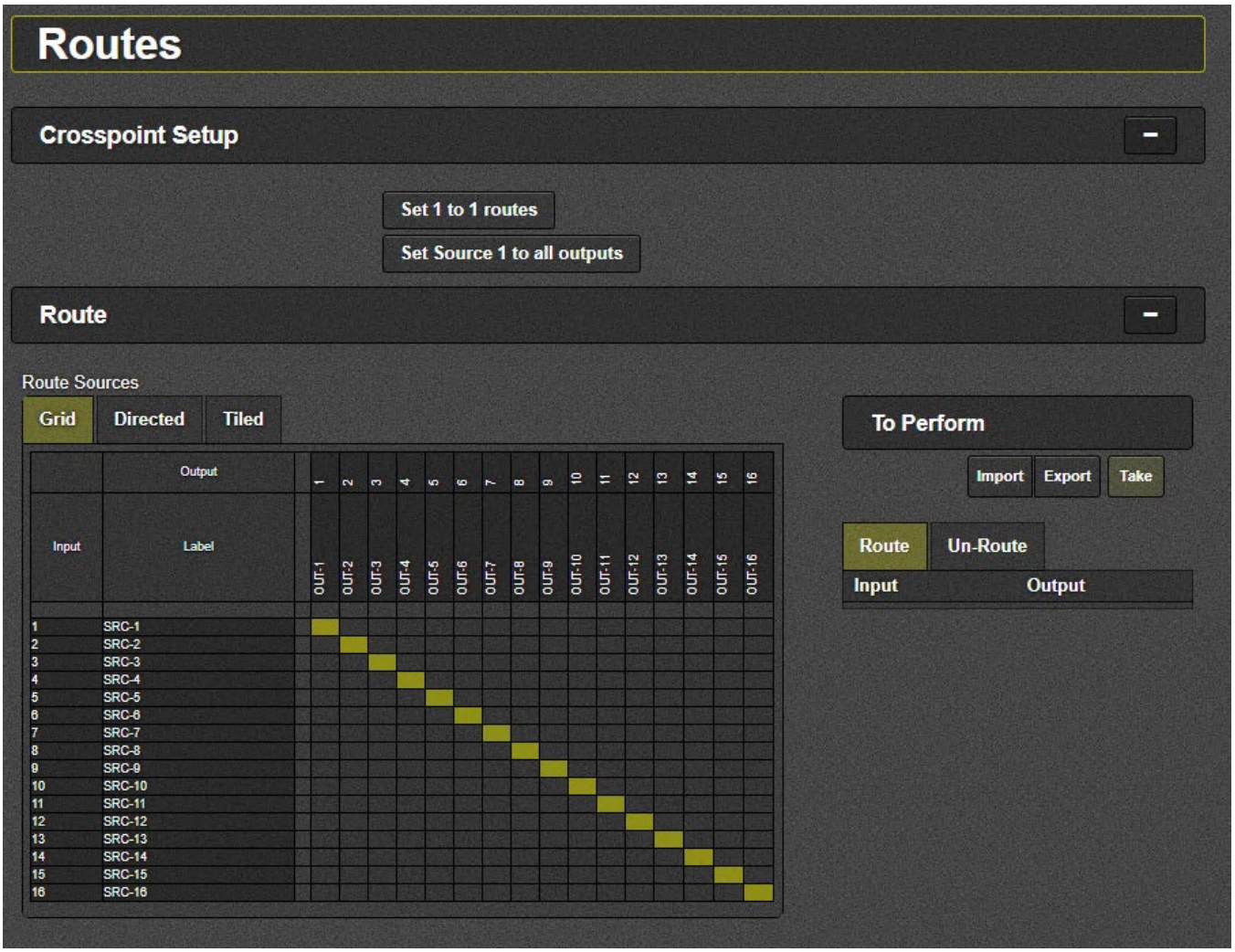

Figure 6-7 : WebEASY® - Routes (Part 1)

6.7.1. Crosspoint Setup

Set 1 to 1 Routes: This button sets routes 1 to 1 (i.e. SRC 1 to DST 1, SRC 2 to DST 2, etc).
Set Source 1 to all outputs: This button sets input channel 1 to all destinations.

6.7.2. Route

Grid: This table sets/displays routes in each source/destination (channels 1-16).

6.7.3. To Perform

Import: This button allows the user to over-write the current route table, by importing a file containing another route table.
Export: This button allows the user to export the current route table and convert into a file.

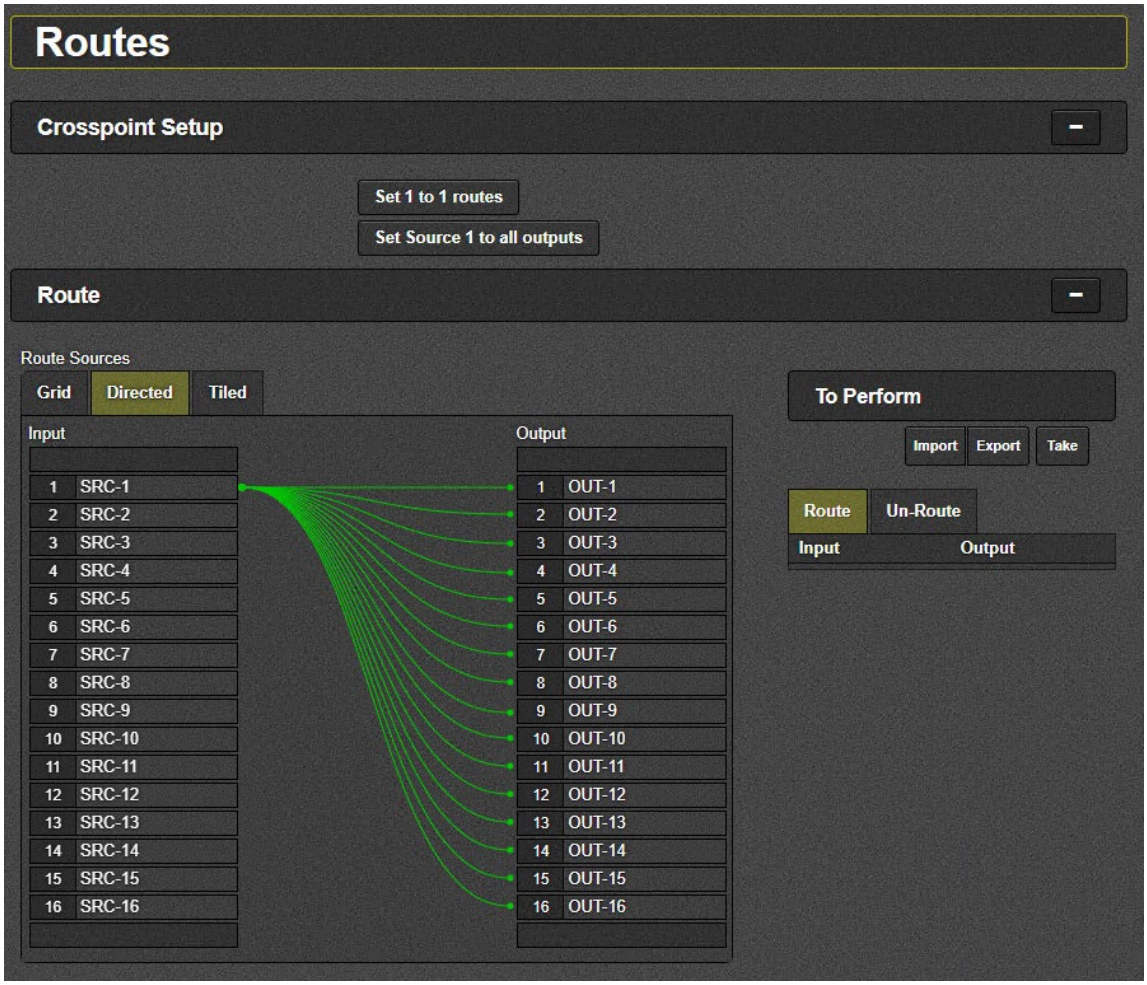

Figure 6-8 : WebEASY® - Routes (Part 2)

6.7.4. Route

Directed: This section shows the signal direction between source and destination. In addition, a route can be set by dragging a source button to a destination. In case any destination button is selected, a un-route can be applied.

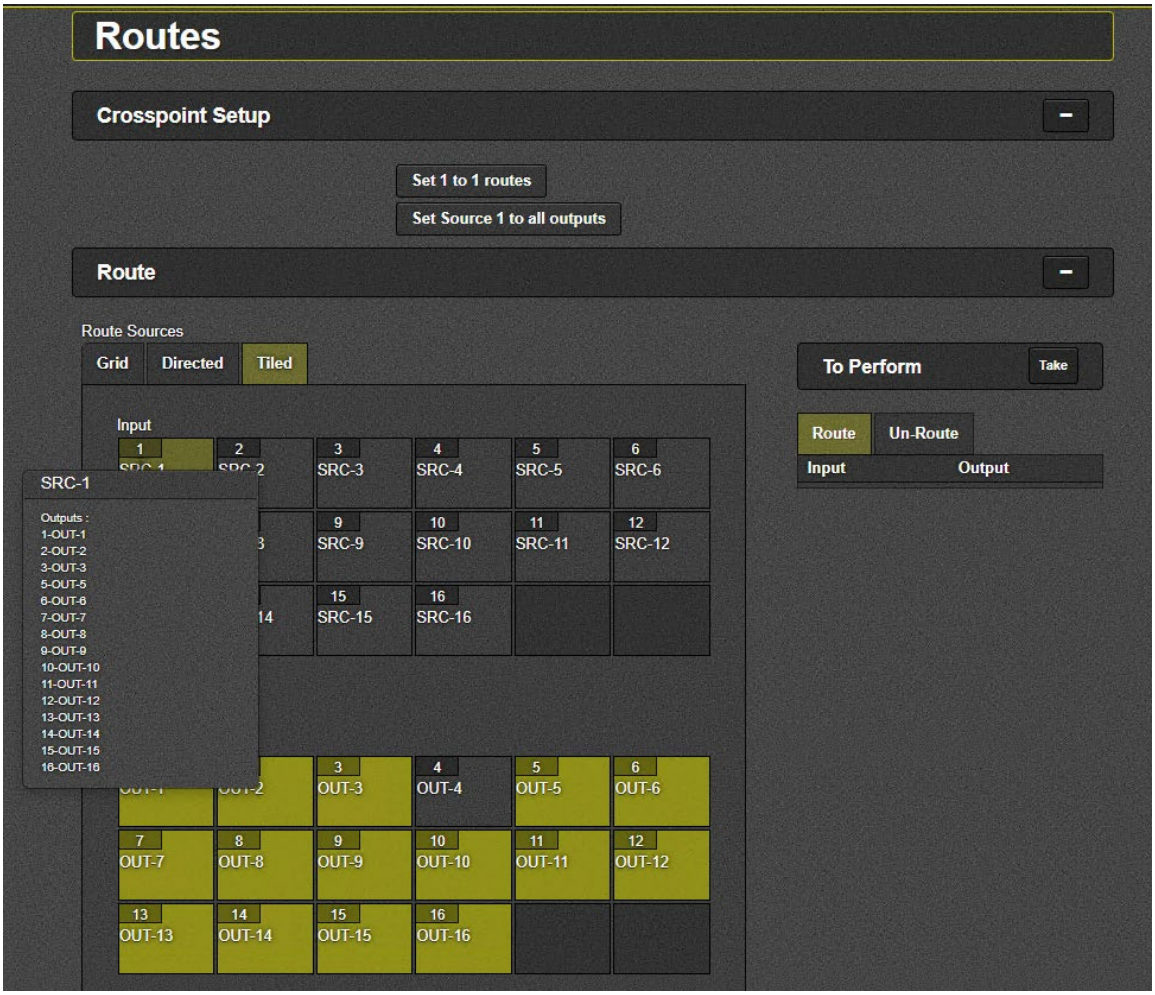

Figure 6-9 : WebEASY® - Routes (Part 3)

6.7.5. Route

Tiled: This section is used to set a route and highlight all destinations routed to a source.

NOTE: ALL sources/destinations selected in Grid, Directed and Tiled section, takes effect only after 'Take' button is pressed.

6.8. GPIO

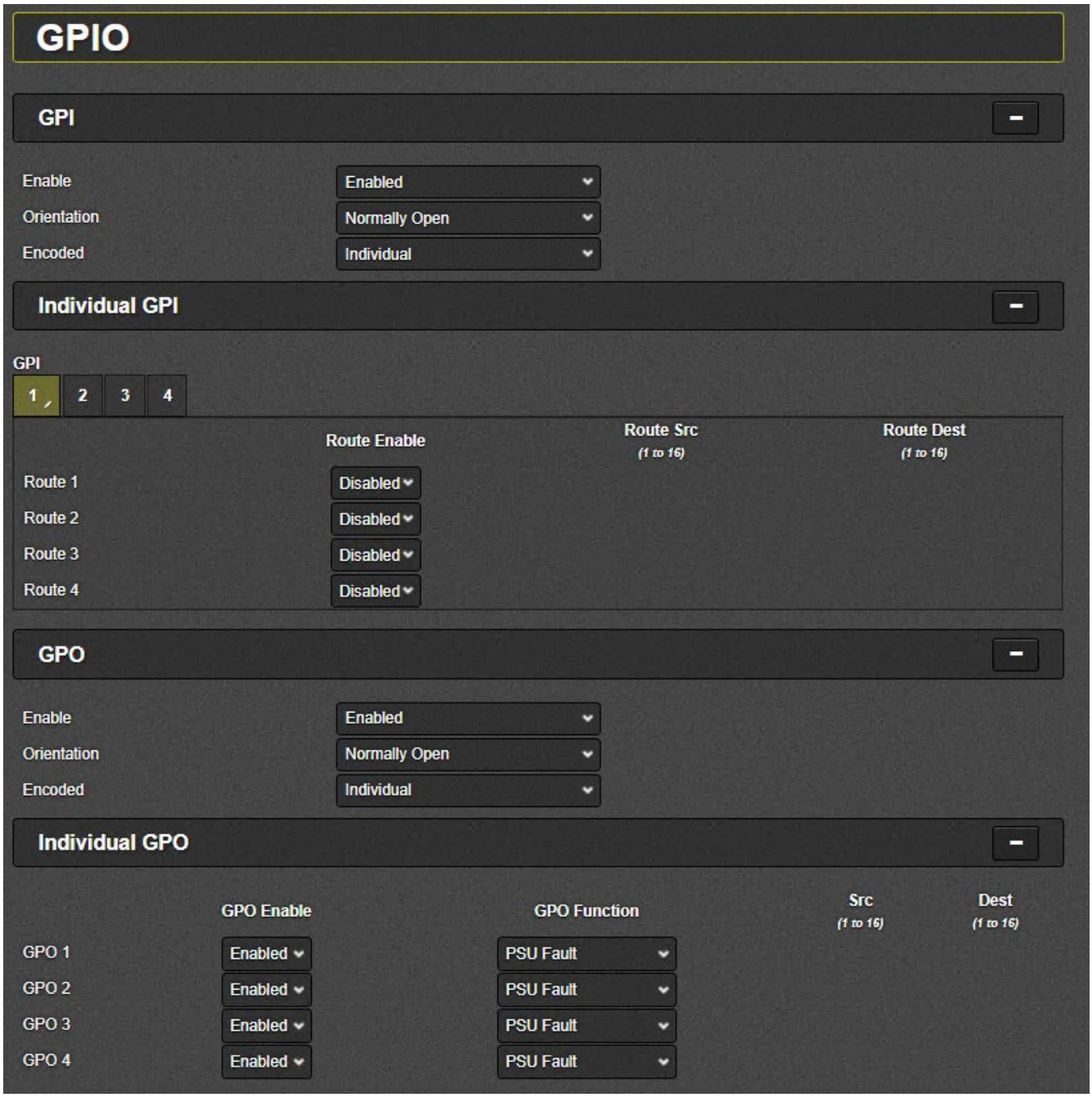

Figure 6-10 : WebEASY® - GPIO

6.8.1. GPI

Enable: This field is used to enable/disable the GPI port.
Orientation: This field is used to set the GPI orientation, whether it is 'Normally Opened' or 'Normally Closed'.

Encoded: This field is used to select whether the GPI connector in the EQT's rear is to be encoded to work individually (set as 'Individual') or collectively (set as 'Encoded').

In case Individual GPI is selected:
Route Enable: This field is used to enable/disable the four routes in each GPI pin.
Route SRC: This field is used to define the source channel for the route.
Route DEST: This field is used to define the destination channel for the route.

In case Encoded GPI is selected:
Dest Enable: This field is used to enable/disable the GPI pins.
Dest for Encoded Src: This field is used to define the Destination channel (1-16) from the encoded source (detailed in Section 4.4.3)

6.8.2. GPO

Enable: This field is used to enable/disable the GPO port.
Orientation: This field is used to set the GPO orientation, whether it is 'Normally Opened' or 'Normally Closed'.
Encoded: This field is used to select whether the GPO is to be encoded to work individually (set as 'Individual') or collectively (set as 'Encoded').

In case 'Individual' GPO is selected:
GPO Enable: This field is used to enable/disable the set of GPOs
GPO Function: This field is used to set which alarm is to be activated: Temperature Fault, Video Src Missing, Video Route Selected and PSU Fault.

In case 'Encoded' GPO is selected:
Dest for Encoded Src: This field is used to define the destination channel (1-16), in which the source will be displayed through GPO (detailed in Section 4.4.3).

NOTE: The device must be rebooted in order for the changes to take effect.

6.9. TRAPS

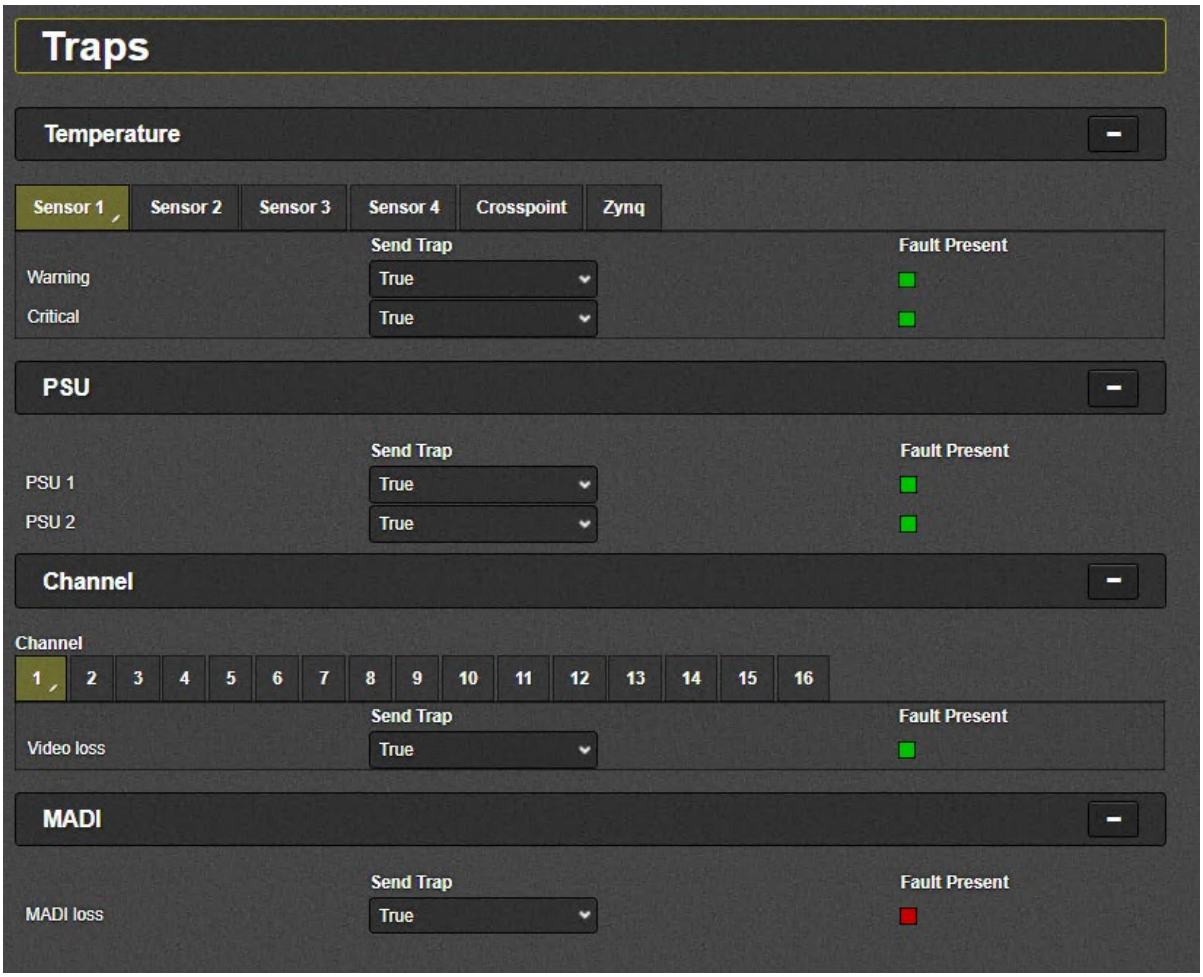

Figure 6-11 : WebEASY® - Traps

6.9.1. Temperature

Temperature Sensor 1-4: This field sets/displays the temperature traps for the fault presence of sensor 1-4, whether the fault is present (green) or absent (red).
Temperature Crosspoint Sensor: This field sets/displays the temperature traps for the fault presence of Crosspoint sensor, whether the fault is present (green) or absent (red).
Temperature Zynq Sensor: This field sets/displays the temperature traps for the fault presence of Zynq sensor, whether the fault is present (green) or absent (red).

6.9.2. PSU

Right: This field sets/displays the right power supply trap for the fault presence, whether it is on (green) or off (red).
Left: This field sets/displays the left power supply trap for the fault presence, whether it is on (green) or off (red).

6.9.3. Channel

Video Loss: This field sets/displays the video loss trap for fault presence, whether video in each channel is present (green) or absent (red).

6.9.4. MADI

MADI Loss: This field sets/displays the MADI trap for fault presence, whether the audio is present (green) or absent (red).

NOTE: 'Fault Presence' colour change can be seen by the user, when 'Refresh' or 'Auto Refresh' is pressed.

6.10. TRAP CONFIGURATION

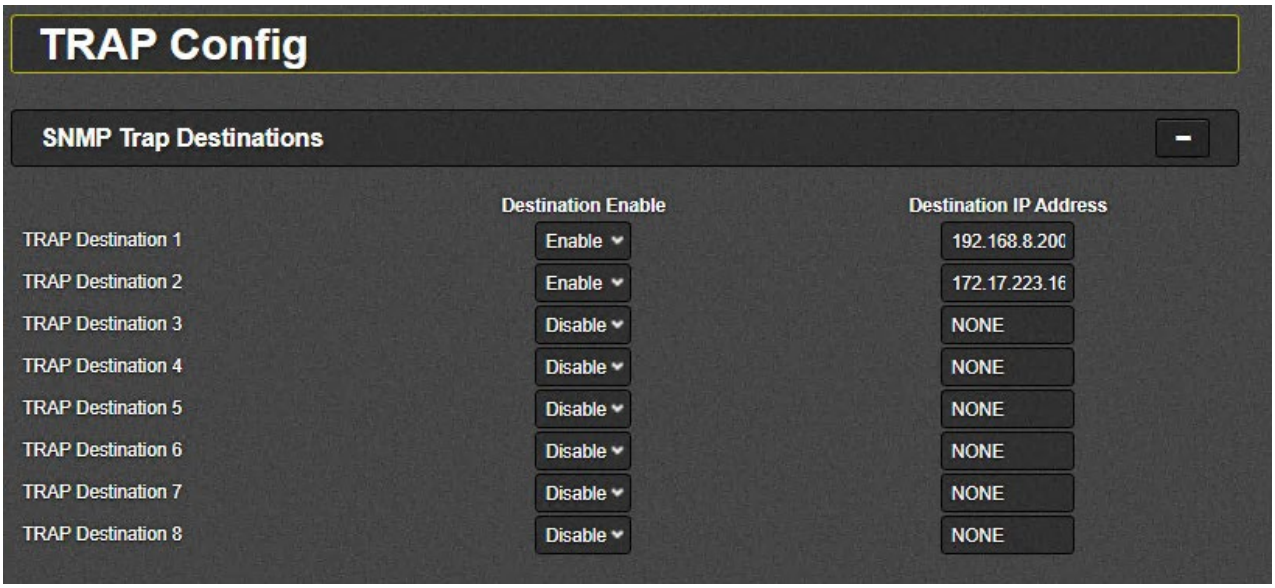

Figure 6-12 : WebEASY® - Trap Configuration

6.10.1. SNMP Trap Destinations

TRAP Destinations 1-8: This field is used to enable/disable and set/display the Destination IP Address for all traps.

NOTE: The device must be rebooted in order for the changes to take effect.

7. VISTALINK® REMOTE MONITORING AND CONTROL

7.1. WHAT'S VISTALINK®?

VistaLINK® is Evertz' remote monitoring and configuration platform that operates over an Ethernet network by using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® provides centralized alarm management that monitors, reports, and logs all incoming alarm events and dispatches alerts to all VistaLINK® clients connected to the server. Card configuration through VistaLINK® can be performed on an individual or multi-card basis using simple copy and paste routines, which reduces the time to configure each module separately. Finally, VistaLINK® enables the user to configure devices in the network from a central station and receive feedback that the configuration has been applied.

There are three components of SNMP:

1. An SNMP manager, also known as a Network Management System (NMS), is a computer running special software that communicates with the devices in the network. Evertz VistaLINK® Pro Manager graphical user interface (GUI), third-party, or custom manager software may be used to monitor and control Evertz VistaLINK® enabled products.

2. Managed devices (such as EQT), each with a unique address, communicate with the NMS through an SNMP Agent.

3. A virtual database, known as the Management Information Base (MIB), lists all the variables being monitored, which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third-party manager or NMS.

7.2. SYSTEM

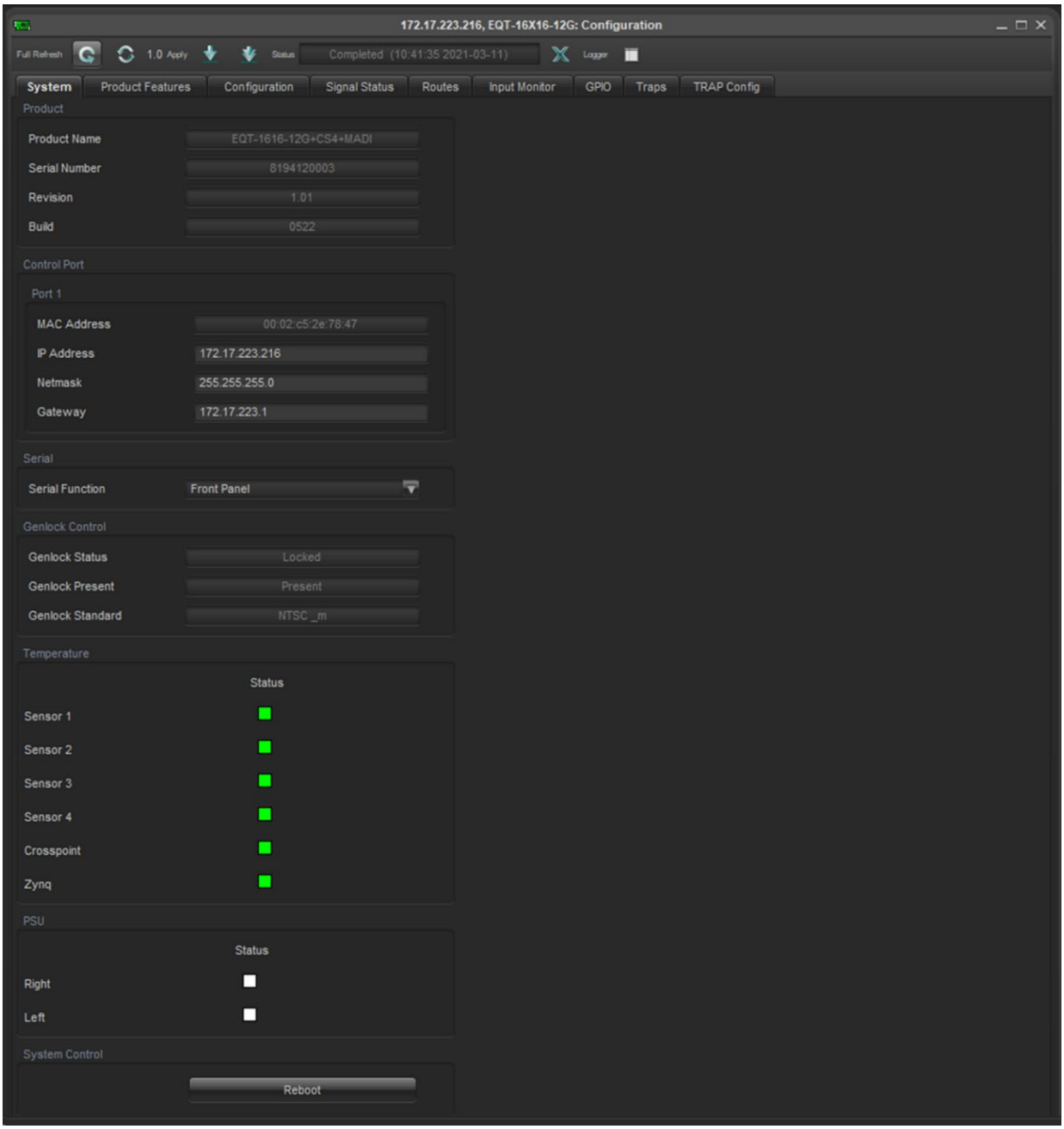

Figure 7-1 : VistaLINK® - System

7.2.1. Product

Product Name: This parameter displays the name of the device.
Serial Number: This parameter displays the serial number of the device.
Revision: This parameter displays the revision of the firmware.
Build: This parameter displays the firmware version uploaded to the device.

7.2.2. Control Port

MAC Address: This parameter displays the physical address of the device.
IP Address: This field is used to set/display the IP address of the device.
Netmask: This field is used to set/display the Subnet Mask of the device.
Gateway: This field is used to set/display the Gateway of the device.

7.2.3. Serial

Serial Function: This field is used to set/display the Serial Control function, whether it is 'Front Panel', related to the front panel buttons (see details in Chapter 8, Levels section), or 'Router Control', related to the serial connector (see details in 4.4.2).

NOTE: The device must be rebooted in order for changes to take effect.

7.2.4. Genlock Control

Genlock Status: This parameter displays the status of Genlock, whether it is 'Locked' or 'Unlocked'.
Genlock Present: This parameter displays whether the Reference is detected by the device, which could be 'Present' or 'Not Present'.
Genlock Standard: This parameter displays the detected Reference standard, whether it is 'NTSC' or 'PAL'.

7.2.5. Temperature

Temperature Sensor 1-4: This parameter displays the temperature status of sensor 1-4, whether it is green (normal), yellow (warning) or red (critical).
Temperature Crosspoint Sensor: This parameter displays the temperature status of Crosspoint sensor, whether it is green (normal), yellow (warning) or red (critical).
Temperature Zynq Sensor: This parameter displays the temperature status of the Zynq sensor, whether it is green (normal), yellow (warning) or red (critical).

7.2.6. PSU

Right: This parameter displays the status of the right power supply, whether it is green (on) or red (off).
Left: This parameter displays the status of the left power supply, whether it is green (on) or red (off).

7.2.7. System Control

Reboot: This button allows the user to reboot the device.

7.3. PRODUCT FEATURES

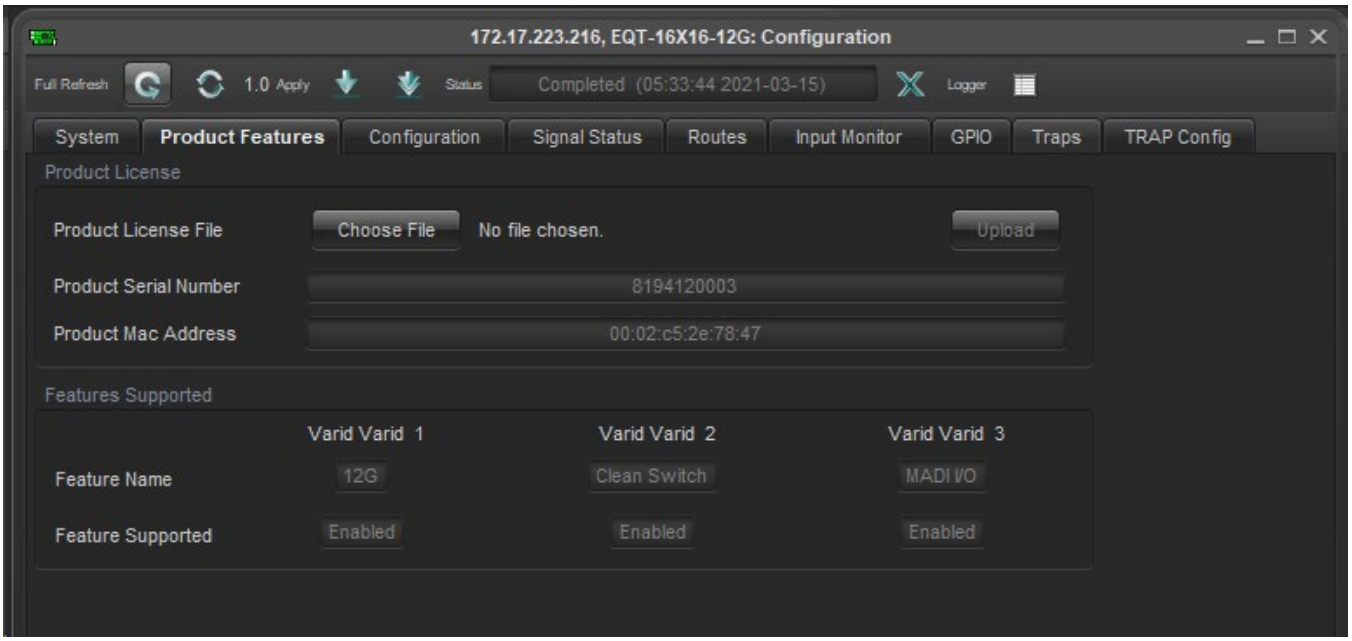

Figure 7-2: VistaLINK® - Product Features

7.3.1. Product License

Product License File: This button allows the user to select and upload a product license file.
Product Serial Number: This parameter displays the serial number of the device.
Product MAC Address: This parameter displays the MAC address of the device.

7.3.2. Feature Supported

Feature Name: This parameter displays the name of the selected feature (if installed).
Feature Supported: This parameter displays whether the selected feature is supported and enabled.

7.4. CONFIGURATION

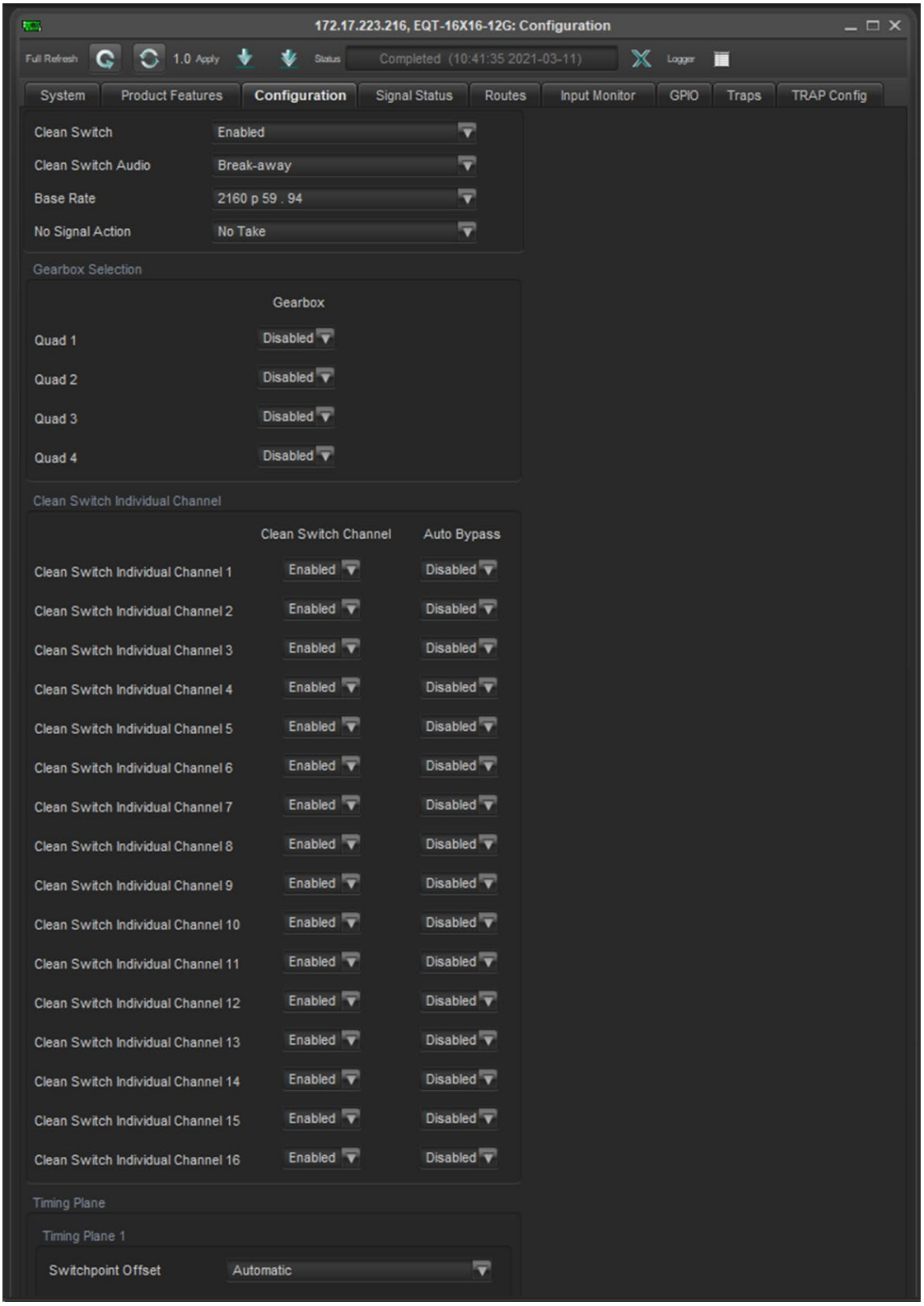

Figure 7-3 : VistaLINK® - Configuration

7.4.1. Output Video

Clean Switch: This field is used to enable/disable the clean switching functionality of the device.
Clean Switch Audio: This field is used to select the clean switching audio functionality of the device, whether it is 'Follow Video', for embedded audio channels to be routed along with its respective video, or 'Break-Away', to route 320 audio channels independently of the video route.

NOTE: 'Clean Switch Audio' must be set to 'Break-Away', in order to route the embedded audio channels and MADI audio channels independently.

Base Rate: This field is used to set/display the base rate of the input signal connected to the device.
No Signal Action: This field is used to set/display the action in case there is no input signal.

NOTE: 'No Signal Action' must be set to 'Take', in order for the routes, done in Route section (7.4.8), to take effect.

7.4.2. Gearbox Selection

(See details in 5.1.2)
Quad 1: This parameter is used to enable/disable 1-4 input and output ports to quad-link.
Quad 2: This parameter is used to enable/disable 5-8 input and output ports to quad-link.
Quad 3: This parameter is used to enable/disable 9-12 input and output ports to quad-link.
Quad 4: This parameter is used to enable/disable 13-16 input and output ports to quad-link

NOTE: At least one of Gearboxes must be disabled to pass through a single-link 12G-SDI signal.

7.4.3. Clean Switch Individual Channel

Clean Switch Channel: This field is used to enable/disable the clean switching functionality in each channel.
Auto Clean Switch Bypass: This field is used to enable/disable the audio bypass functionality in each channel, in case the input source does **not** match the base rate.

NOTE: 'Clean Switch' must be enabled, in order to use all the above features.

7.4.4. Timing Plane

Switching Offset: This parameter is used to set/display whether Timing Plane is ‘Automatic’ or ‘Manual’.

NOTE: The device must be rebooted in order for changes to take effect.

7.5. SIGNAL STATUS

Figure 7-4 : VistaLINK® - Signal Status

7.5.1. Device Info

Src Standard: This parameter displays the input signal source standard.
Src marches Baserate: This parameter detects whether the signal source base rate matches the device's base rate (green) or mismatches the device's base rate (red).
Rx Data Rate: This parameter detects/displays the input signal source.
Rx Presence: This parameter detects whether the signal source is present (green) or absent (red).
Tx Data Rate: This parameter detects/displays the output signal.
Tx Presence: This parameter detects whether the output signal is present (green) or absent (red).

7.5.2. MADI Status

MADI Presence: This parameter detects whether the MADI audio is present (green) or absent (red).
MADI Channels: This parameter detects whether the MADI audio is active (green) or inactive (red) in each channel.

7.6. ROUTES

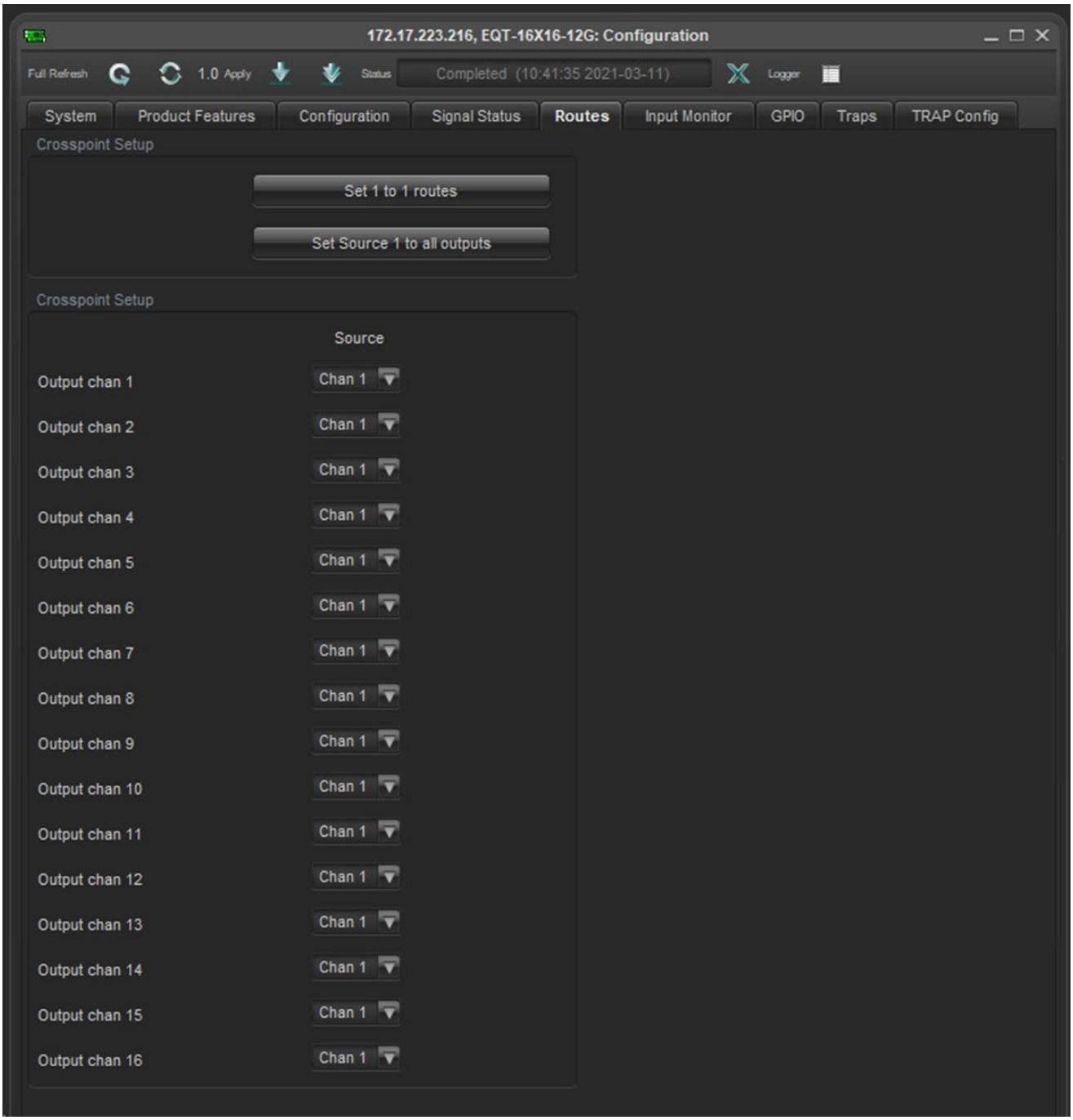

Figure 7-5 : VistaLINK® - Routes

7.6.1. Crosspoint Setup

Set 1 to 1 Routes: This button routes 1 to 1 (i.e. SRC 1 to DST 1, SRC 2 to DST 2, etc.).
Set Source 1 to all outputs: This button sets input source channel 1 to all destinations.
Source: This section sets/displays the source routed for each destination output channel 1-16.

7.7. INPUT MONITOR

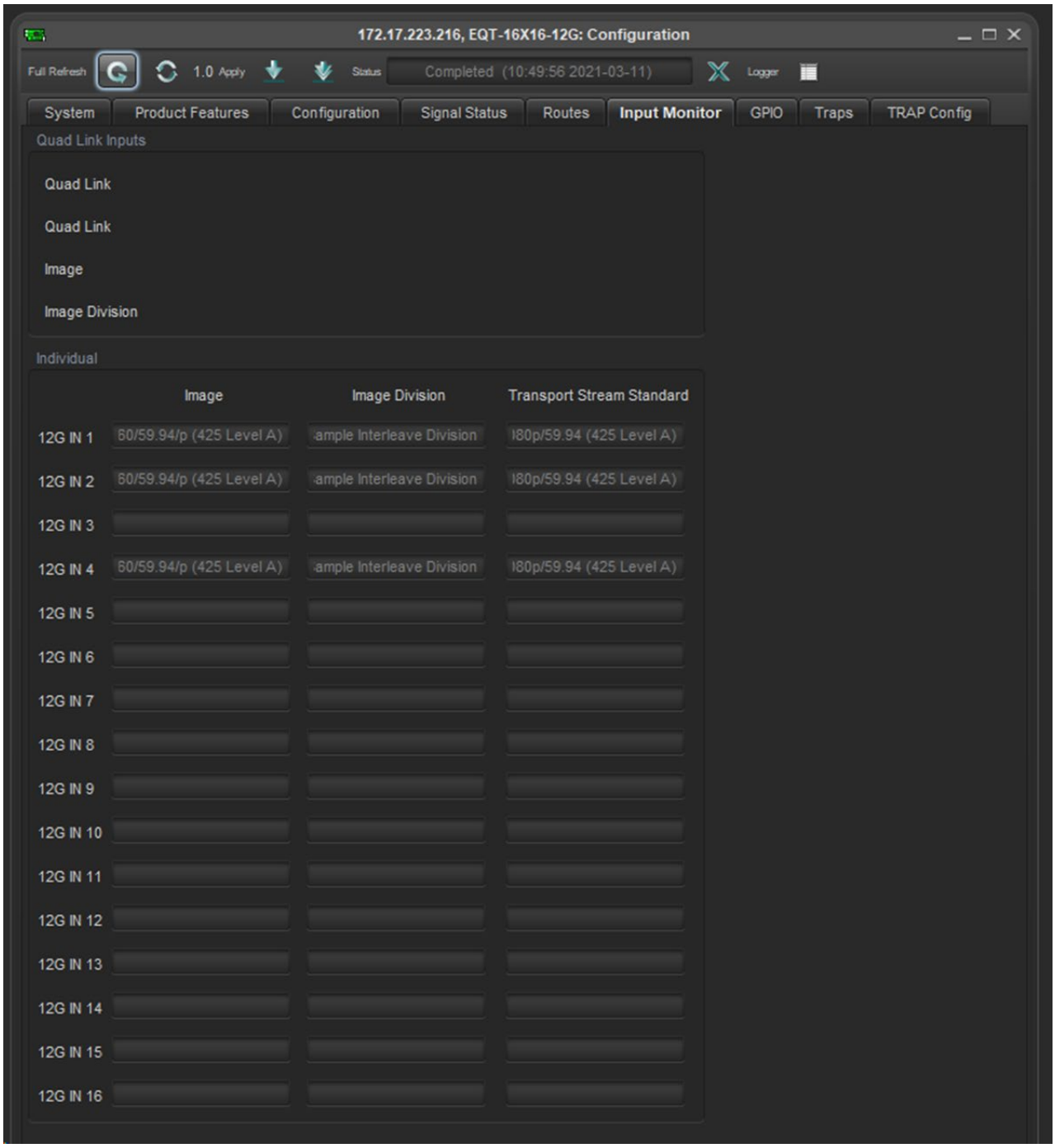

Figure 7-6 : VistaLINK® - Input Monitor

7.7.1. Quad Link Inputs

Quad link: This parameter displays which input quad-link from Gearbox feature is enabled (groups of 4).
Image: This parameter detects/displays the signal standard of the input quad-link group.
Image Division: This parameter detects/displays the image division of the input quad-link group.

7.7.2. Individual

Image: This parameter detects/displays the signal standard of each input channel.
Image Division: This parameter detects/displays the image division of each input channel.
Transport Stream Standard: This parameter detects/displays the stream standard in each input channel.

7.8. GPIO

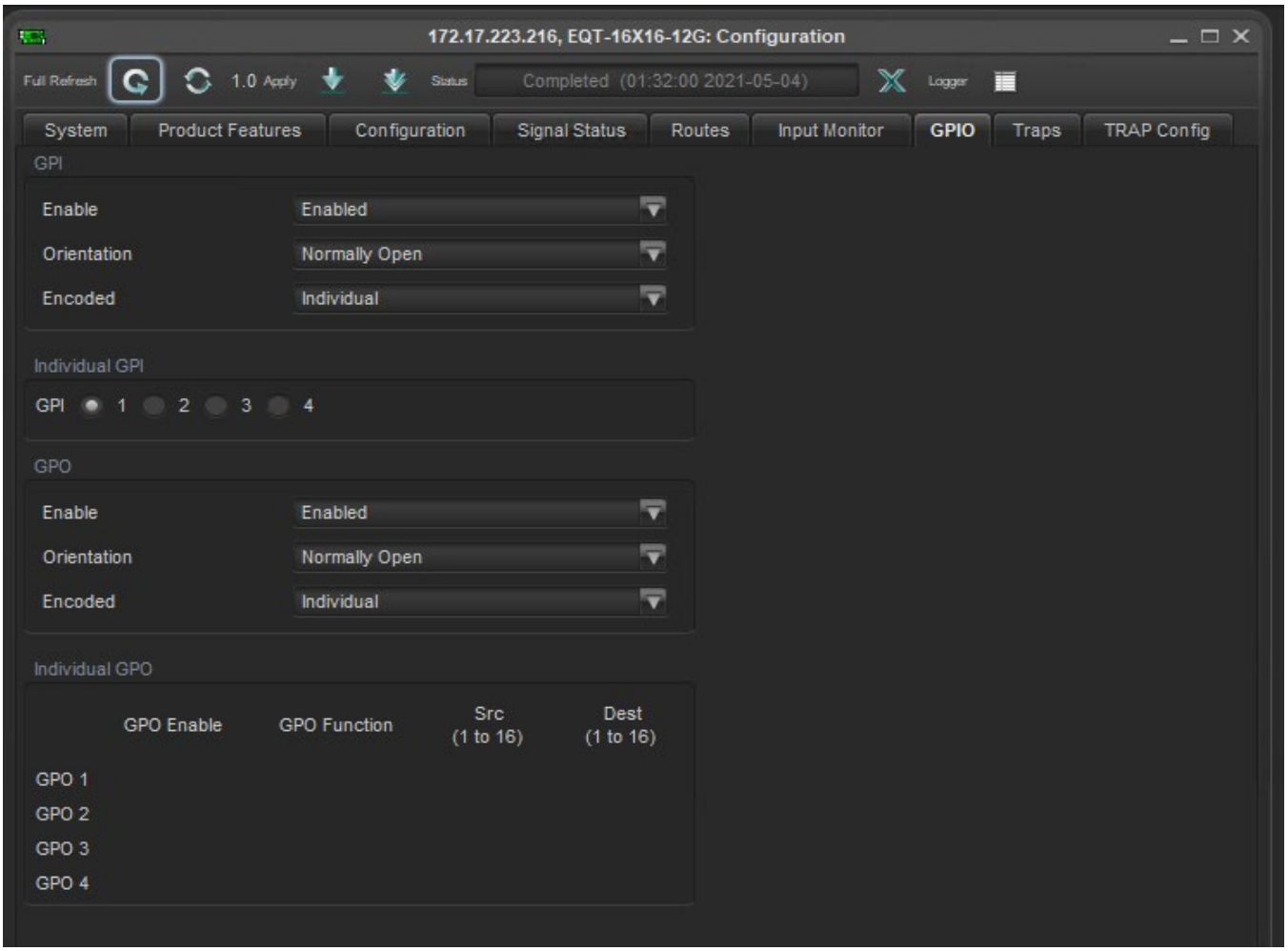

Figure 7-7 : VistaLINK® - GPIO

7.8.1. GPI

Enable: This field is used to enable/disable the GPI port.
Orientation: This field is used to set the GPI orientation, whether it is 'Normally Opened' or 'Normally Closed'.
Encoded: This field is used to select whether the GPI connector in the EQT's rear is to be encoded to work individually (set as 'Individual') or collectively (set as 'Encoded').

In case Individual GPI is selected:
Route Enable: This field is used to enable/disable the four routes in each GPI pin.
Route SRC: This field is used to define the source channel for the route.
Route DEST: This field is used to define the destination channel for the route.

In case Encoded GPI is selected:
Dest Enable: This field is used to enable/disable the GPI pins.
Dest for Encoded Src: This field is used to define the Destination channel (1-16) from the encoded source (detailed in Section 4.4.3)

7.8.2. GPO

Enable: This field is used to enable/disable the GPO port.
Orientation: This field is used to set the GPO orientation, whether it is 'Normally Opened' or 'Normally Closed'.
Encoded: This field is used to select whether the GPO is to be encoded to work individually (set as 'Individual') or collectively (set as 'Encoded').

In case 'Individual' GPO is selected:
GPO Enable: This field is used to enable/disable the set of GPOs
GPO Function: This field is used to set which alarm is to be activated: Temperature Fault, Video Src Missing, Video Route Selected and PSU Fault.

In case 'Encoded' GPO is selected:
Dest for Encoded Src: This field is used to define the destination channel (1-16), in which the source will be displayed through GPO (detailed in Section 4.4.3).

NOTE: The device must be rebooted in order for the changes to take effect.

7.9. TRAPS

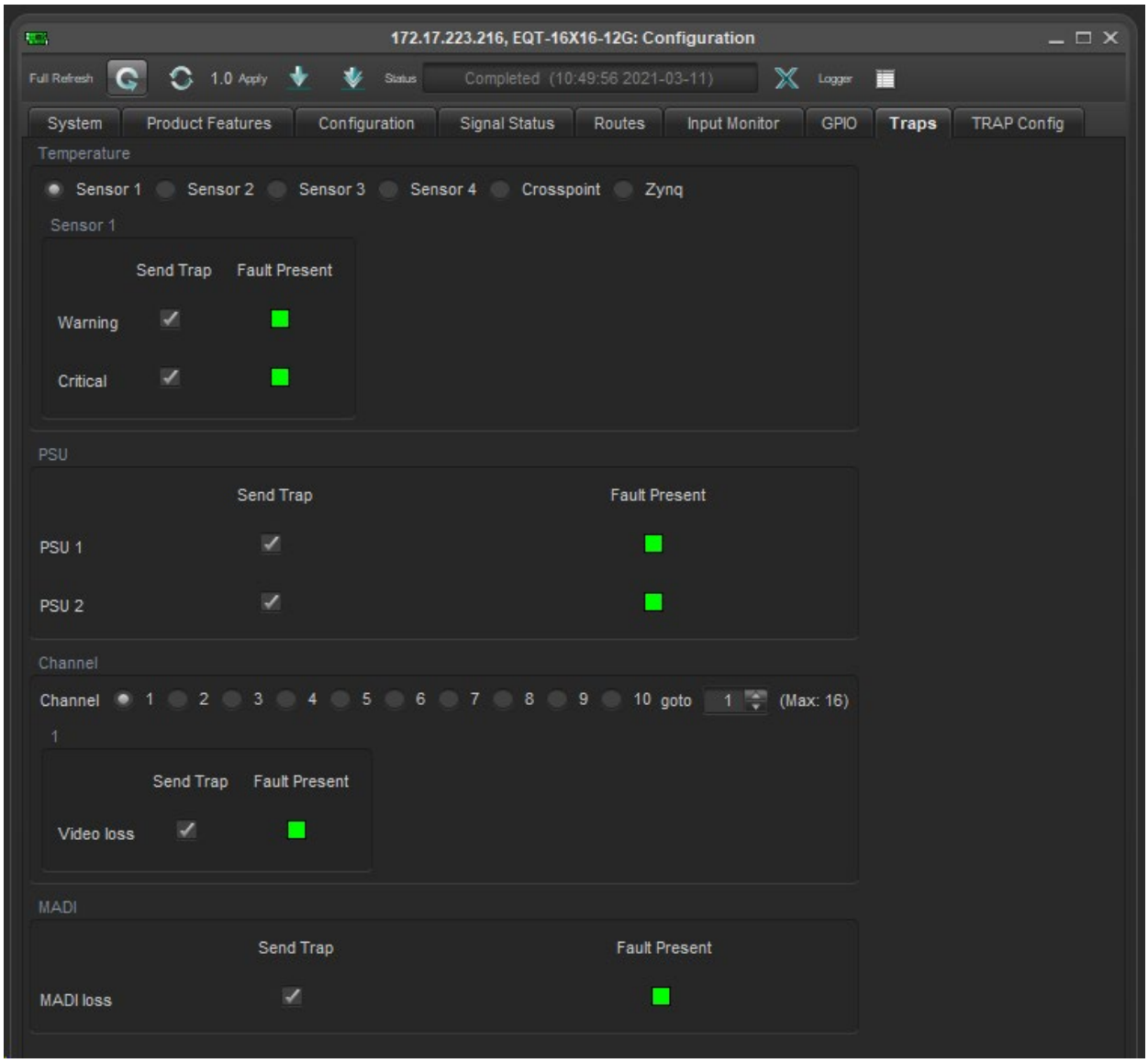

Figure 7-8 : VistaLINK® - Traps

7.9.1. Temperature:

Temperature Sensor 1-4: This field sets/displays the temperature traps for the fault presence of sensor 1-4, whether the fault is present (green) or absent (red).
Temperature Crosspoint Sensor: This field sets/displays the temperature traps for the fault presence of Crosspoint sensor, whether the fault is present (green) or absent (red).
Temperature Zynq Sensor: This field sets/displays the temperature traps for the fault presence of Zynq sensor, whether the fault is present (green) or absent (red).

7.9.2. PSU

Right: This field sets/displays the right power supply trap for the fault presence, whether it is on (green) or off (red).
Left: This field sets/displays the left power supply trap for the fault presence, whether it is on (green) or off (red).

7.9.3. Channel

Video Loss: This field sets/displays the video loss trap for fault presence, whether video in each channel is present (green) or absent (red).

7.9.4. MADI

MADI Loss: This field sets/displays the MADI trap for fault presence, whether the audio is present (green) or absent (red).

NOTE: 'Fault Presence' colour change can be seen by the user, when 'Refresh' or 'Auto Refresh' is pressed.

7.10. TRAP CONFIG

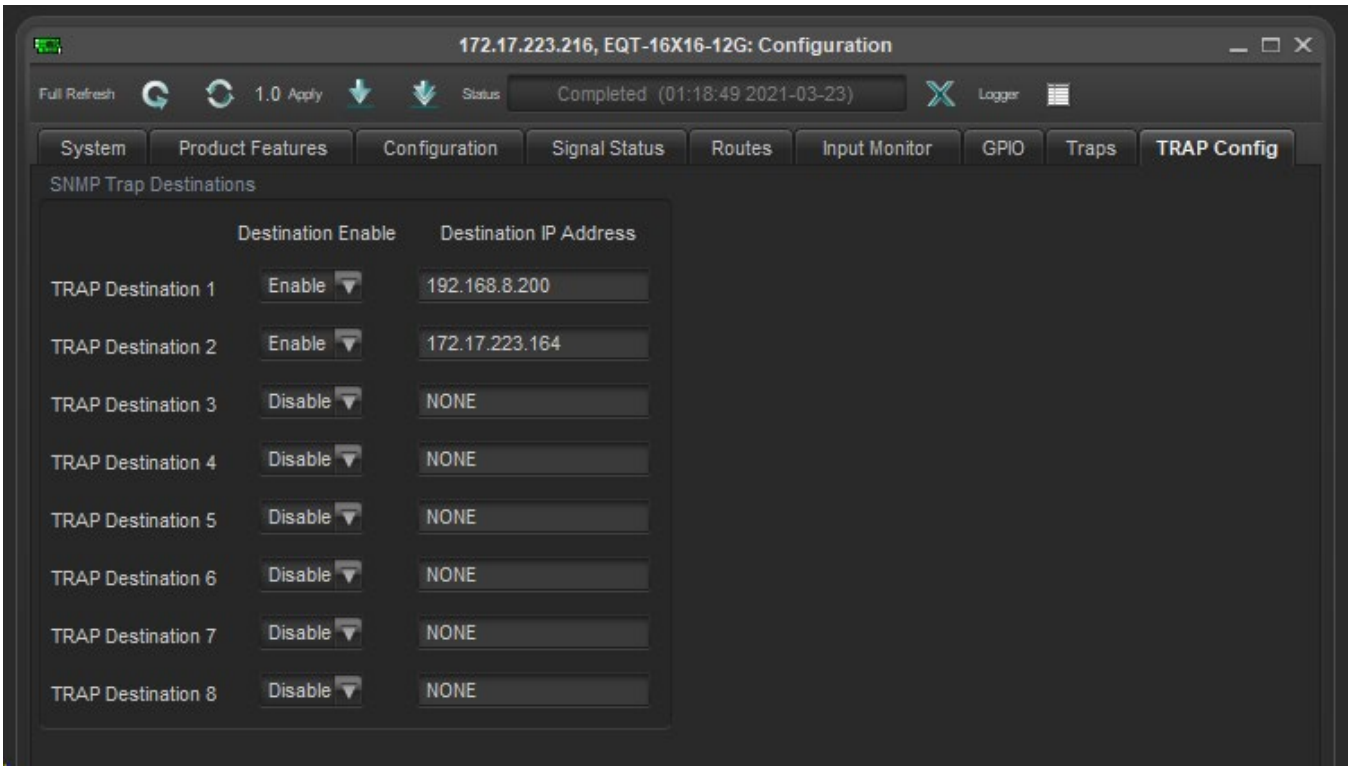

Figure 7-9 : VistaLINK® - Trap Config

7.10.1. SNMP Trap Destinations

TRAP Destinations 1-8: This field is used to enable/disable and set/display the Destination IP Address for all traps.

NOTE: The device must be rebooted in order for the changes to take effect.

7.11. MANAGE ROUTES

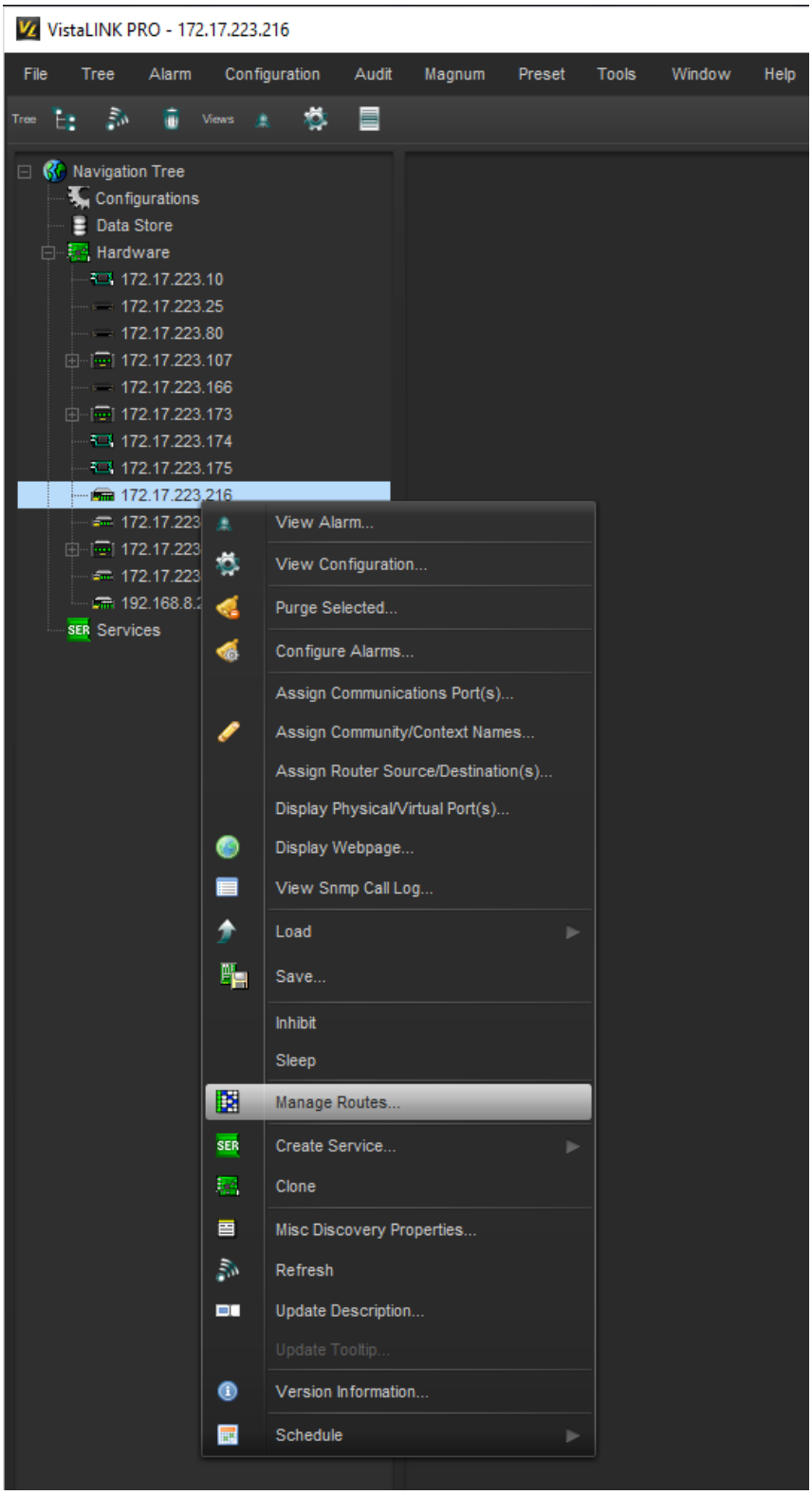

Figure 7-10 : VistaLINK® - Manage Routes (Part 1)

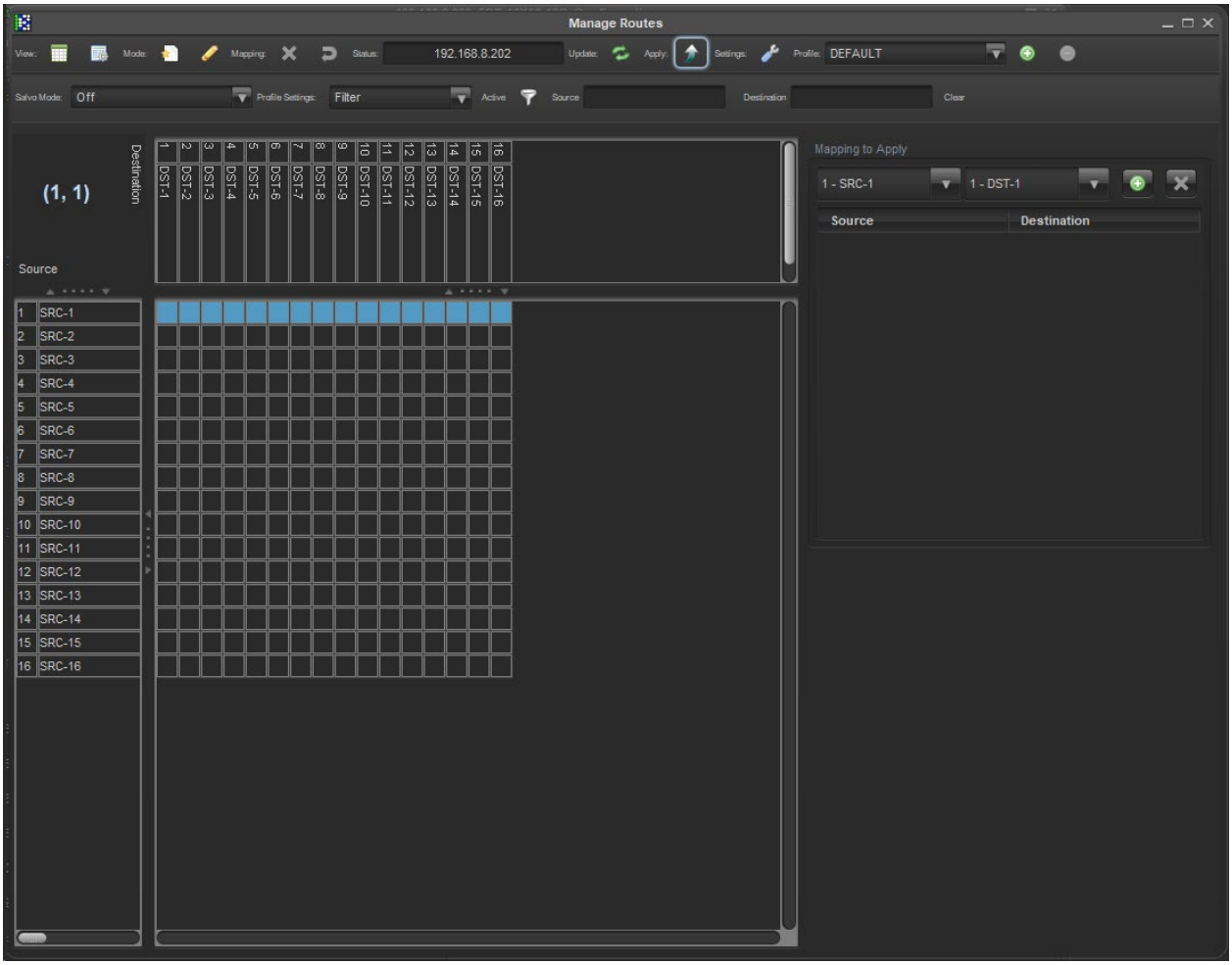

Figure 7-11 : VistaLINK® - Manage Routes (Part 2)

This section shows the path to display the Manage Routes table through VistaLINK®, as well as, it displays possibilities of individual sources/destinations routes.

NOTE: After every route, press ‘Apply’ for the changes take effect.

8. CONFIGURING THE SYSTEM USING WINSETUP

The WinSetup program is used to configure most of the routing functions, including control panel operation. It allows such things as the number of signal levels to be defined, which control panels are connected to the system, and the names of inputs and outputs.

The configuration of the EQT uses a special version of WinSetup. To ensure that the correct version is used, check the *Options* > *System Version* menu. The correct version has the SC-500E as the only system inside the Routing System Controller box.

NOTE: Configuration of the EQT requires a specific version of WinSetup.

WinSetup is supplied with a comprehensive help system that can be accessed by pressing **F1** from any screen. The help system can also be entered from the *Help* > *Index* menu. The following notes are a very brief guide to getting started with WinSetup.

The following dialog box is the WinSetup main screen. Any part of the system can be configured from the menu at the top of the screen. The grey bars above each main section and the line items within the main sections can both be used for quick access to specific items.

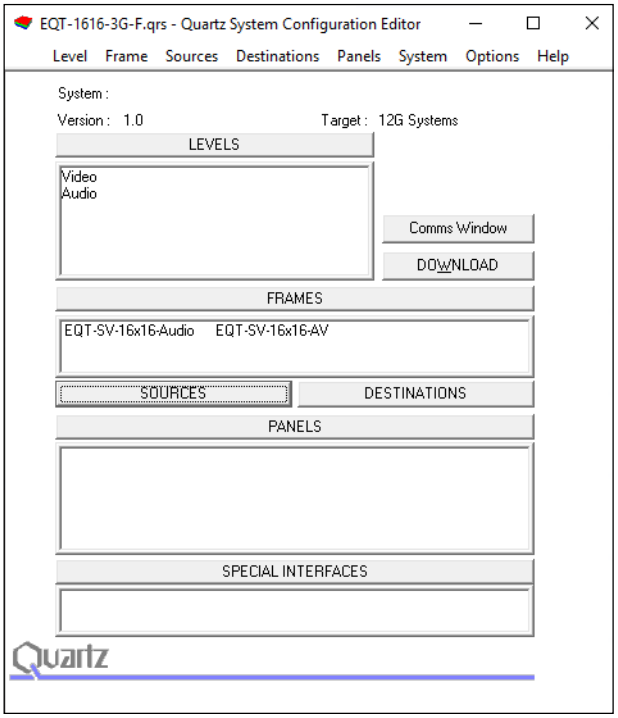

Figure 8-1 : WinSetup - Configuration Editor

When generating a new system configuration, some of the menus and functions are grayed out (not available). This is deliberate to lead the user through the functions that need to be set up. Carry out the following functions to configure the system.

1. **Levels:** Enter the level names for each of the levels that you want to control. EQT-1616-3G-C can have two separate levels, for Audio and Video, since the used can route/shuffle both independent. **Do not tick the 'Complex' box at this stage.**

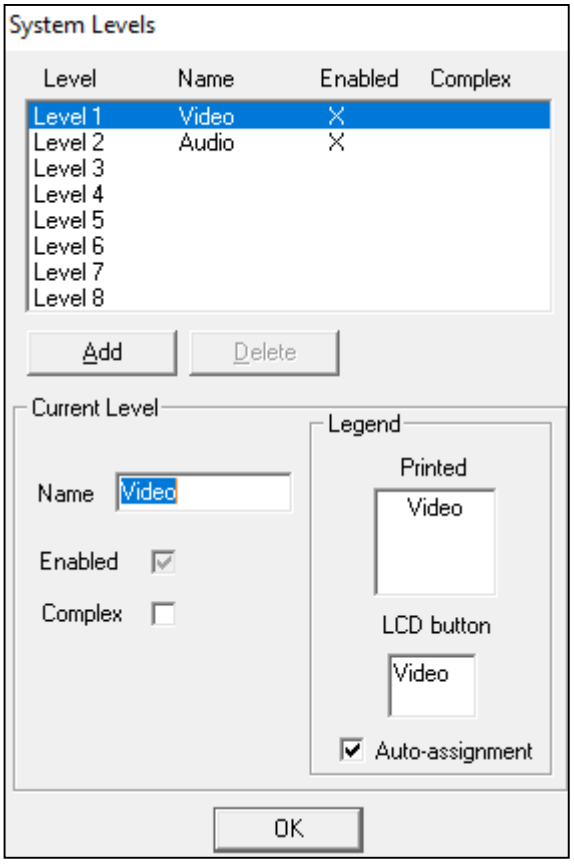

Figure 8-2 : WinSetup - System Levels Editor

2. **Frames:** Enter the frames dialog and use the '**New'** button. Select the appropriate router from the list available. In order to control 16 Video channels and 320 Audio channels separately, select EQT-SV-16x16-Audio Part Number.
   The only change that needs to be made in the *Edit Frame* dialog, Main tab, is the *Q-LINK* address. This address must be unique among all devices in the system.

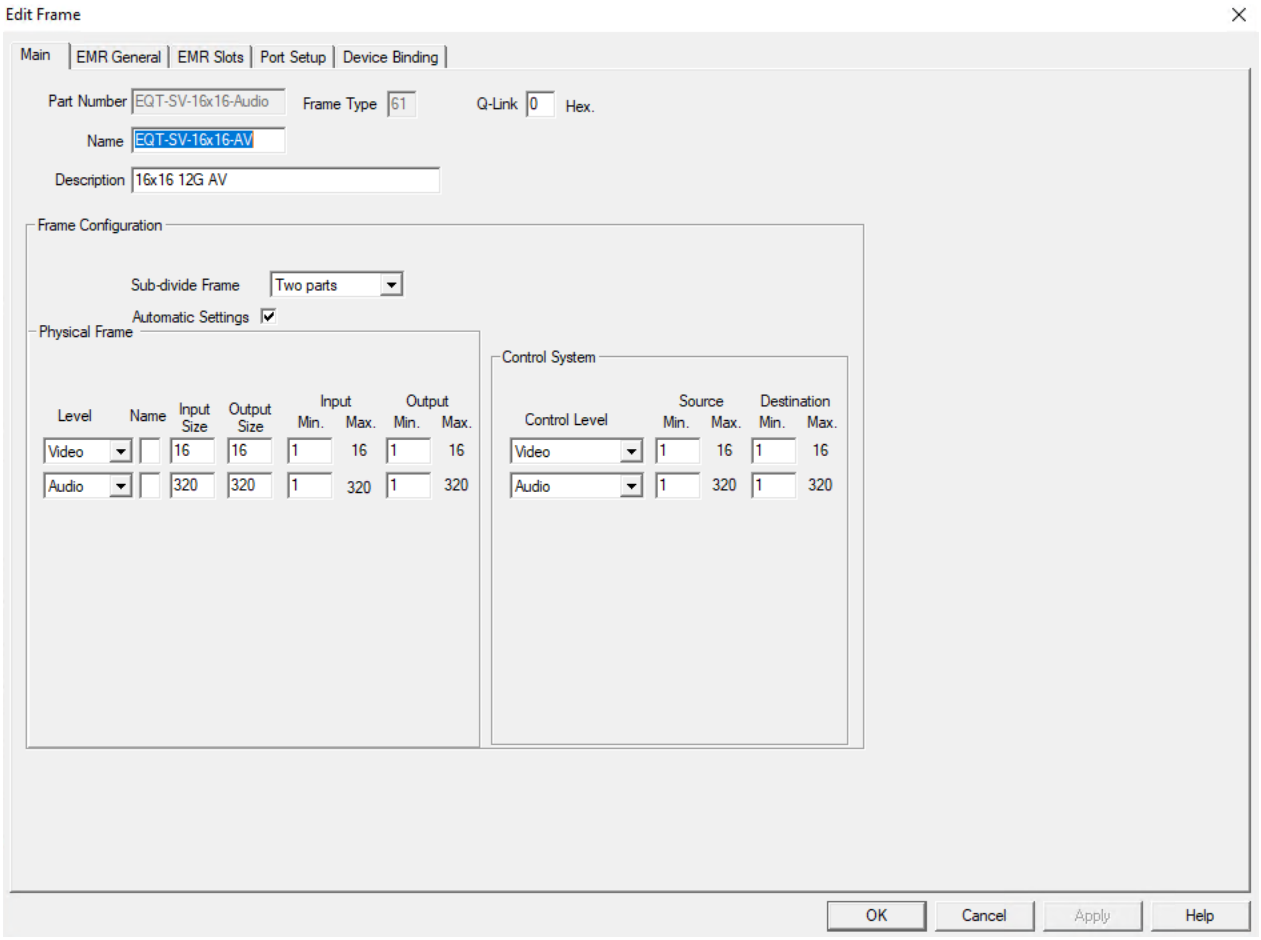

Figure 8-3 : WinSetup - Frame Editor

The *Port Setup* section configuration details is shown in 6.1 Communication Port Setup.

3. **Sources:** Enter the sources dialog and use the 'add' button to fill the number of sources and name of the sources. Also, select the desired Levels, since there are Video and Audio levels. Each level will display the maximum sources set in the *Frame Edit* dialog. The names can be edited later when a few panels are configured and working properly.

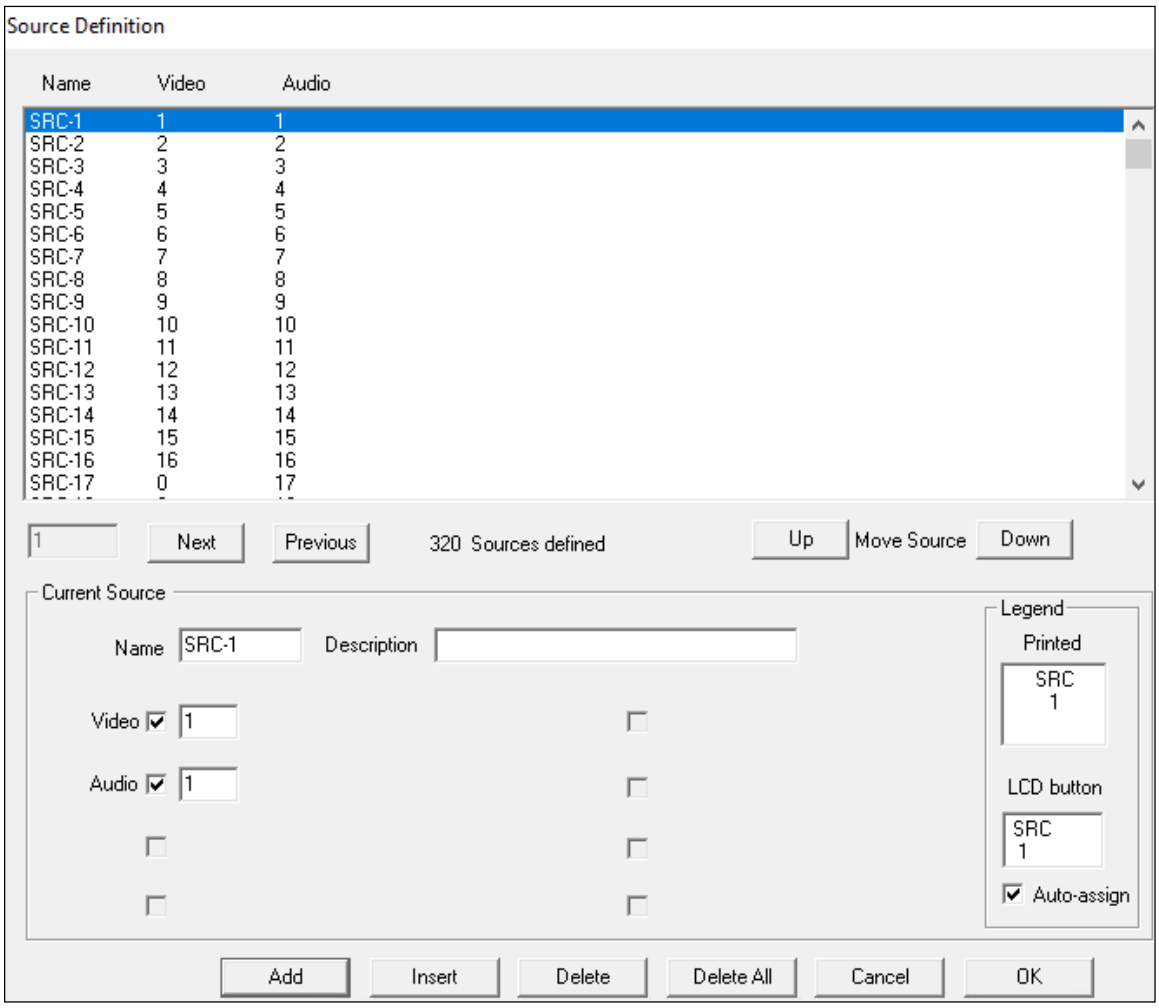

Figure 8-4 : WinSetup - Source Definition

4. **Destinations:** Enter the destination dialog and use the 'add' button to fill the number of destinations to create and the name of the destinations. Also, select the desired Levels, since there are Video and Audio levels. Each level will display the maximum sources set in the *Frame Edit* dialog. The names can be edited later when a few panels are configured and working properly.

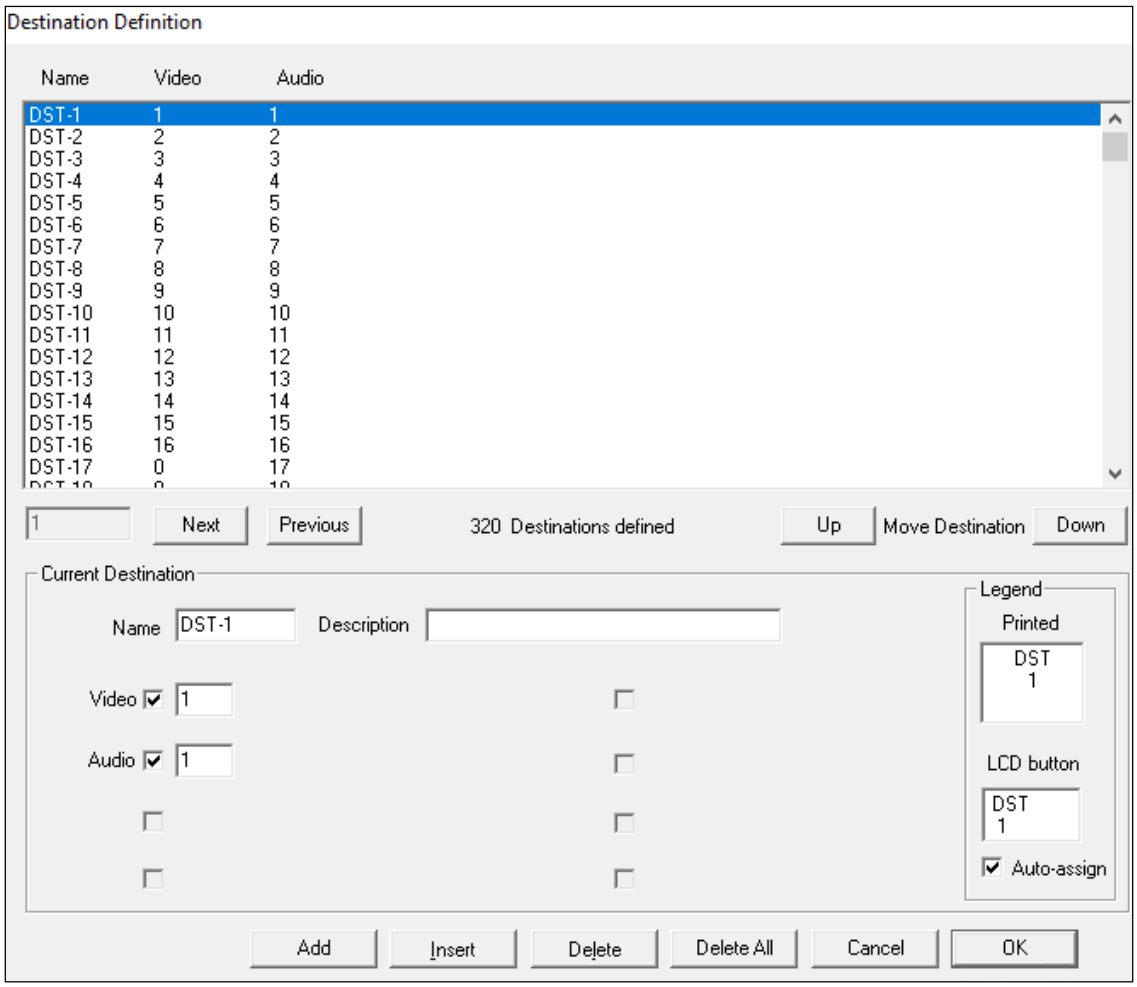

Figure 8-5 : WinSetup - Destination Definition

5. **Panels:** Enter the panel's dialog and use the **'New'** button; this will show all Evertz panels listed by part number. Select the part number that matches the part number on the panel's serial number label. Ignore the A/E designation as the connection method for the panel that will be defined in the panel configuration dialog. Once a part number is selected, a new dialog box will appear displaying a graphic of the panel. Figure 8-6 shows the button display for the CP-2402E front control panel.

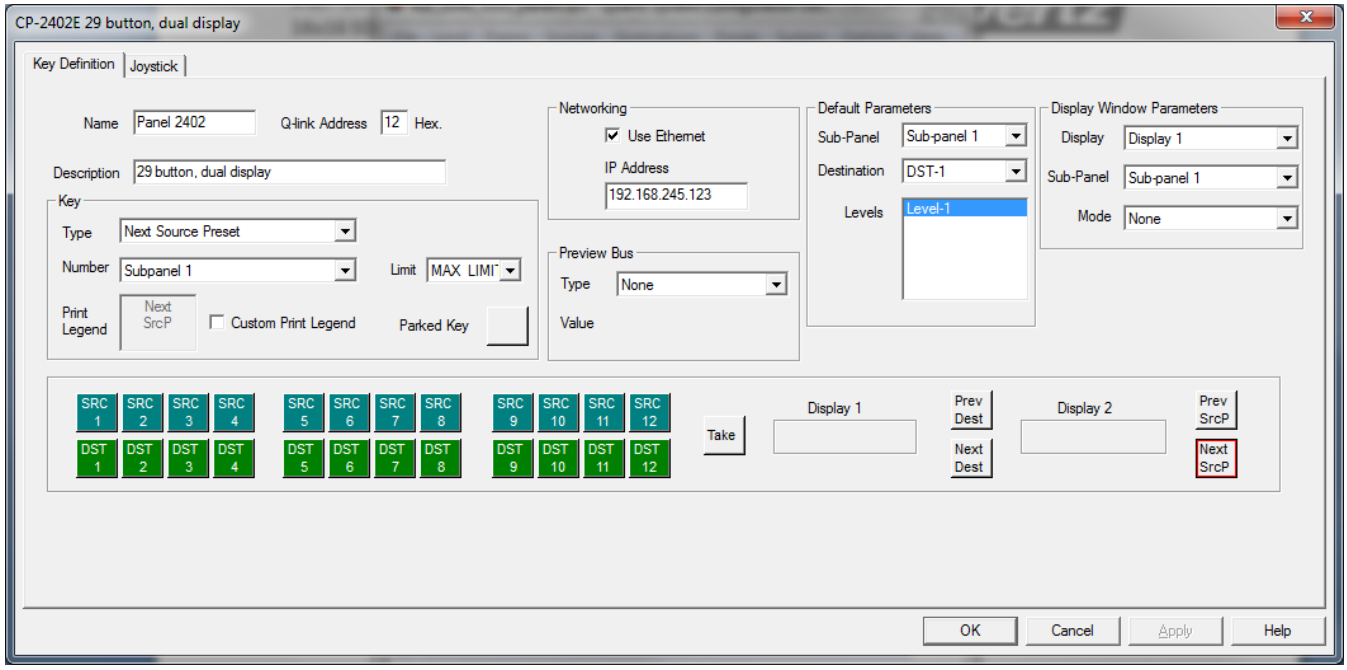

Figure 8-6 : WinSetup - Panel Configuration

Each button can be programmed by selecting the button and then editing the functions in the Key section of the dialog box. Each panel should also be given a name for later identification; *Panel 2402* is used in this example. The Q-LINK address will be allocated automatically by the program, but can be edited if required. The default parameters control how the panel will function at power up. In this example the panel will always control DST-1 to start with. Now add any further panels that the system will need.

NOTE: The checkbox for 'Use Ethernet' must be checked to control the panel over the Ethernet network.

NOTE: For versions that are equipped with a local control panel, an Ethernet panel configuration must be defined using the type CP-2402E.

6. **Download:** Click the **'Download'** button on the main screen (or, alternatively, use *System* > *Download to router*) to transfer the setup data to the router.

NOTE: The configuration for the EQT can only be downloaded over Ethernet and not serially.

NOTE: Configuration downloads to the EQT must be performed using port 2500.

8.1. COMMUNICATION PORT SETUP

The EQT has several communication ports that require additional setup. This section is used to define all of the interfaces that will be connected to the EQT. Enter the *Edit Frame* dialog and select the *Port Setup* section.

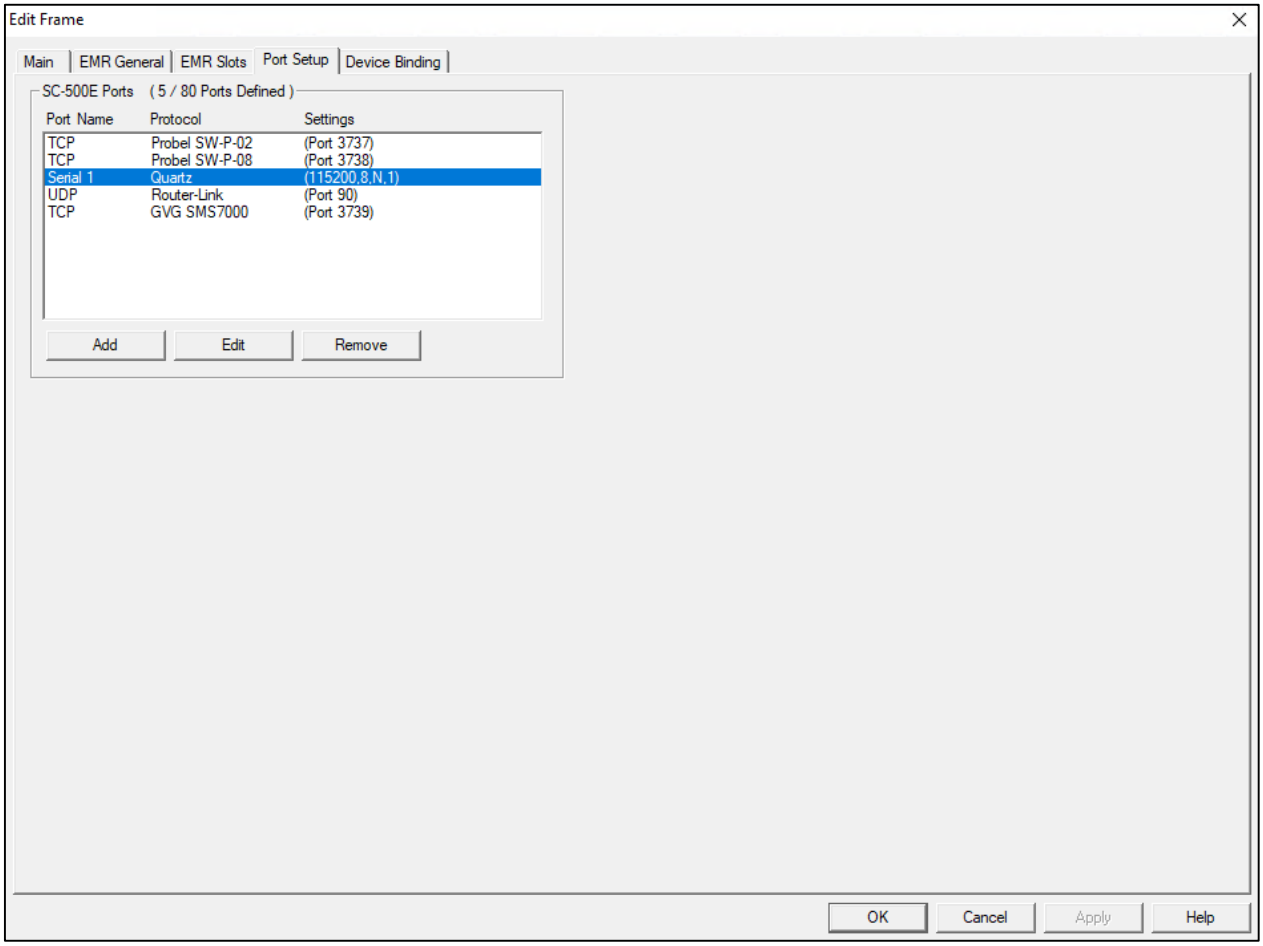

Figure 8-7 : WinSetup - Port Setup

8.1.1. Control Panel Ethernet Interface

The control panel Ethernet port is a single interface that is defined to allow all properly equipped control panels to connect to the EQT via Ethernet. The interface is designed as a *UDP* interface using the *Router-Link* protocol. The port is always defined as *90*. A properly configured setting is shown in Figure 8-8.

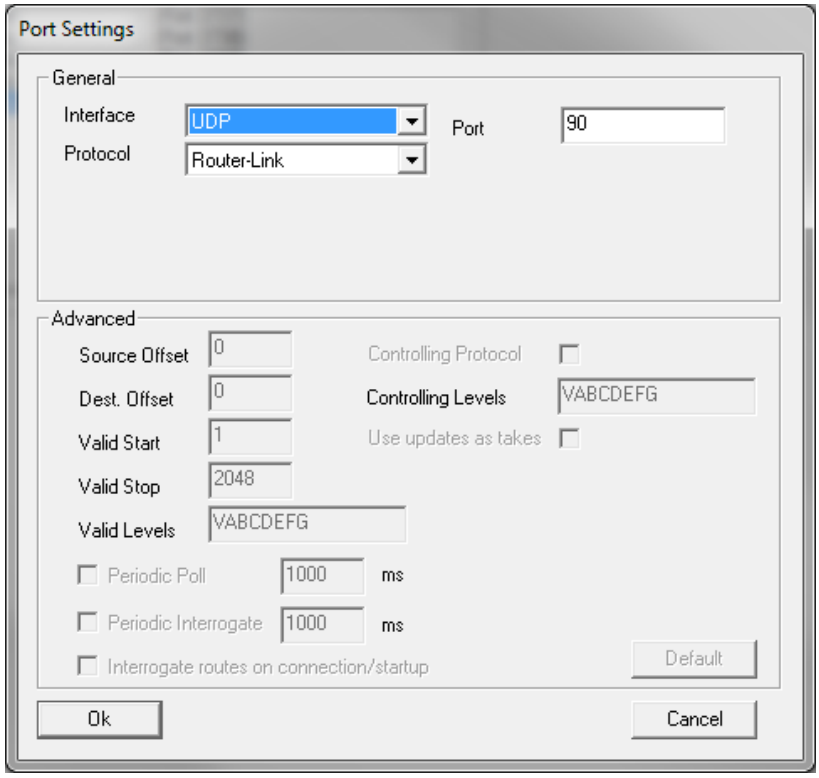

Figure 8-8 : WinSetp - Ethernet Port Settings - UDP

NOTE: A control panel Ethernet interface must be setup on the EQT-1616-3G-C.

8.1.2. Ethernet Interface

The Ethernet interface is defined to provide access to the EQT so that it can be controlled via Ethernet. There are options for protocols depending on the user requirements. Quartz protocol is designed for Evert'z control devices; however, for Third-Party Controls, there are other protocols, such as: Probel SW-P-02 (one level control), Probel SW-P-08 and GVG SMS7000 (control of two levels). An example of a properly configured Ethernet port for external control is shown in Figure 8-9.

NOTE: Quartz, Probel SW-P-02, Probel SW-P-08 and GVG SMS7000 Protocols can be assigned to ports from 3737 to 3740.

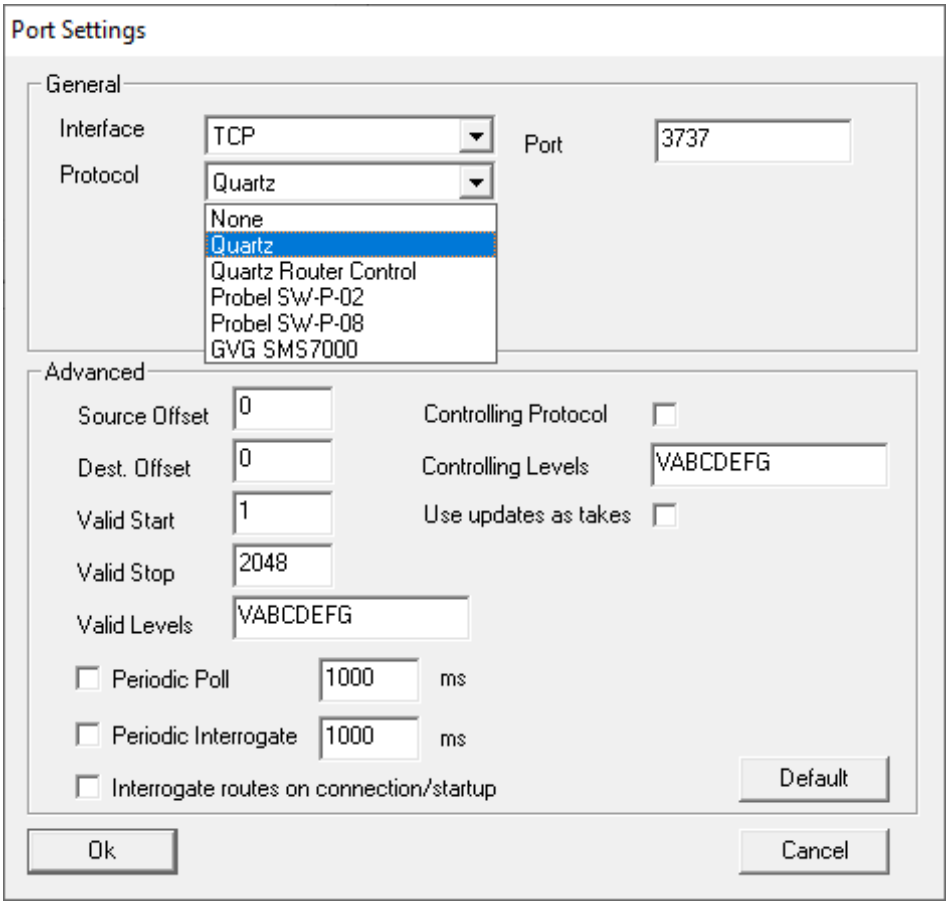

Figure 8-9 : WinSeup - Ethernet Port Settings - TCP

8.1.3. Control Panel Serial Interface

The Serial Interface is selected to provide access to the EQT through a physical cable, plugged into the SERIAL port, on device's rear.
There are two serial standards: RS232 and RS422 , detailed in 2.3.2. section, since there are differences in the pin-out configuration. Both uses the Quartz protocol to communicate to the EQT.

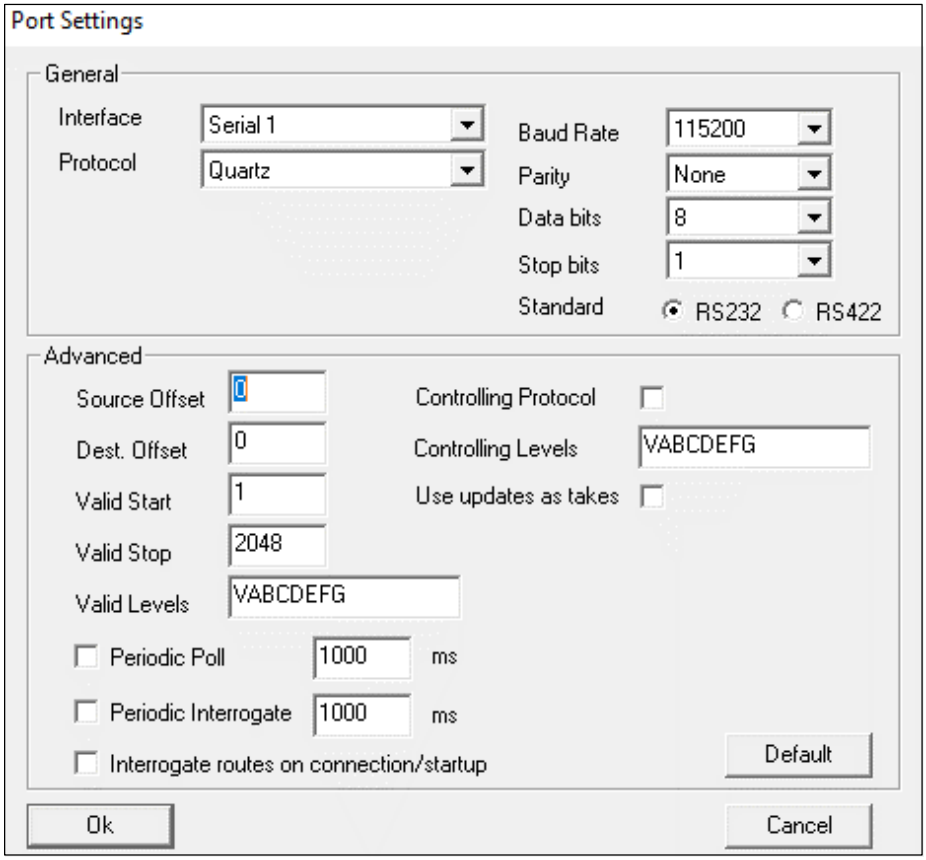

Figure 8-10: WinSeup - Ethernet Port Settings - Serial

8.2. COMMUNICATIONS

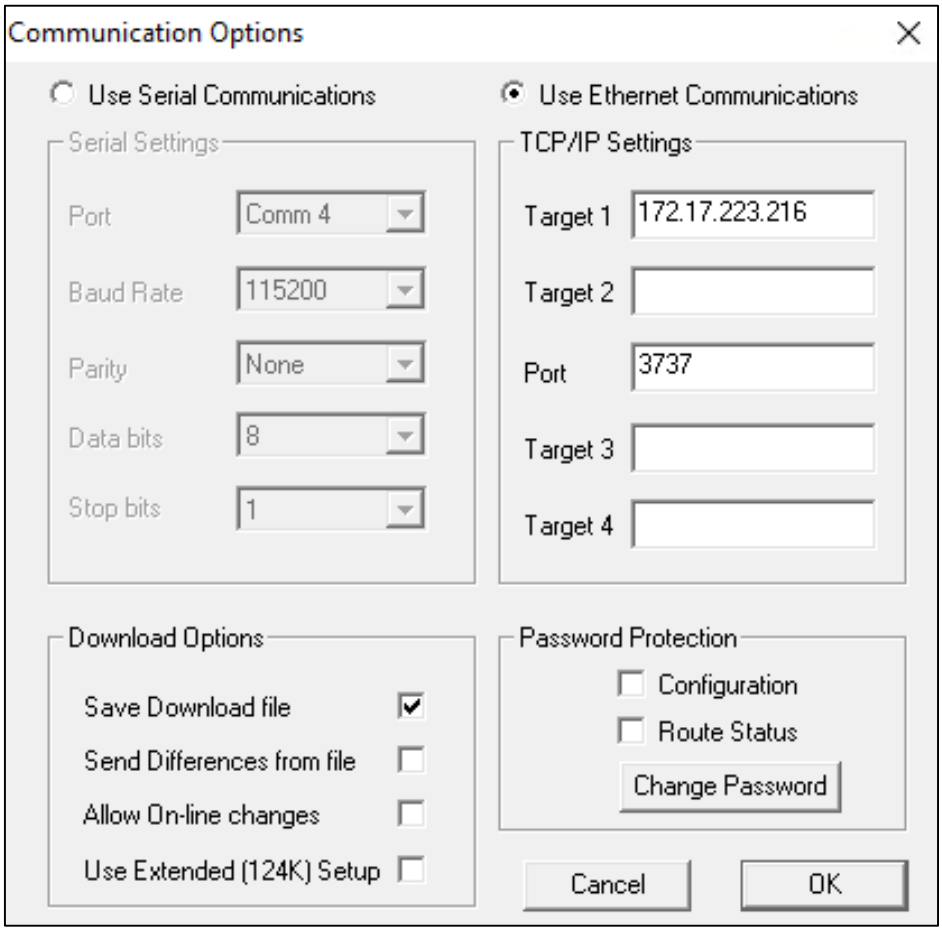

Figure 8-11 : WinSetup - Communication Options

The Comms Window can be used to check for correct setup and working communication between the PC and the router.

a) Select Options > Communications. Then, select the suitable option: **'Use Serial Communications'** or **'Use Ethernet Communications'**.
In case, **'Use Serial Communications'** is selected, set the appropriate Port, as well as Baud Rate, Parity, Data and Stop bits.
In case **'Use Ethernet Communications'** is selected, include the EQT IP Address and TCP port.

NOTE: The setup information, such as Baud Rate, Parity, Data and Stop bits (Serial) and Port (Ethernet), must be the same as set in *Ports Setting* dialog.

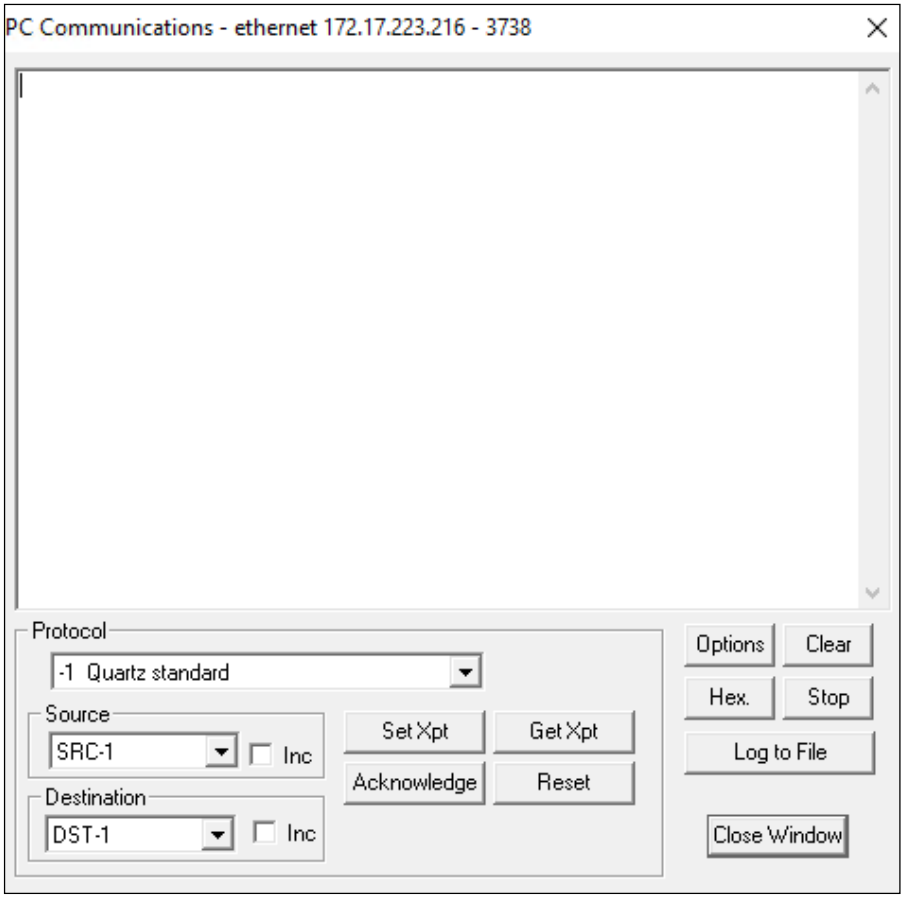

Figure 8-12 : WinSetup - PC Communications

b) Click the **'Comms Windows'** button to open the PC Communications Window.

c) Use Quartz Protocol commands for Video and Audio routes:

COMMANDS	DESCRIPTION
.SV[DEST],[SRC]	Single video route
.MV[INITIAL_DEST]-[FINAL_DEST],[SRC]	Multiple video routes
.SA[DEST],[SRC]	Single audio route
.MA[INITIAL_DEST]-[FINAL_DEST],[[SRC]	Multiple audio routes

NOTE: Make sure to save the configuration before closing the WinSetup

9. BASIC MAGNUM CONFIGURATION

MAGNUM is an Evertz server that is used to monitor and control a variety of the company's devices. The server can control the 16 video channels and 320 audio channels of the EQT device – according to the below configuration instructions:

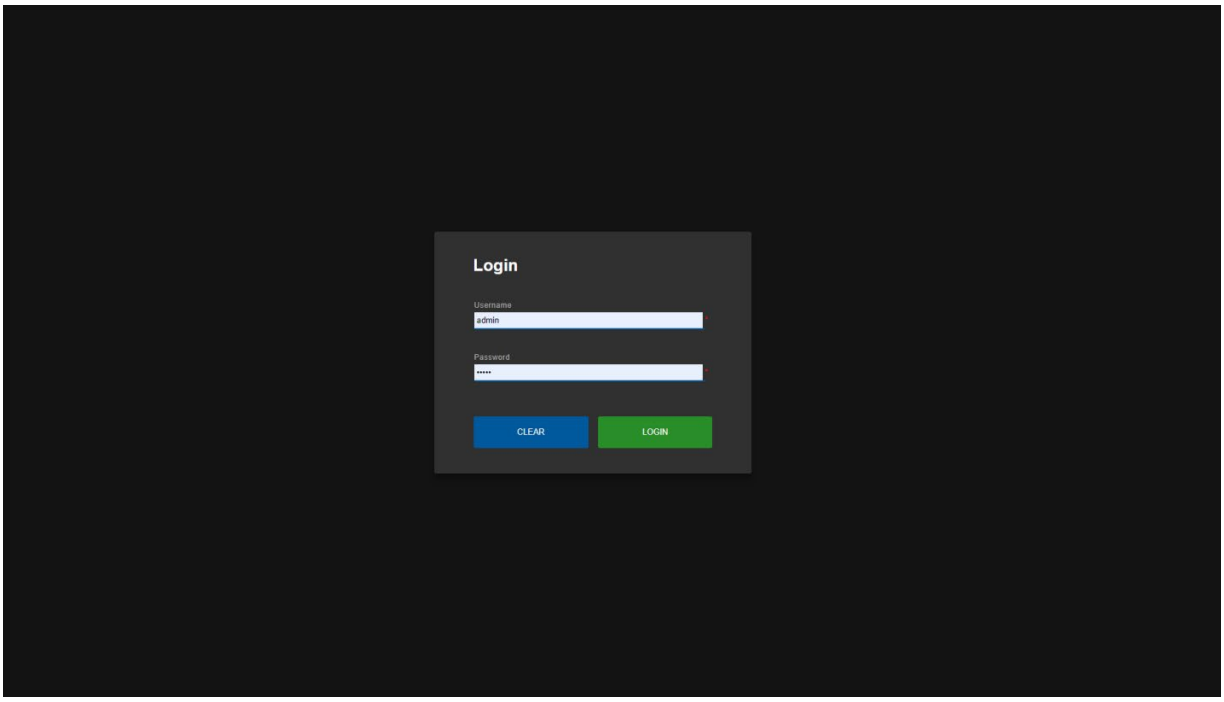

Figure 9-1 : MAGNUM - Login Screen

1. Using a web browser, navigate to the cluster IP address of the MAGNUM server
2. Log in using the appropriate login and password. The factory default is admin/admin (as shown in Figure 9-1).

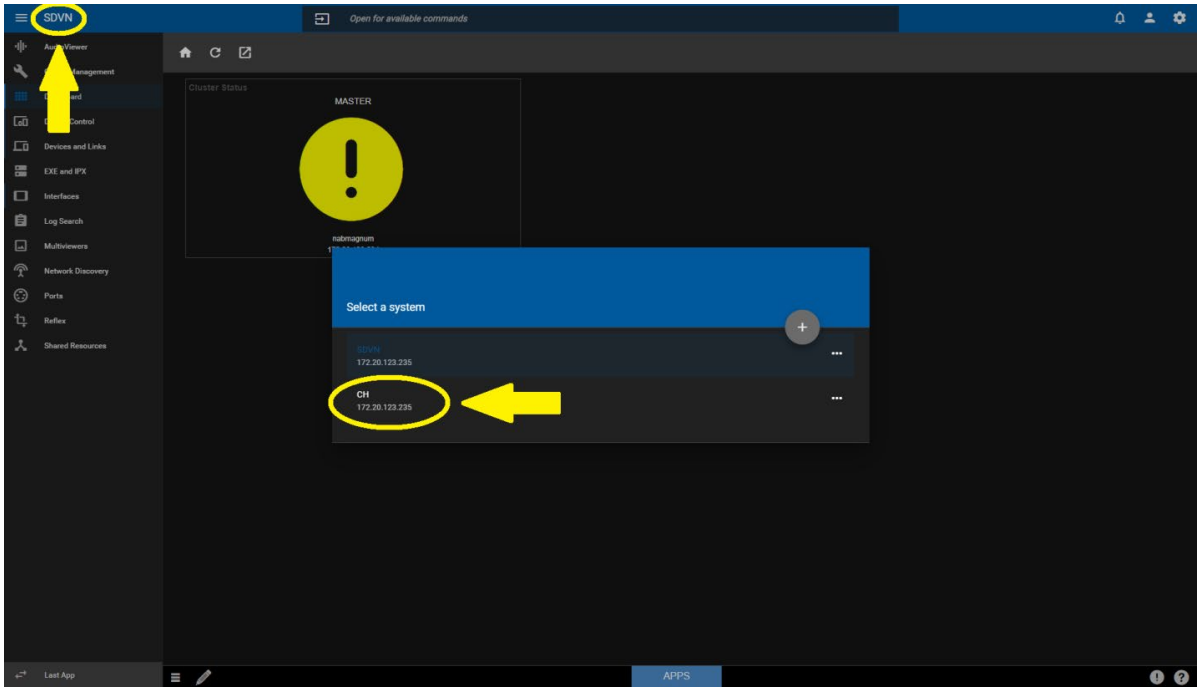

Figure 9-2 : MAGNUM - SDVN Screen

3. Switch to Client Host by clicking “SDVN” at the top-left of the page and then selecting “CH” (Figure 9-2).

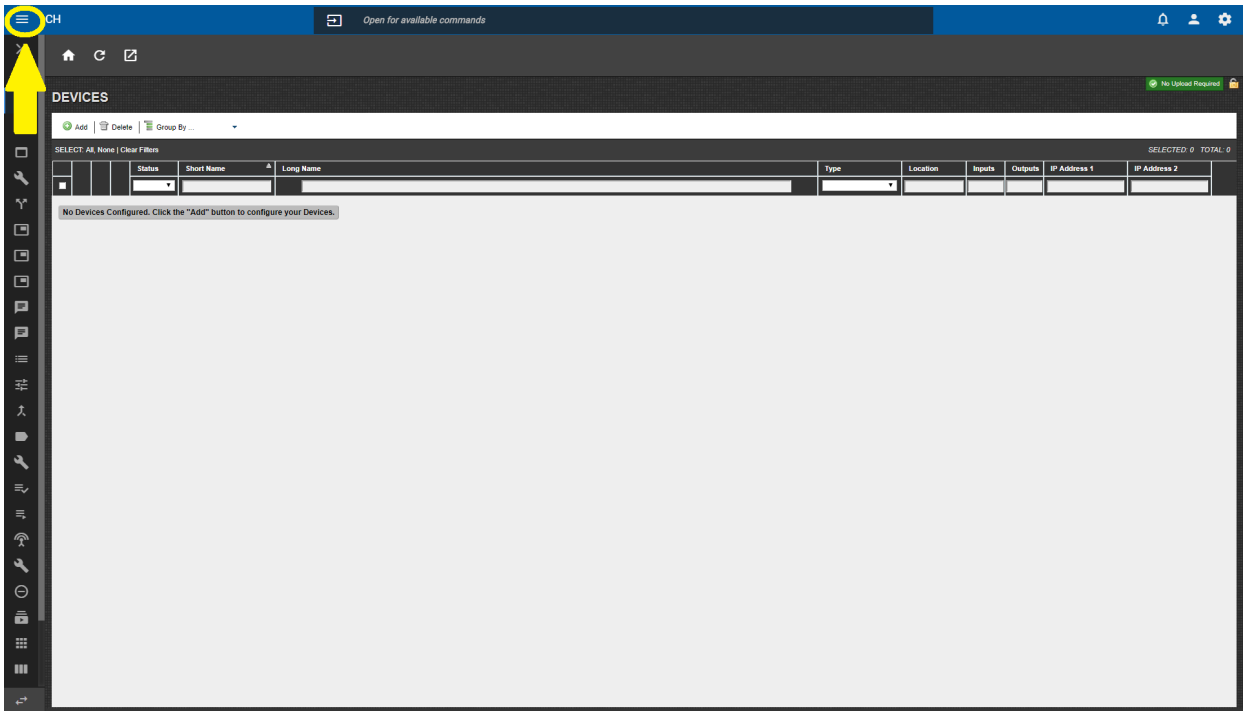

Figure 9-3 : MAGNUM - Expanding the Pane

4. If navigation pane is collapsed, click the icon at the top-left of the page to expand the pane as highlighted in Figure 9-3.

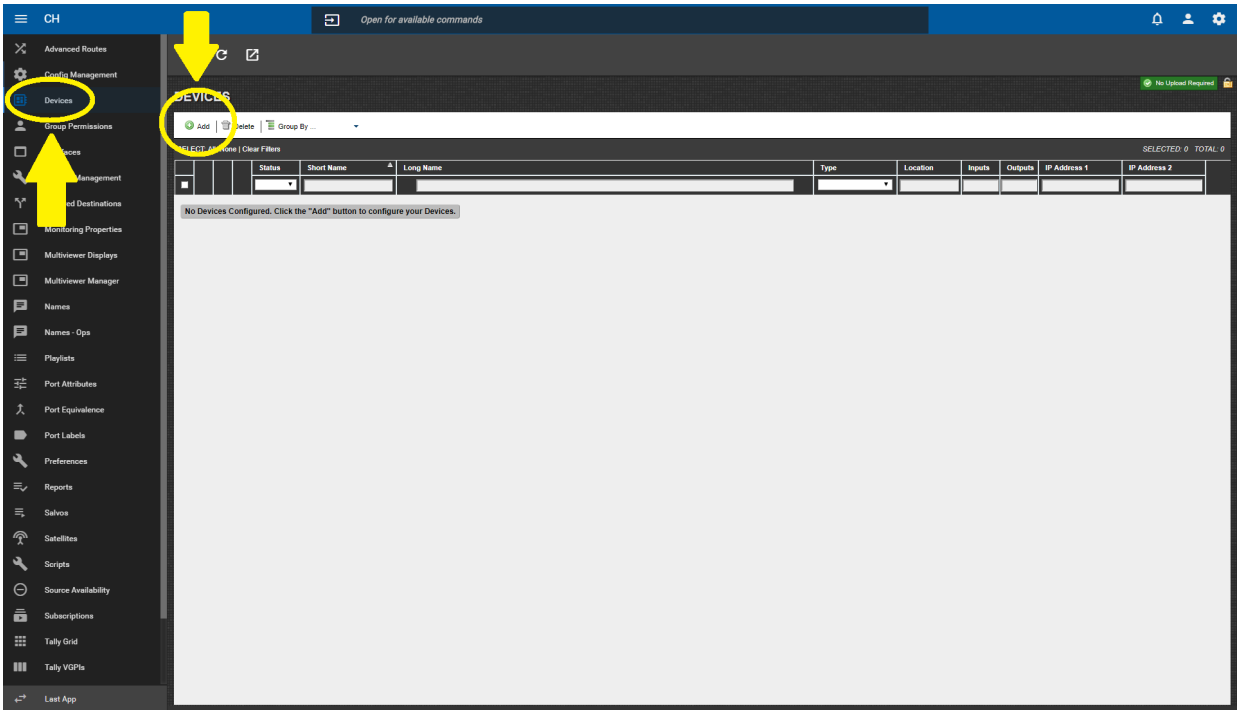

Figure 9-4 : MAGNUM - Devices Page

5. Navigate to the Devices page and click “Add”, in order to select the proper device (Figure 9-4).

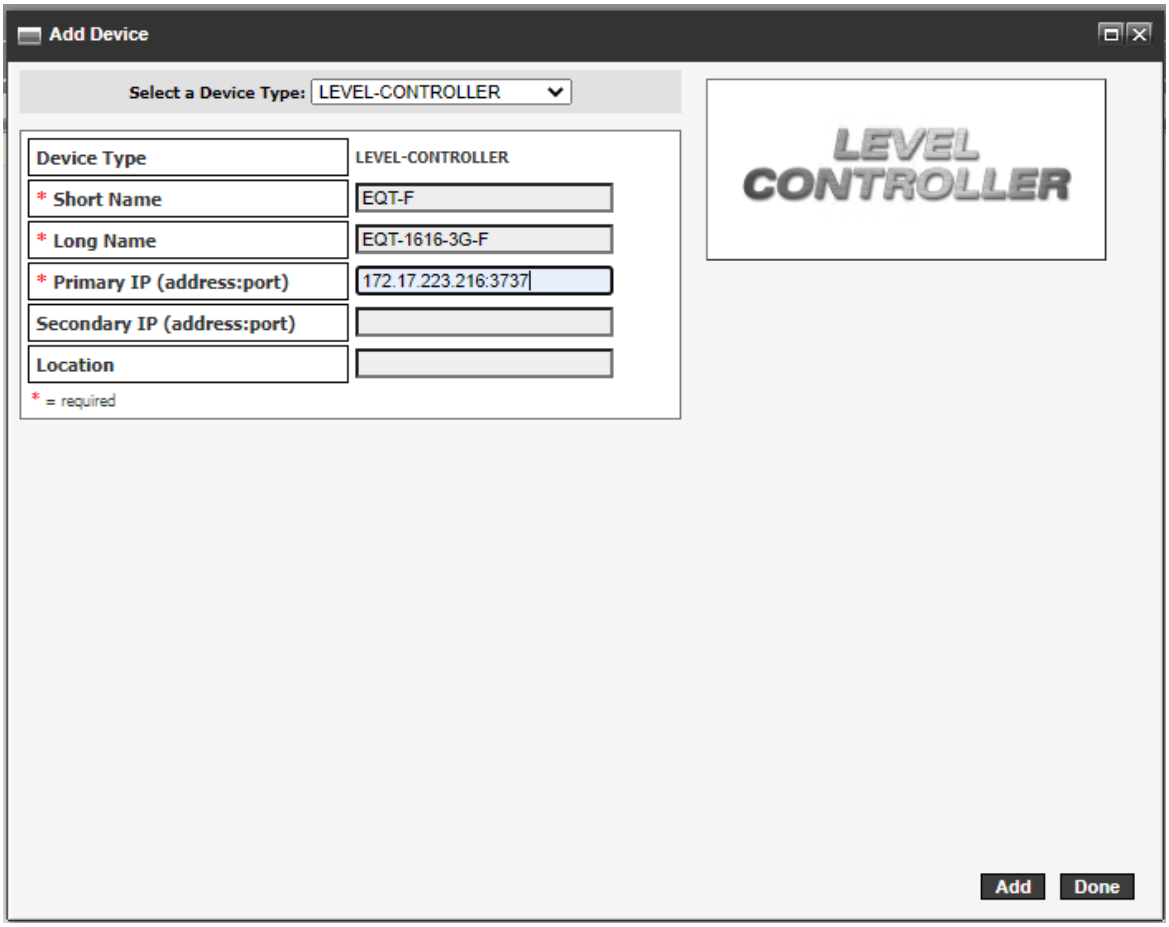

Figure 9-5 : MAGNUM - Add Dialog

6. Select “LEVEL-CONTROLLER” as the device type.
7. Once the *Add Device* dialog is opened, enter the long name and short name for the router. Also, enter the IP addresses of the device, along with a TCP/Quartz port that has been defined in the WinSetup configuration (see Figure 9-5 for details).
8. Click “Add” and then click “Done”

NOTE: Do not use the default port 2500, as it will disrupt WinSetup communications.

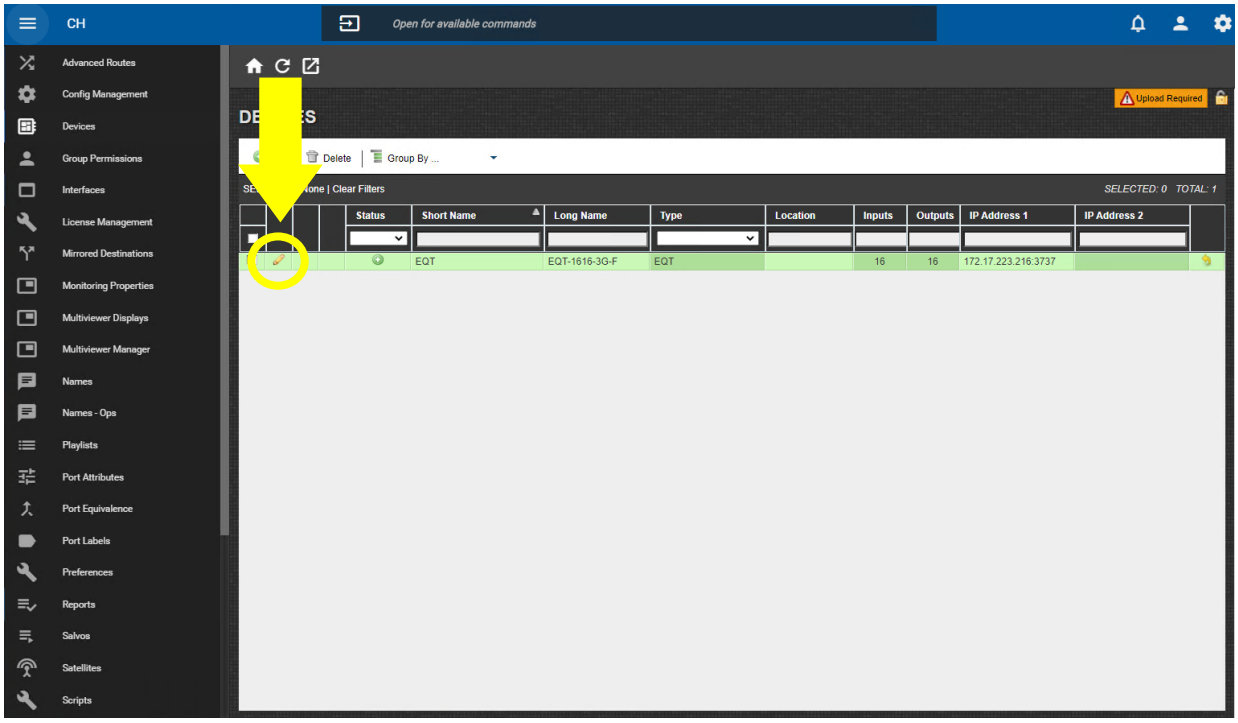

Figure 9-6 : MAGNUM - Edit Option

9. Click the icon indicated in Figure 9-6 to edit and include the device's information for proper control.

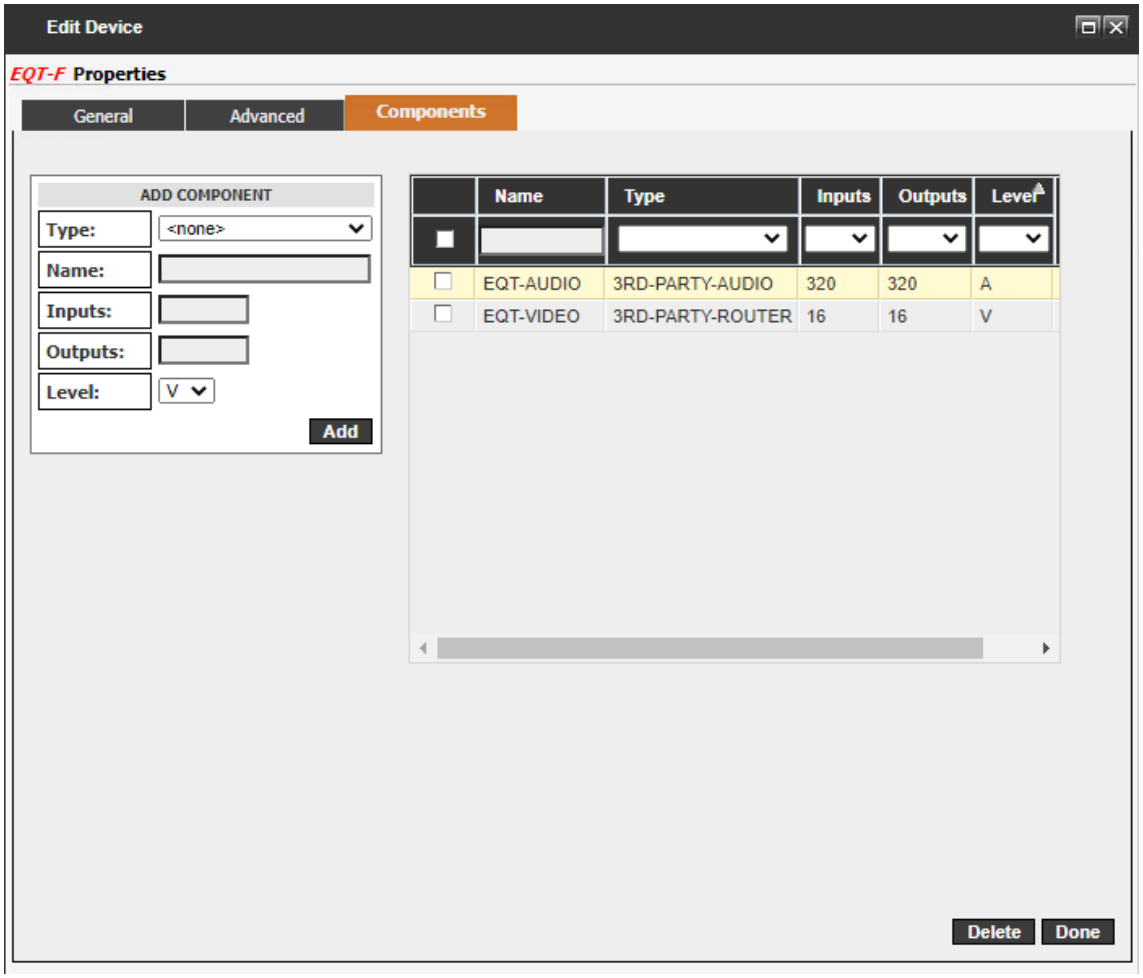

Figure 9-7 : MAGNUM - Edit Device Dialog

10. In *Edit Devices* dialog, select the type component: “3RD-PARTY-ROUTER” to control video and/or “3RD-PARTY-AUDIO” to control audio. Enter the name and the quantity of inputs and outputs. Also, select the level of each component (see Figure 9-7 for details).
Click “Add” after configuring each component. Once both control levels are included, click “Done”.

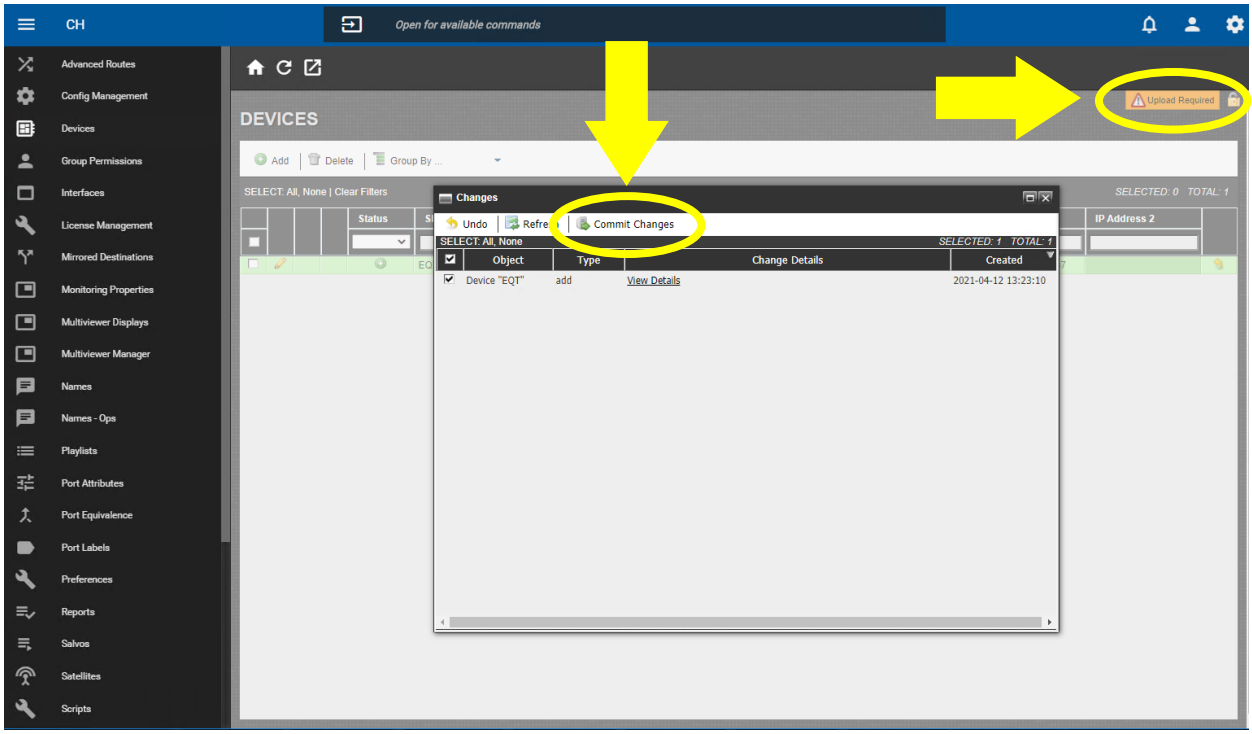

Figure 9-8 : MAGNUM - Verification

11. Click Upload Required.
12. Click Commit Changes (as highlighted in Figure 9-8).

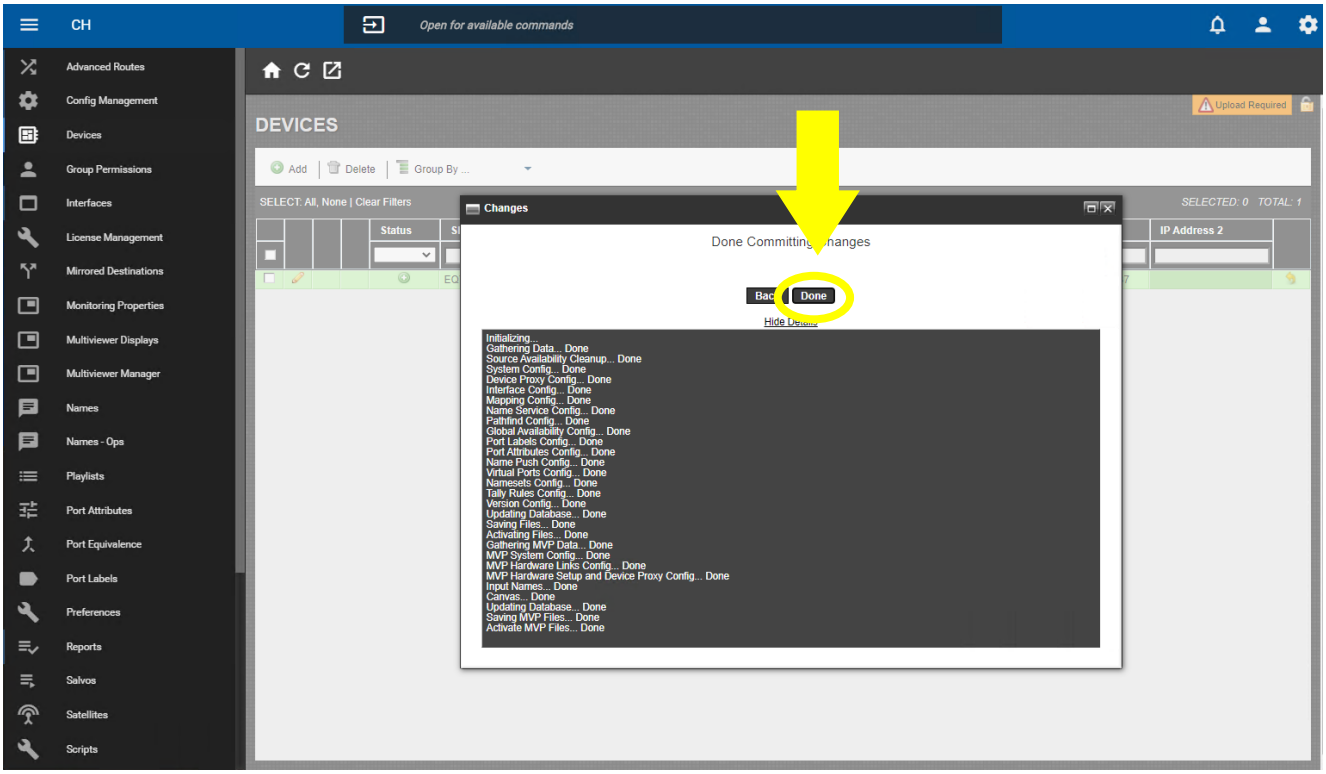

Figure 9-9 : MAGNUM - Complete Configuration

13. Once the server update is complete, click “Done” (see Figure 9-9).

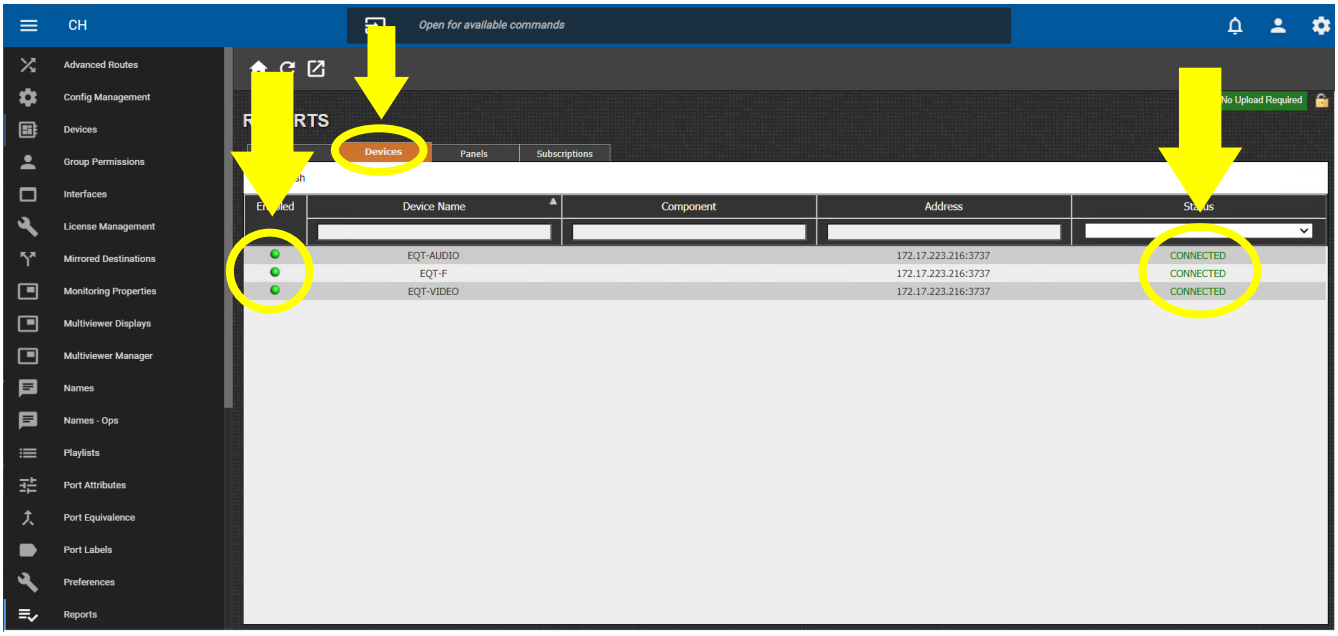

Figure 9-10 : MAGNUM - Reports Page

14. Navigate to the Reports page. Confirm that the router, as well as the video and audio levels are present and ‘connected’ in the Devices tab as highlighted in Figure 9-10.

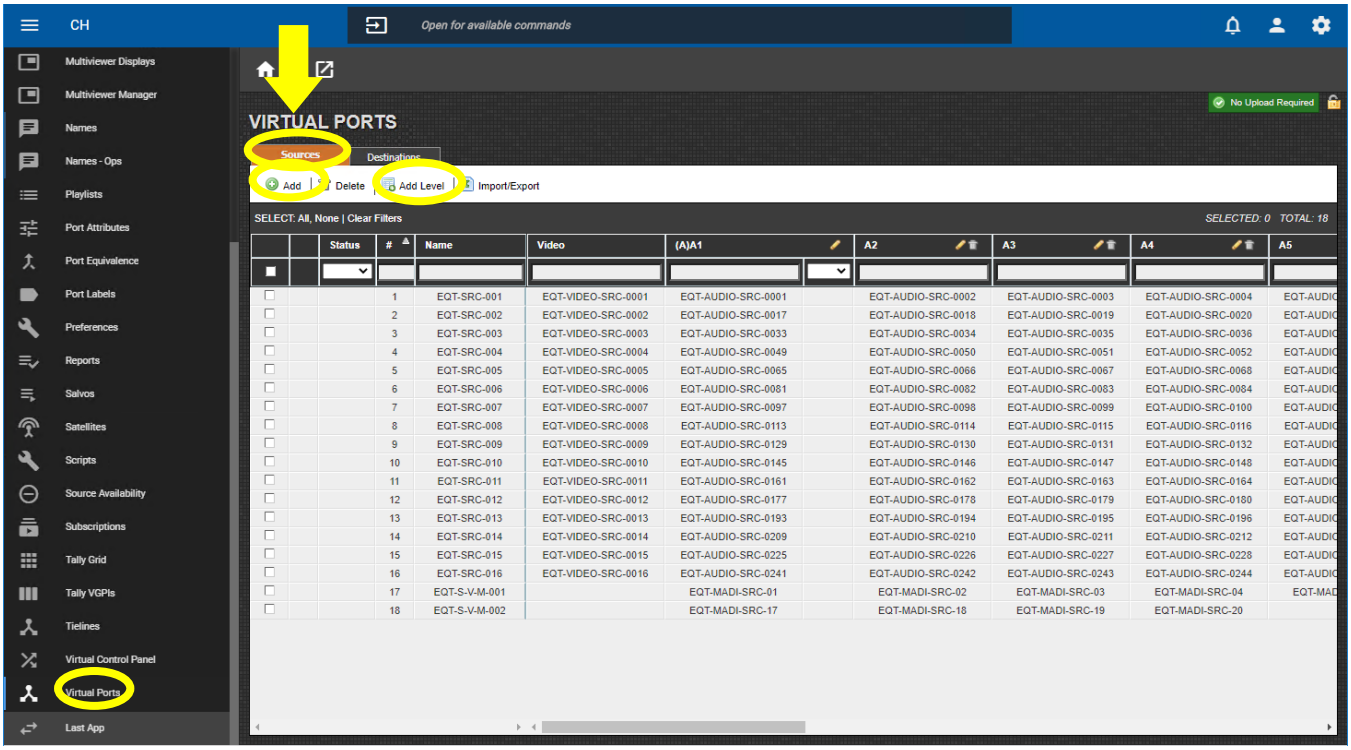

Figure 9-11 : MAGNUM - Virtual Ports Source

15. Navigate to the Virtual Ports page. In the Sources section, click “Add” and enter the name of the virtual port. Repeat the process 20 times: 16 input video ports and 4 virtual MADI input ports (since MADI physical input port is only one).
Click “Add Level” and include 16 levels (A1-A16), in order to reproduce the number of existing audio channels (total of 320 channels) – see Table 5-1 for details of audio channels per video.
Assign a video source for each virtual input port (except MADI ports). Also, assign an audio source for each audio level (see details in Figure 9-11).

NOTE: MADI virtual ports do not require a video source; ONLY audio levels. In order to assign 64 audio channels, it is necessary to add four MADI virtual ports.

NOTE: Since changes were done, an upload is required. Follow the steps described in Figure 9-8 and Figure 9-9.

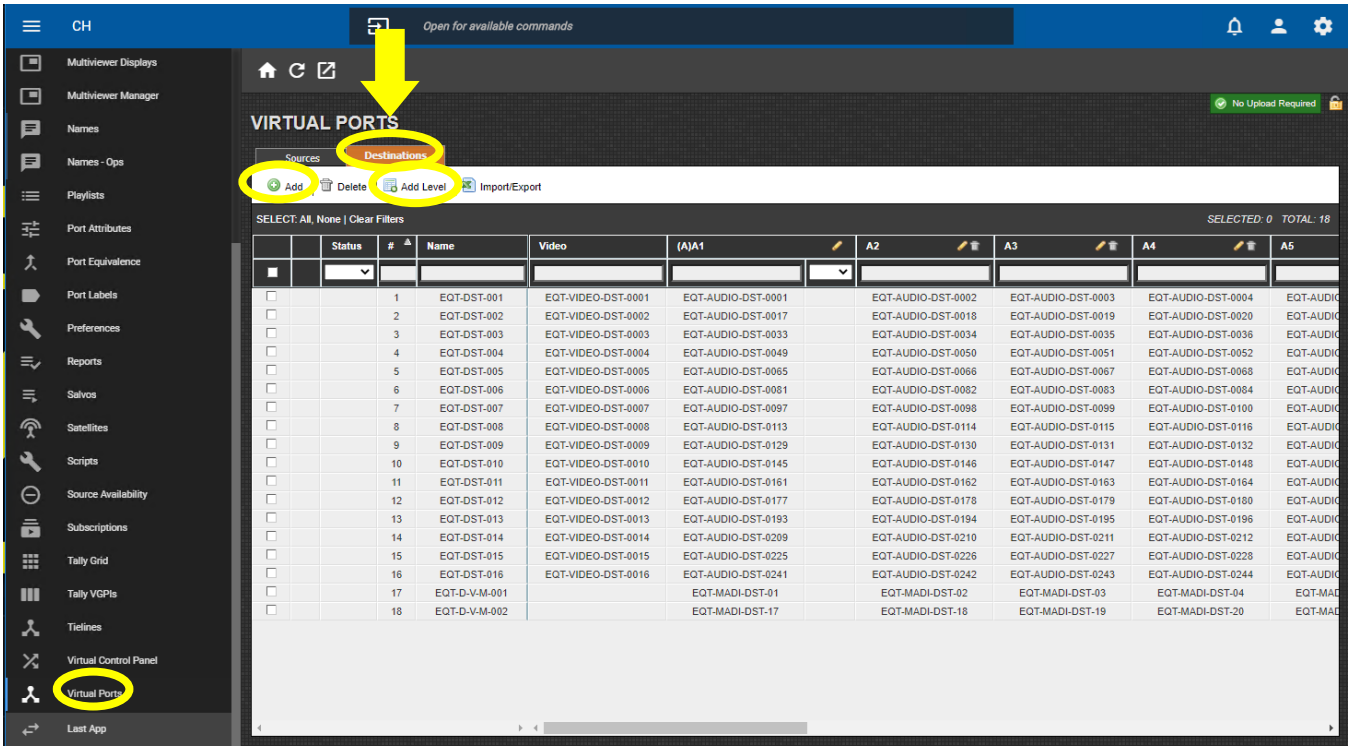

Figure 9-12 : MAGNUM - Virtual Ports Destinations

16. In the Destinations section, click “Add” and enter the name of the virtual port. Repeat the process 20 times: 16 output video ports and 4 virtual MADI output ports.
Click “Add Level” and include 16 levels (A1-A16), in order to reproduce the number of existing audio channels (total of 320 channels) - see Table 5-1 for details of audio channels per video.
Assign a video destination for each virtual output port (except MADI ports). Also, assign an audio destination for each audio level (see details in Figure 9-12).

NOTE: MADI virtual ports do not require a video destination; ONLY audio levels. In order to assign 64 audio channels, it is necessary to add four MADI virtual ports.

NOTE: Since changes were done, an upload is required. Follow the steps described in Figure 9-8 and Figure 9-9.

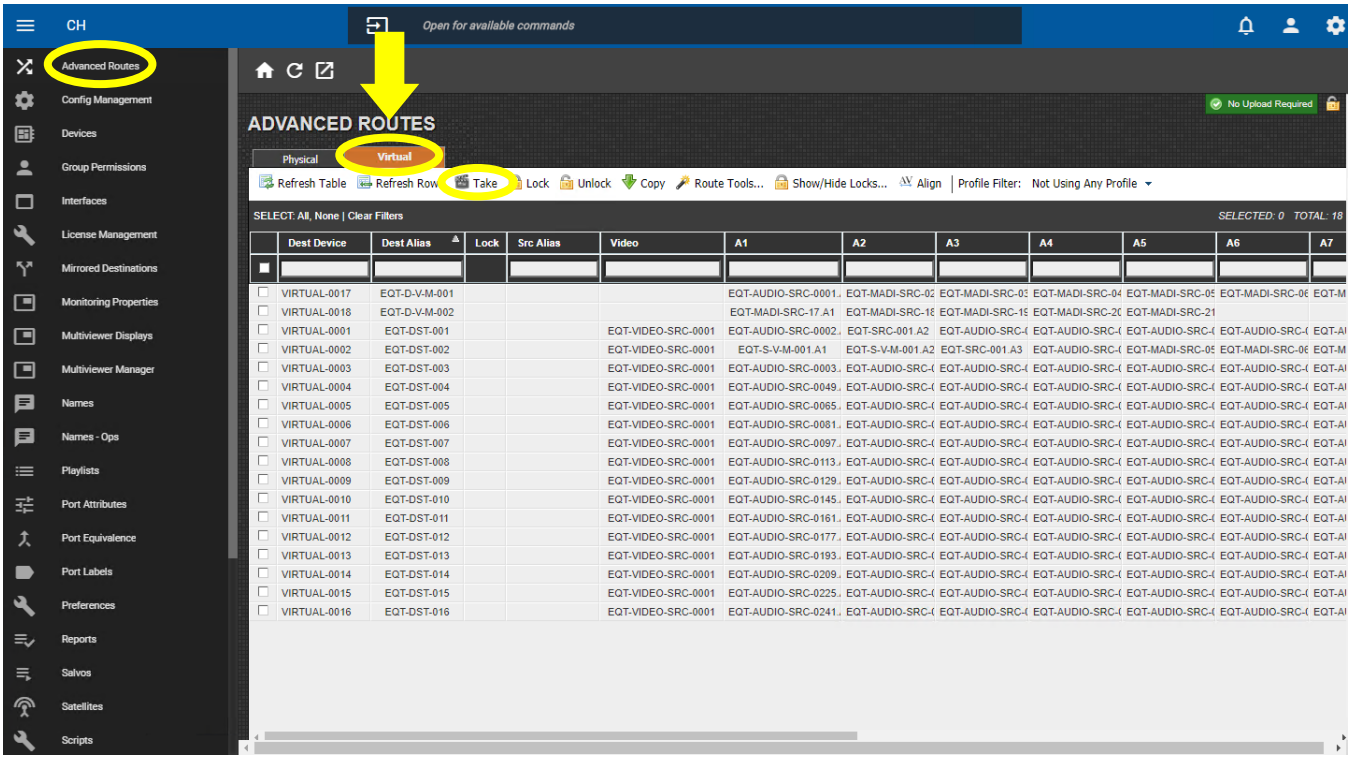

Figure 9-13 : MAGNUM – Virtual Advanced Routes

17. Test MAGNUM routing control by navigating to the Advanced Router page.
Double click on the video or an audio level cell and change the assigned video/audio source. Then, click the “Take” icon as highlighted in Figure 9-13. Monitor the destination to confirm that the take has occurred.

NOTE: In case the sources and destinations were not proper assigned as depicted in Figure 9-11 and Figure 9-12, changing the sources in the Advanced Routes page will NOT be possible.

NOTE: If the EQT sources and destinations do not appear on the Advanced Routes page, check to ensure you are on the Virtual tab (vs. Physical) and that you are using the correct profile. Select “Not Using Any Profile” if there is no profile with router permissions.

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10. DEFINITIONS

4:2:2: The sampling ration used in the HDTV digital video signal. For every 4 samples of luminance, there are 2 samples each of R-Y (red minus luminance) and B-Y (blue minus luminance).

16x9: A wide-screen television format such as HDTV in which the aspect ratio of the screen is 16 units wide by 9 units high as opposed to the 4x3 aspect ratio of traditional SD television.

AES/EBU: Sometimes abbreviated as AES. Refers to the digital audio standard (AES3-1992) set by the Audio Engineering Society and European Broadcast Union and used by most forms of digital audio from CDs to professional digital video.

ASPECT RATIO: The ratio of width to height in a picture. Theatre screens generally have an aspect ratio of 1.85 to 1, widescreen TV (16x9) is 1.77 to 1, and traditional SD TV (4x3) is 1.33 to 1.

CCIR: Abbreviation for International Radio Consultative Committee, an international standards committee. This organization is now known as ITU.

CCIR-601: See ITU-R601.

CLIFF EFFECT: Also referred to as the 'digital cliff.' This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality when due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognizable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by ITU-R709 for HDTV signals. SMPTE 274M and SMPTE 296M specify the parallel interface.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

DROP FRAME: In NTSC systems, where the frame rate is 29.97002618 frames per second, the drop frame mode permits time of day indexing of the frame numbers by dropping certain frame numbers. Specifically frames 0, and 1 at the beginning of each minute except minutes 0, 10, 20, 30, 40, and 50, are omitted, to compensate for an approximate timing error of 108 frames (3 seconds 18 frames) per hour. A flag bit is set in the time code to signal when the drop frame mode is in effect.

EBU: Abbreviation for European Broadcast Union, an organization of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: An international standard for standard definition component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITU-R601 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

NTSC: The National Television Standards Committee established the television and video standard in use in the United States, Canada, Japan, and several other countries. NTSC video consists of 525 horizontal lines at a field rate of approximately 60 fields per second (Note – two fields is equal to one complete frame). Only 487 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Closed Captioning.

PAL: Abbreviation for Phase Alternating Line, the television and video standard in use in most of Europe. It consists of 625 horizontal lines at a field rate of 50 fields per second (Note – two fields is equal to one complete frame). Only 576 of these lines are used for picture. The rest are used for sync or extra information such as VITC and Teletext.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element.*

SMPTE: Abbreviation for Society of Motion Picture and Television Engineers, a professional organization that recommends standards for the film and television industries.

SMPTE 12M: The SMPTE standard for time and address code. SMPTE 12M defines the parameters required for both linear and vertical interval time codes.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 259M-C: The SMPTE standard for 525- and 625-line serial digital component and composite interfaces.

SMPTE 272M: The SMPTE standard for embedding audio in serial digital standard definition (SMPTE 259M-C) video signals.

SMPTE 274M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 1080 lines x 1920 pixels.

SMPTE 276M: The SMPTE standard for transmission of AES/EBU digital audio signals over coaxial cable.

SMPTE 292M: The SMPTE standard for high definition serial digital component interfaces.

SMPTE 296M: The SMPTE standard for bit parallel digital interface for high definition component video signals with an active picture of 720 lines x 1280 pixels.

SMPTE 299M: The SMPTE standard for embedding audio in serial digital high definition (SMPTE 292M) video signals.

TRS: Abbreviation for Timing Reference Signals used in composite digital signals. It is four digital words long.

TRS-ID: Abbreviation for Timing Reference Signal Identification, a reference signal used to maintain timing in composite digital systems. It is four digital words long.

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