9990-DEC-MPEG MPEG4 AVC and MPEG2 Decoder with ASI and IP Inputs and SDI Outputs

Product Manual

Version 1.0

9990-DEC-MPEG • MPEG4 AVC and MPEG2 Decoder with ASI and IP Inputs and SDI Outputs Product Manual

- Cobalt Digital Inc. Part Number: **9990-DEC-MPEG-OM**
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Notice

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Important Regulatory and Safety Notices

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Products may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning — *The symbol with the word "**Warning**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Notice — *The symbol with the word "**Notice**" within the equipment manual indicates a situation, which if not avoided, may result in major or minor equipment damage or a situation which could place the equipment in a non-compliant operating state.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

Important Safety Instructions

Caution — *This product is intended to be a component product of an 8300 series frame. Refer to the frame User Manual for important safety instructions regarding the proper installation and safe operation of the frame as well as its component products.*

Warning — *Certain parts of this equipment namely the power supply area still present a safety hazard, with the power switch in the OFF position. To avoid electrical shock, disconnect all A/C power cards from the chassis' rear appliance connectors before servicing this area.*

Maintenance/User Serviceable Parts

Routine maintenance to this Cobalt Digital Inc. product is not required. This product contains no user serviceable parts. If the frame does not appear to be working properly, please contact Technical Support using the numbers listed under the "Contact Us" section on the last page of this manual. All Cobalt Digital Inc. products are covered by a generous 5-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Cobalt Digital Inc. encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.
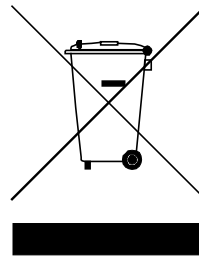
If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Cobalt Digital Inc. for more information on the environmental performances of our products.

Contents

Safety Notice and Warnings

FCC Notice

This device complies with Subpart B of Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

No Telecommunications Network Voltage (TNV)-connected PCBs shall be installed.

Other Certifications

This class A digital apparatus complies with Canadian ICES-003, Issue 4.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.
This device complies with EN 55022 standards.
This device complies with EN 61000-3-2 standards.
This device complies with EN 61000-4-2 standards.
This device complies with CISPR 22 Edition 6.
This device complies with AS/NZS CISPR 22.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Introduction

- This manual covers 9990-DEC-MPEG openGear™ Multi-Standard Decoder card which has the following features:

- Multi-Standard Decoder (MPEG-2 and H.264), with support for both SD (Standard Definition) and HD (High Definition) content.
- Resolution resizing support (both upscale and downscale support).
- Frame rate conversion.
- Audio decoding support: MPEG-1 Layer III, AAC-LC, HE-AAC and Dolby AC-3.
- ASI input and output ports. All ports support the full ASI line rate of 213 Mb/s.
- Ethernet port for streaming with 100/1000 Mb/s support.
- Internet Protocol support:
  - UDP/RTP/SMPTE-2022 auto-sensing
  - HTTP Live Streaming (HLS) client
  - RTMP Client mode – connects to an RTMP server and plays the content
  - RTMP Server mode – accepts connections from an RTMP encoder

- o RTSP Client mode – connects to an RTSP server, such as a camera, and plays the content
- (P)SI and ATSC table parsing.

Typical application scenarios for the 9990-DEC-MPEG are:

- Contribution and Distribution: reception of MPEG-2/H.264 content.
- Contribution feeds over the Internet.
- Ingestion of traffic cameras for broadcast use.

Product Overview

The 9990-DEC-MPEG is a multi-standard broadcast decoder with the following features:
- Video Decoding: MPEG-2 and H.264 4:2:0 High Profile video streams with resolution up to 1920×1080p60.
- Audio Decoding capabilities: summarized in the table below. Note that 5.1 and 7.1 audio services are down-converted to stereo when decoded.

Standard	Max Sample Rate	Max Channels
Dolby Digital[1]	48 kHz	5.1
Dolby Digital Plus[1]	48 kHz	7.1
WMA	48 kHz	2
WMAPRO	48 kHz	5.1
MPEG-1 Layer I/II/III	48 kHz	2
MPEG-2 Layer II MC	48 kHz	5.1
AAC-LC	48 kHz	5.1
HE-AAC V1	96 kHz	5.1
HE-AAC V2	96 kHz	2
DRA	96 kHz	7.1
FLAC	96 kHz	5.1
OGG Vorbis	48 kHz	5.1

- Inputs:
  - o ASI Input
  - o IP Input using an auto-sensing 10/100/1000 Gb/s Ethernet
- Internet Protocol support[2]:
  - o UDP/RTP (auto-detected)
  - o SMPTE-2022 FEC (auto-detected, support for both row and column)
  - o HTTP Live Streaming (HLS) client
  - o RTMP client (flash content playback from servers)
  - o RTMP server (accepts connections from live encoders)
  - o RTSP client (connects to IP cameras)

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[1] A separate license is required for Dolby decoding. Please contact Cobalt Digital Inc. if you need this license.
[2] A separate license is required for the IP input. Please contact Cobalt Digital Inc. if you need this license.

- Outputs
  - Composite video output
  - HDMI video output with embedded audio
  - SDI video output with embedded audio and SMPTE-334 closed-captions
  - Analog stereo audio output
  - ASI loop-through output

For the remainder of this manual, we will use the term *port* for a physical input/output port (such as ASI or Ethernet), and *stream* for a transport stream present in the port. ASI ports support only one stream, while Ethernet ports support multiple streams. A transport stream can have one or more *programs*. In this manual, we will use the words *program* and *service* interchangeably.

9990-DEC-MPEG Indicators and Switches

The 9990-DEC-MPEG card is intended for installation in the 20-slot openGear frames. Earlier 10-slot frames are not supported. Prior to installing the card, first install the corresponding rear panel I/O module.

Rear I/O Panel Indicators

There are two types of rear I/O panels available for the 9990-DEC-MPEG, depicted below. Both types include one ASI input, one ASI output, one composite output and one SDI output on standard BNC connectors, one HDMI output and one 100/1000 Mb/s Ethernet port on a standard RJ-45 connector. The panels differ only on the type of analog audio output: one type has balanced audio on terminal blocks, and the other type has unbalanced audio on RCA connectors.

The ASI input port has a green indicator LED, with the following states:

- **LED off:** ASI port is disabled.
- **LED flashing once every 3 seconds:** the ASI port is not locked to a signal (i.e., there is no input signal).
- **LED flashing once per second:** the ASI port is locked to a signal.

The ASI output port has a green indicator LED, with the following states:

- **LED off:** ASI port is disabled.
- **LED flashing multiple times per second:** ASI port is transmitting packets.

The Video output ports share one green indicator LED, with the following states:

- **LED off:** the 9990-DEC-MPEG is not currently decoding a stream. There may be a valid video signal in the output, but it does not correspond to a decoded stream.
- **LED flashing once per second:** the 9990-DEC-MPEG is currently outputting an SD stream on the selected output ports.
- **LED flashing multiple times per second:** the 9990-DEC-MPEG is currently outputting an HD stream on the selected output ports.

The Gigabit Ethernet port has two indicator LEDs, with the following states:

- **Green LED:**
  - o **Off:** No link
  - o **On:** Link
- **Yellow LED:**
  - o **Off:** No activity (transmit and/or receive)
  - o **Flashing:** Port is currently transmitting and/or receiving
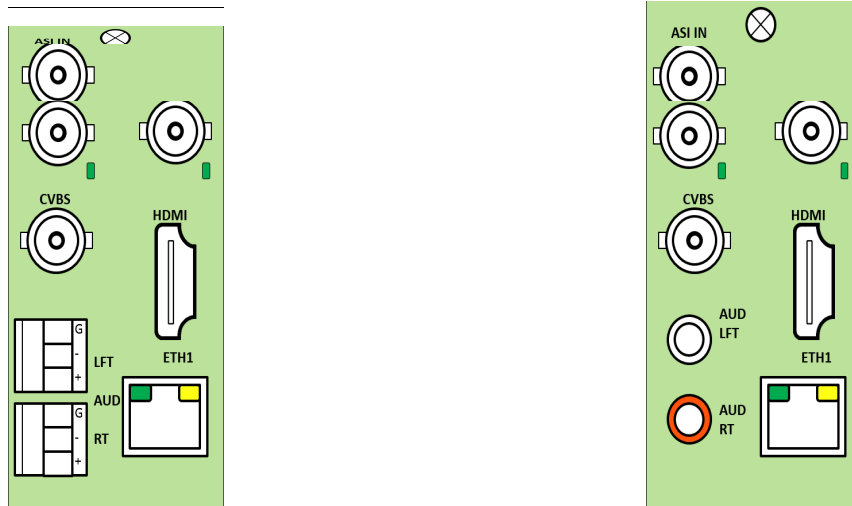
Front Indicators

A similar set of indicators exist in the front of the board. These are visible when the frame front door is opened. The indicator layout is depicted below.

The LED indicators are as follows:

- **Status LED:** indicates the overall status of the board.
  - **Green:** no active alarm
  - **Red:** at least one critical alarm present

  When inserting a board in the frame, this LED will be red until the board starts operation. At that point, it will turn green if there is no active alarm or red if there is at least one alarm.
- **Power OK LED:** indicates that the power received from the frame is OK.
  - **Green:** power OK
  - **Off:** no power (or insufficient voltage – check the frame power status)
- **ASI In LED:** behaves exactly the same as the ASI input rear I/O panel indicator.
- **ASI Out LED:** behaves exactly the same as the ASI output rear I/O panel indicator.
- **VID LED:** behaves exactly the same as the Video output rear I/O panel indicator.
- **Ref In LED:** this LED blinks when the 9990-DEC-MPEG is receiving a genlock signal from the chassis reference input.
- **ETH LED:** indicates the status of the back panel Ethernet connection.
  - **Off:** no link
  - **On:** link OK, no activity
 - **Blinking:** link OK, port is transmitting and/or receiving packets

Top Corner

Status   **Power OK**

VID

ASI Out   **ASI In**

Ref In

ETH
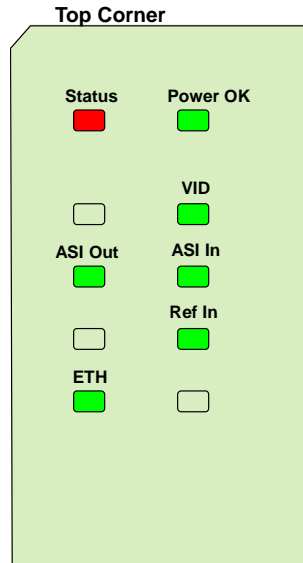
The 9990-DEC-MPEG board has other LEDs that may or may not be illuminated. They are intended for engineering debug only.

Front Switches

The 9990-DEC-MPEG board has two pushbutton-type switches in the front, just below the LEDs, as depicted below. Their operation is as follows:

- **Default IP Switch:** This switch is used to recover the board in the unlikely case of a corrupted or broken firmware update. In most cases, the 9990-DEC-MPEG will detect the error and automatically fall back into the factory-default firmware load. If it does not, pull the card out, press and hold this switch, and push the card back into the frame while still holding the switch. You can release the switch once the Status LED turns orange. This action causes the card to revert to the factory-default firmware.
- **Reset Switch:** Pressing this pushbutton switch causes the card to reset.

Top Corner

Default IP

Reset
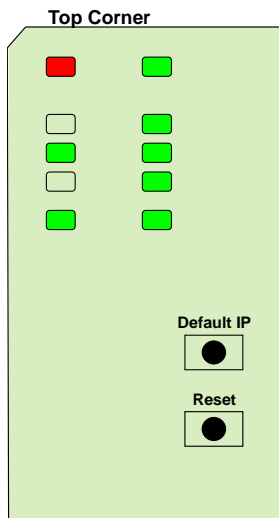
9990-DEC-MPEG Operation and Management

The 9990-DEC-MPEG is configured using the free Dashboard™ application, which is available for Windows, Apple OS X, and Linux. Dashboard can be downloaded from this link:

http://www.opengear.tv/dashboard-software[3]

The 9990-DEC-MPEG user interface is depicted below. As with any openGear™ card, it is divided into a statistics panel on the left, and a configuration panel on the right. Each panel has multiple tabs, corresponding to the various functions in the card. Note that the **Card State** alarm indicator is also reflected in the green/red **Status** LED in the front of the board. The Status LED will be green when Card State is green or yellow, and will be red when Card State is red.

The following tabs are available:
- **Product:** this tab provides general information on the card, including firmware version, uptime, temperatures, and other parameters. It appears only on the Statistics panel.
- **Network:** this tab is used to configure the IP addresses and network information for the Ethernet ports. The statistics side of the panel includes some additional information such as link state.
- **ASI Input:** this tab is used to configure/monitor the ASI Input port.
- **ASI Output:** this tab is used to configure/monitor the ASI Output port.
- **Decoder:** this tab is used to configure/monitor the decoding function.
- **Admin:** this tab is used for general administrative functions, such as firmware upgrades, licensing, logs, and configuration management.
- **Support:** this tab has information on how to contact Customer Support, and has the ability to generate a tech support dump for the unit.
- **Control:** this tab is present only in the 9990-DEC-MPEG versions of the product. It allows for the configuration of the Ethernet control port and the SNMP function.

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[3] Please note that DashBoard versions 4.0 and 4.1 have GUI performance problems with the 9990-DEC-MPEG. We recommend version 5.0 or higher

Slot 8: 9990-DEC-MPEG

Card state: ● OK → **Reflected in the front Status LED**

Connection: ● ONLINE

| Decoder | ASI Output | Admin |

| Product | Network | ASI Input |

Build Date	Oct 6 2015 15:56:49
Supplier	Cobalt Digital Inc
Product	9990-DEC-MPEG
Software Rev	0.5.1
DSP Version	1.1
Serial Number	ac83f0009004
Hardware Version	1
Rear Module	● OK
Analog Audio Output	Unbalanced
Card Uptime	5 days, 6 hours, 30 minutes
Ambient Temp	30.13
Internal Temp	35.88
MDP Core Temp	37.25
Card Power (W)	4.5

Statistics Panel

| ASI Output | Admin | Support |

| Network | ASI Input | Decoder |

Ethernet Configuration

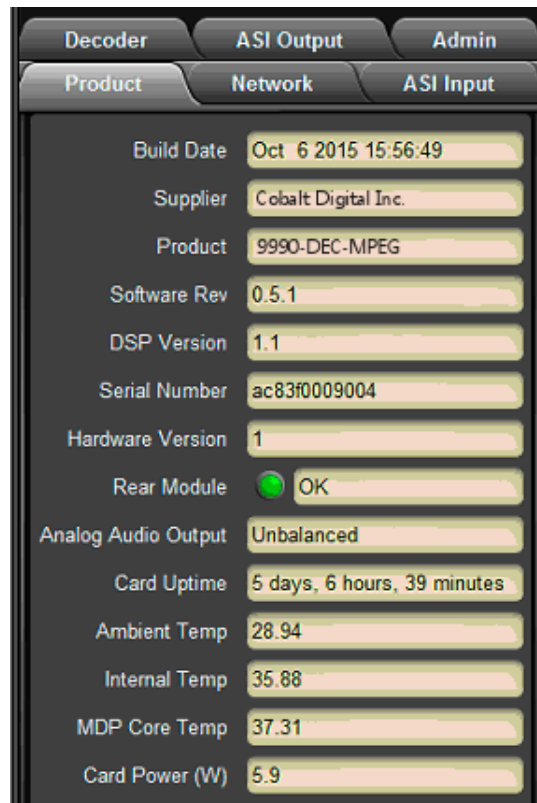| Alarm on Link Loss | ● Yes ○ No |
IP Address	10.10.9.128
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server 1	0.0.0.0
DNS Server 2	0.0.0.0
IGMP Version	Auto-Detect
Interface Speed	Auto-Negotiate
Interface Settings	Apply
	Cancel

Configuration Panel

Product Tab

The Product Tab contains basic information about the 9990-DEC-MPEG.

The following information is available:

- **Build Date:** Date the firmware image was built.
- **Supplier:** Cobalt Digital Inc.
- **Product:** 9990-DEC-MPEG.
- **Software revision:** This indicates the firmware revision currently running. The format is Major Version • Minor Version • Build Number.
- **DSP version:** This indicates the firmware revision for the decoding subsystem. The format is Major Version • Minor Version. DSP firmware will only occasionally be updated by Cobalt Digital Inc..
- **Serial Number:** This is the serial number of this particular 9990-DEC-MPEG card.
- **Hardware Version:** This indicates the board version number. All board versions are functionally equivalent.
- **Rear Module:** This indicates the status of the Rear I/O Module. It can have one of the following states:

- o ⬤ **OK**: The Rear Module is the correct module for the 9990-DEC-MPEG. In the 9990-DEC-MPEG this indicator will always indicate **OK.**
- o ⬤ **Not Installed**: The 9990-DEC-MPEG is not connected to a rear module. The card is operating normally, but it will not be useful as there are no input and output connections to it.
- o ⬤ **Wrong Module:** The 9990-DEC-MPEG is connected to a rear module that was not designed for it (most likely from another openGear™ vendor). Depending on the signals present on that module, there may be a small chance of damage to the 9990-DEC-MPEG; Cobalt Digital Inc. recommends that this situation be rectified immediately. This alarm will cause the front status LED to turn red.

- **Analog Audio Output:** The 9990-DEC-MPEG can be fitted with either balanced or unbalanced analog audio outputs. The openGear 9990-DEC-MPEG can be ordered with either balanced or unbalanced rear I/O panels. The same card will support both types.
- **Card Uptime:** Indicates how long the card has been running since it was last rebooted.
- **Ambient Temperature:** Temperature, in degrees centigrade, of the air intake of the card (measured at the front edge of the card).
- **Internal Temperature:** Temperature, in degrees centigrade, at the back of the card.
- **MDP Core Temperature:** Temperature, in degrees centigrade, of the core processing element.
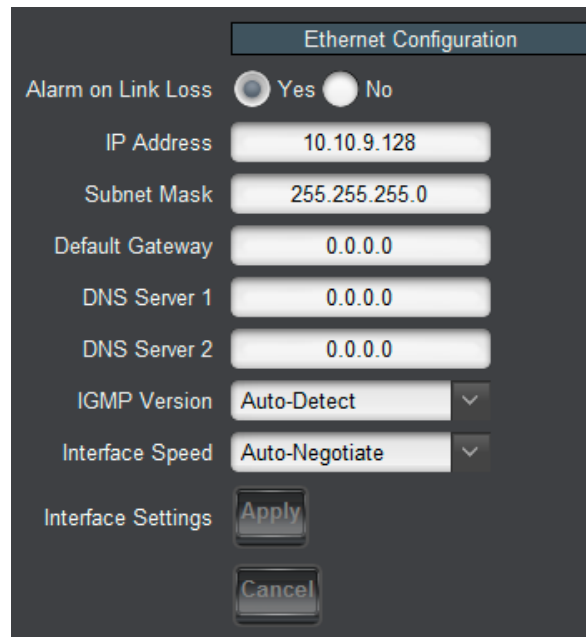- **Card Power (W):** Indicates the current power draw of the unit, in watts.

The openGear™ frame is designed to operate in environments with up to 40°C ambient. There is typically a 5°C temperature raise from the external ambient to the "Ambient Temperature" measured by the 9990-DEC-MPEG. If that measurement is at 45°C or higher, action must be taken to cool down the ambient temperature. The 9990-DEC-MPEG will log excessive temperature events.

Network Tab

The Network Tab allows for configuration/monitoring of the streaming Ethernet port.

Network Configuration Tab

The Network Configuration Tab is used to set the individual parameters for the streaming Ethernet port.

	Ethernet Configuration
Alarm on Link Loss	● Yes ○ No
IP Address	10.10.9.128
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server 1	0.0.0.0
DNS Server 2	0.0.0.0
IGMP Version	Auto-Detect
Interface Speed	Auto-Negotiate
Interface Settings	Apply
	Cancel

The following parameters can be configured:

- **Alarm on Link Loss:** If set to Yes, the card will raise an alarm if this Ethernet interface loses link. The Card State indicator in Dashboard™ and the front Status LED will both be red. If set to No, the card will still report loss of link in the Statistics page but no alarm will be raised. Cobalt Digital Inc. recommends turning on the alarm for ports that are in use; only turn it off if you do not plan to connect that port to a network.
- **IP Address:** Enter the desired IP address for this Ethernet port.
- **Subnet Mask:** Enter the desired subnet mask for this Ethernet port.
- **Default Gateway:** Enter the desired default gateway for this Ethernet port, or 0.0.0.0 if no gateway is available.
- **DNS Server 1, DNS Server 2:** Enter up to two DNS IP addresses, or 0.0.0.0 if the DNS functionality is not required. The 9990-DEC-MPEG will need to consult a DNS server when operating as an HLS or RTMP client, if the servers are to be specified by host names instead of IP addresses[4].

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[4] If the 9990-DEC-MPEG has connectivity to the Internet and there is no DNS in your local network, Cobalt Digital Inc. recommends using the Google public servers at addresses 8.8.8.8 and 8.8.4.4.

- **IGMP Version:** The 9990-DEC-MPEG implements the IGMP protocol for multicast reception. This parameter controls the version of the protocol to be used.
  - **Auto-Detect:** The 9990-DEC-MPEG will attempt to auto-detect the IGMP version in use by inspecting the Group Membership Requests received from the router. It defaults to IGMP Version 3 if no messages are received.
  - **IGMP Version 1:** Force the use of Version 1 only (not recommended)
  - **IGMP Version 2:** Force the use of Version 2 only
  - **IGMP Version 3:** Force the use of Version 3 only
- **Interface speed:** Configures the speed of the interface. The following modes can be selected:
  - **Auto-Negotiate:** The Ethernet port will auto-negotiate the speed. All modes are available.
  - **100 Mb/s Full-Duplex:** Force the port to 100Mb/s Full-Duplex mode. Note that the port will still perform auto-negotiation, but it will only advertise this mode.
  - **1Gb/s Full-Duplex:** restrict the operation to 1Gb/s Full-Duplex mode. Note that the port will still perform auto-negotiation, but it will only advertise this mode.
- **Interface Settings:** If you make any changes to the IP Address, Subnet Mask, Default Gateway and/or DNS fields, the **Apply** and **Cancel** buttons become active. The changes only take effect when you press the **Apply** button. Pressing the **Cancel** button reverts the fields back to their original values. Note that the 9990-DEC-MPEG will check the consistency of the data entered and will reject invalid combinations. Once the **Apply** button is pressed, a status message appears just below the **Cancel** button, as follows:
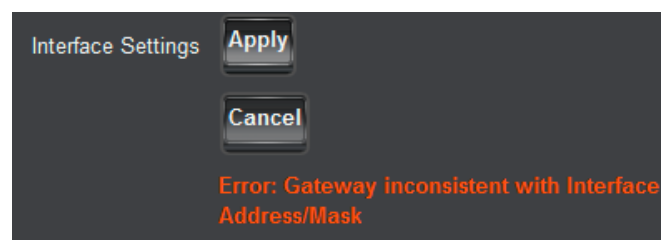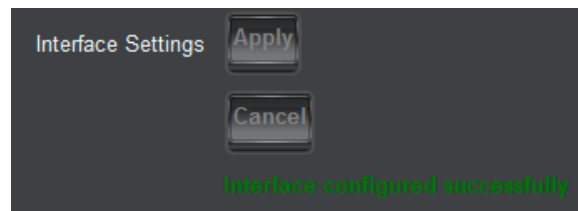
Network Statistics Tab

The Network Statistics Tab reports the current IP configuration the Ethernet port, as well as its link state and running status.

The following parameters are reported in the Network Statistics tab:

- **Alarm on Link Loss:** Reports the current setting of this parameter.
- **IP Address:** Reports the current IP Address for the port.
- **Subnet Mask:** Reports the current Subnet Mask for the port.
- **Default Gateway:** Reports the current Default Gateway for the port.
- **DNS Server 1, DNS Server 2:** Report the current DNS IP addresses.
- **IGMP Version:** Reports the current setting for this parameter.
- **Interface Speed:** Reports the current setting for this parameter.
- **Port 1 Link:** This indicator has the following states:
  - ⬤ **Link OK**: The port has established link with the switch.
  - ⬤ **No Link:** The port does not currently have link. If Alarm on Link Loss is set to Yes, the Dashboard™ Card State will be red and the Status LED in the front of the board will also be red. If Alarm on Link Loss is set to No, this indicator will still be red, but the alarm will not propagate.
- **Link Speed (Mb/s):** This parameter reports the actual speed negotiated with the switch for the port. If the port has no link, the value reported here is zero.
- **MAC Address:** This reports the MAC address of the Ethernet port.

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ASI Input Port

The 9990-DEC-MPEG decoder has one fixed-function ASI Input Port. This tab is used to configure and manage it.

ASI Input: Configuration Tab

The Configuration Tab for the ASI inputs is shown below:
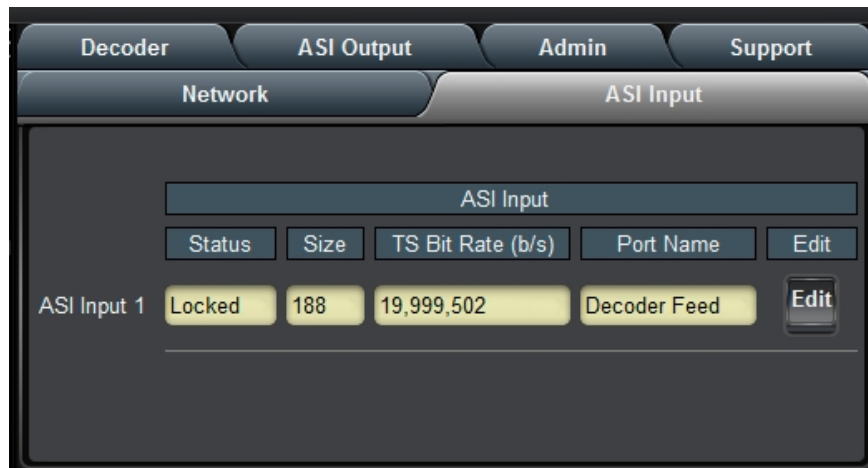
The Configuration tab is divided into two areas:
- The **ASI Input** table, which displays an overview of the ports. It contains the following fields:
  - **Status:** Indicates the current status of the port. The possible values are:
    - **Locked:** the port is enabled and locked to a valid ASI signal.
    - **Unlocked:** the port is enabled, but has no signal.
    - **Disabled:** the port is disabled by user configuration.
  - **Size:** Indicates the detected ASI transport packet size (188 or 204 bytes). If the port is disabled or unlocked, this field will show a value of 0 (zero).
  - **TS Bit Rate (b/s):** Measured transport stream bit rate, in bits/second.
  - **Port Name:** All 9990-DEC-MPEG ports can be assigned a user-defined name, which is displayed here. The default name is **ASI Input 1**.
  - **Edit:** This button, when clicked, brings up the configuration area of the port.
- The configuration area of the port, which is accessed by clicking on the **Edit** button, as shown below.
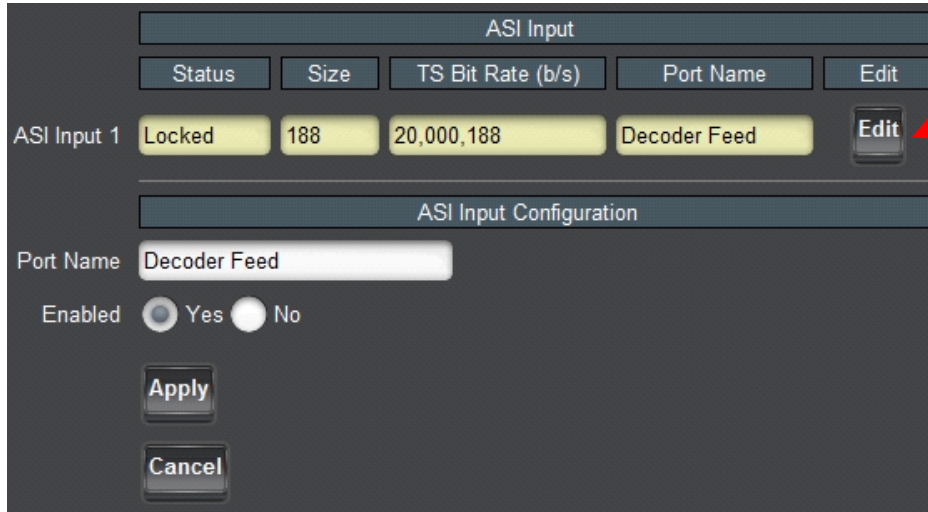
Click here to configure

The following parameters are available:

- **Port Name:** All 9990-DEC-MPEG inputs and outputs can be assigned a user-defined port name. This name is used to identify the port later when making connections. Use any descriptive name suitable for your application, or accept the default.
- **Enabled:** the ASI Input can be enabled/disabled using this parameter. When the port is disabled, the corresponding LED in the front and back panels stays off.

Once the desired configuration is entered, click on the **Apply** button to have them take effect. This will cause the changes made in the Configuration Parameters to be implemented. Clicking on the **Cancel** button will discard any changes.

ASI Input: Statistics Tab

The Statistics Tab for the ASI Ports provides a quick visual summary status for the ports. A sample is depicted below:
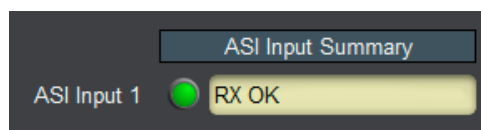
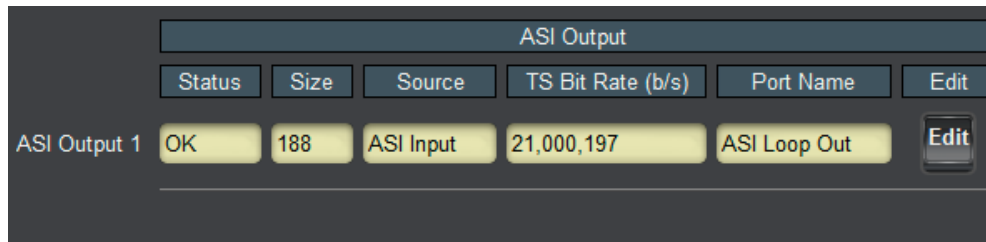The ASI Input Port indicator can have the following values:

- ⬤ **RX Locked**: The port is locked to an input signal.
- ⬤ **RX Disabled:** The port is disabled.
- ⬤ **RX Unlocked:** The port is not locked to any signal.

ASI Output Port

The 9990-DEC-MPEG decoder has one fixed-function ASI Output Port. This tab is used to configure and manage it.

ASI Output Port: Configuration Tab

The ASI Output Configuration Tab is show below:

The **ASI Output** table is always displayed, and its columns are:
- **Status:** Indicates the port status. It can contain the following values:
  - **OK:** Port is operating normally.
  - **Unlocked:** Port is unlocked. This status means that the port is in Automatic mode and it has no input.
  - **Overflow:** This means that the ASI Output is in Manual mode, and the configured bit rate is insufficient to carry the input connected to it. This situation will raise an alarm.
- **Size:** Indicates the transport packet size, in bytes.
- **Source:** Indicates the current source for the data being outputted in the port.
- **TS Bit Rate (b/s):** This reports the actual transport stream bit rate, in bits/second.
- **Port Name:** This reports the configured Port Name.
- **Edit Button:** Clicking on this button allows reconfiguration of the port. The ASI Port Configuration screen appears, with the settings for the port.

Clicking on the **Edit** button will cause the configuration area of the port will to open, as depicted below. The configurable parameters are:

- **Port Name:** All 9990-DEC-MPEG inputs and outputs can be assigned a user-defined port name. This name is used to identify the port later when making connections. Use any descriptive name suitable for your application, or accept the default.
- **Packet Size:** Select between 188 or 204 bytes.
- **ASI Rate:** The available selections are:
  - **Manual:** In this mode, the ASI output bit rate is manually set. If the content routed to the port exceeds the configured bit rate, packets will be dropped and the port will raise an alarm.
  - **Automatic:** In this mode, the ASI output bit rate is automatically set by the 9990-DEC-MPEG to match the source connected to the port.

- **Bit Rate:** This field is only shown if the **ASI Rate** control is set to **Manual**. Enter the desired bit rate in bits/second.
- **Source:** This field indicates the source for the ASI Output content. For the current firmware version, the only option is the ASI Input content. Future versions of the firmware will offer additional options.
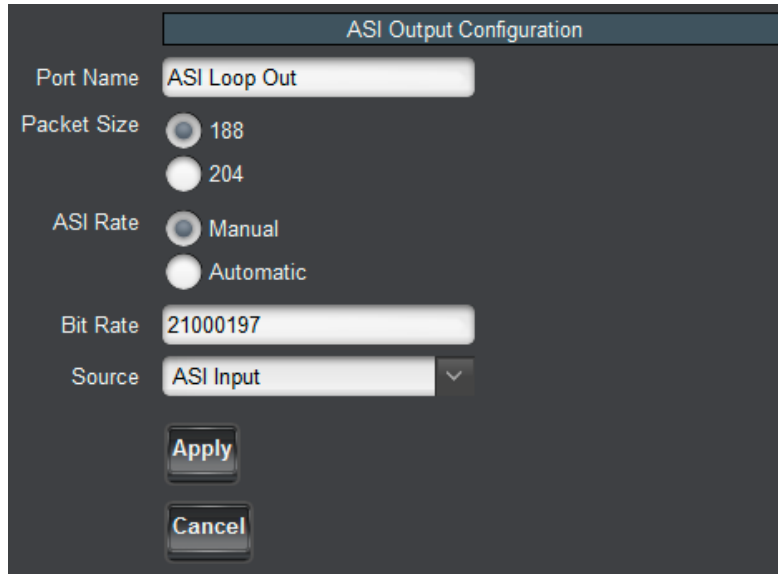
Once the desired configuration is entered, click on the **Apply** button to have them take effect. This will cause the changes made in the Configuration Parameters to be implemented. Clicking on the **Cancel** button will discard any changes.

ASI Output Port: Statistics Tab

The Statistics Tab for the ASI Output Port provides a quick visual summary status. An example is depicted below.
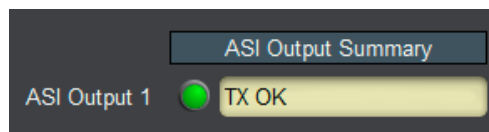
The ASI Port indicator can have the following values:

- ⬤ **TX OK**: The port is operating normally in transmit mode (ASI Output).
- ⬤ **TX Overflow:** The port is in manual bit rate setting, and the connected bit rate is excessive. The Dashboard Card State will be red and the Status LED in the front of the board will also be red. To correct this problem, either externally reduce the input bit rate, or increase the ASI output bit rate, or configure the port in Automatic mode. **If this alarm is active, data is being dropped.**
- ⬤ **TX Unlocked:** The port is in transmit mode, automatic bit rate, and there is no data rate coming to it. Any downstream ASI receivers will lose lock.

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Decoder

The Decoder Configuration Tab contains the configuration parameters for the decoding function. The Statistics tab provides quick feedback on the configuration and status of the decoding process.

Decoder Configuration Tab

The decoder configuration tab is divided into two bottom tabs (depicted below):
- The **Configuration** tab, where all the main decoder parameters are configured.
- The **Program Info** tab, where program-specific information is displayed. If the decoder is in HLS mode, this tab allows for manual configuration of the decoded profile.


The decoder configuration tab is divided into the following functional areas:
- The **Decoder Input** configuration area
- The **Program and Audio Selection** configuration area
- The **Output Configuration** area
- The **Analog Audio Configuration** area
- The **Apply/Cancel** buttons

The settings displayed in each of the areas will vary according to the specific configuration.

Decoder Input Configuration

The primary decoder input configuration parameter is the **Source**, which selects the input and protocol from which the decoder will take its content:
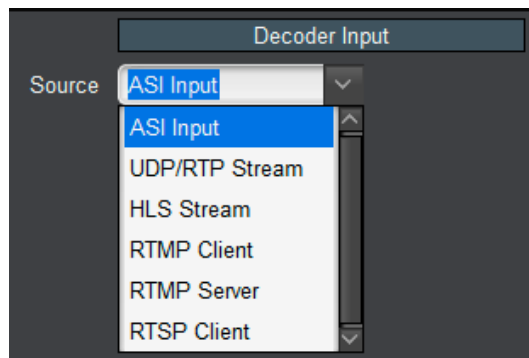
The following stream sources are supported:

- **ASI Input:** the decoder will accept content on its ASI Input port.
- **UDP/RTP Stream:** the decoder will accept content on Ethernet over UDP/RTP, with optional support for SMPTE-2022 FEC.
- **HLS Stream:** the decoder will retrieve the stream in real-time from an HTTP Live Streaming web server.
- **RTMP Client:** the decoder will retrieve a Flash stream from an RTMP Server, such as the Adobe Media Server or similar.
- **RTMP Server:** the decoder will accept a Flash stream from a publishing RTMP client.
- **RTSP Client:** the decoder will connect to an RTSP server, such as an IP Camera, and play the content.
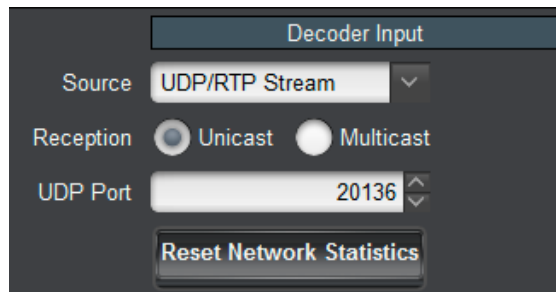
The remaining parameters in the **Decoder Input** section will depend on the **Source** selection.

ASI Input

There are no additional parameters for the decoder ASI Input.

UDP/RTP Stream

When UDP/RTP Stream is selected, the following controls become available:

- **Reception:** select between **Unicast** and **Multicast**. In **Unicast** mode, the stream must be sent to the decoder's streaming port IP address (see the Network Tab). In **Multicast** mode, the decoder will join an IP Multicast stream. When this mode is selected, a new field appears for the multicast address:
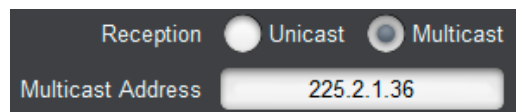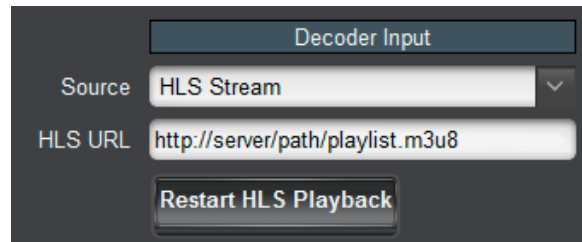

- o **Multicast Address:** enter the desired IP multicast address. The decoder will only accept addresses between 224.0.0.0 and 239.255.255.255 in this field.
- **UDP Port:** enter a valid UDP port. Valid values are between 1 and 65535.
- **Reset Network Statistics** button: when clicked, this button causes the UDP/RTP statistics shown in the Network Tab on the Statistics area to be cleared. This is useful to manage network performance (i.e., packet loss) from a known state.

The 9990-DEC-MPEG will automatically detect UDP/RTP/SMPTE-2022 FEC (if licensed).

HLS Stream

In this mode, the decoder can access and play a stream from a web server with an HTTP Live Streaming service. Access to the server can be either from the control or streaming ports. The configuration parameters are:

- **HLS URL**: Enter a valid HLS URL. The URL must start with **http://** or **https://** and must end with either **.m3u** or **.m3u8**. In order to use a server name instead of an IP address, the decoder must have at least one DNS server configured and accessible. DNS servers can be specified in the Network Configuration Tab.
- **Restart HLS Playback**: HLS content in the server may be a continuously-running live stream or a VOD stream. If it is a VOD stream, the decoder will stop at the end of the stream. Clicking on this button makes it play it again. The type of stream (Live or VOD) is reported in the Network Tab in the Statistics area.

RTMP Client

In this mode, the decoder can access and play a Flash stream from an RTMP Server such as the Adobe Media Server or similar. Note that not all Flash streams are supported. The 9990-DEC-MPEG will only support the following types of streams:

- Video Compression: H.264
- Audio Compression: MPEG-1 Layer III or AAC-LC.

An RTMP access point is defined by the following:

- An RTMP URL, of the form:

$$\texttt{rtmp[t][e][s]://servername/app}$$
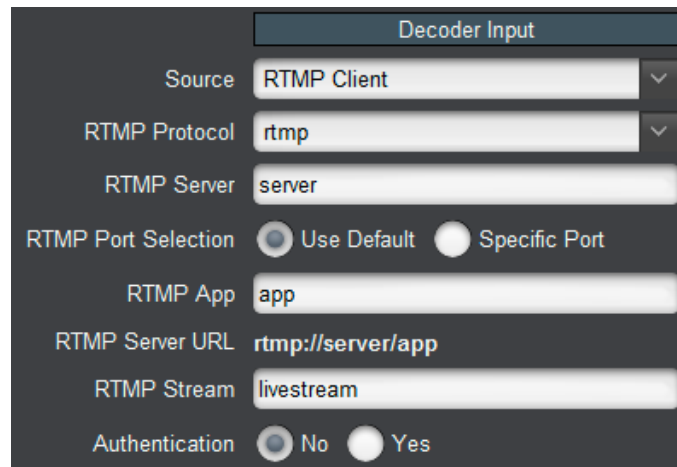
- A stream name

The first part of the URL defines the protocol, as follows:
- **`rtmp`**: standard RTMP with no security
- **`rtmpt`**: RTMP tunneled over HTTP
- **`rtmpe`**: encrypted RTMP using proprietary security
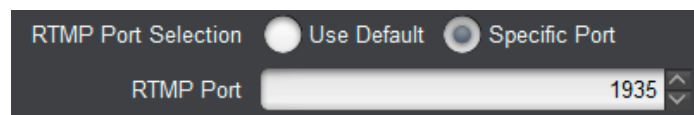- **`rtmps`**: encrypted RTMP over SSL

- **rtmpte**: encrypted RTMP using proprietary security, tunneled over HTTP
- **rtmpts**: encrypted RTMP over SSL, tunneled over HTTP

The **servername** field is the host name or IP address of the RTMP server to be contacted. The **app** field is the application in the server that should receive the data being transmitted. Note that, depending on the service, the **app** field may contain a complete path or even a set of parameters.

The RTMP Client configurable parameters are:

- **RTMP Protocol:** Select the protocol variant, as discussed above.
- **RTMP Server:** Enter the host name or IP address of the RTMP server to be contacted. If you want to use host names instead of IP addresses, make sure to configure at least one DNS server. DNS servers can be specified in the Network Configuration Tab.
- **RTMP Port Selection:** If your RTMP server is using the default TCP ports for the protocol variant, select **Use Default**. If your server is using a non-standard port, select **Specific Port**. When **Specific Port** is selected, an additional field is displayed:

- **Port:** This field is only displayed if **RTMP Port Selection** is set to **Specific Port**. Configure a non-standard TCP port here.
- **RTMP App:** Enter the application name in the server, as discussed above. Consult your CDN or server documentation to find out what should be entered in this field.
- **RTMP Server URL:** This informational field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the primary server.
- **RTMP Stream:** Enter the stream name for the server. Consult your server documentation or CDN to find out what should be entered here. Some servers allow arbitrary stream names, while others use this field for authentication and thus require specific names.

- **Authentication:** Some RTMP servers require username/password authentication for access. If your server does not require authentication, select **No**, otherwise select **Yes**. If you select **Yes**, additional fields are presented:

- **Username:** Enter the username to be used for authentication.
- **Password:** Enter the password to be used for authentication.

RTMP Server

In RTMP Server mode, the decoder waits for a publishing RTMP client to connect to it and publish a stream, which the decoder will then play.
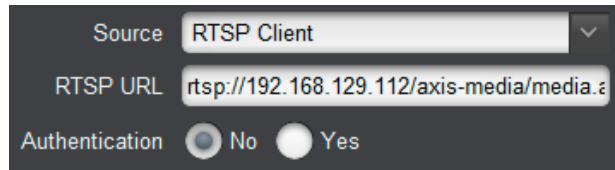
The configuration parameters are as follows:

- **RTMP Protocol:** This is an informational field. The only supported variant is `rtmp://`.
- **RTMP Port Selection:** If **Use Default** is selected, the decoder will listen on the default RTMP Port (TCP Port 1935). If a custom, non-standard port is desired, select **Specific Port**, and a new field will appear for the TCP port.

- **Port:** This field is only displayed if **RTMP Port Selection** is set to **Specific Port**. Configure a non-standard TCP port here.
- **RTMP App:** any arbitrary name can be used here. Configure the exact same name in the encoder.
- **RTMP Stream:** this field is fixed at **livestream**. Configure this name in the encoder.
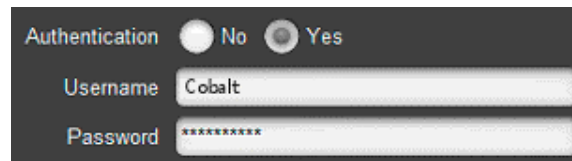
RTSP Client

In RTSP Client mode, the decoder will connect to an RTSP server (specified by an `rtsp://` URL), request a stream, and play the stream. This mode is intended primary to support devices such as IP Cameras. The configuration parameters are as follows:

The parameters are:
- **RTSP URL:** Enter the full RTSP URL to access the RTSP server. Please consult the RTSP server vendor to find out what to enter here. A comprehensive list of URLs from the various IP Camera manufacturers can be found in this link.
- **Authentication:** Some RTSP devices can be configured to require username/password authentication. Select **Yes** if this is the case. The following additional options are displayed:

- **Username:** enter the username expected by the RTSP device.
- **Password:** enter the password expected by the RTSP device.

RTSP support in the 9990-DEC-MPEG has the following limitations:
- No audio support.
- For video, only H.264 compression is supported.
- No support for the TCP-tunneled versions of the protocol.
- No support for encrypted passwords.

Decoder Program and Audio Selection

This section is only displayed if the **Source** parameter in Decoder Input Configuration is set to either **ASI Input** or **UDP/RTP Stream**. It allows the following selections to be made:

- If the stream being received by the decoder is a Multi-Program Transport Stream (MPTS), the program to be decoded can be chosen here.
- If the program being played by the decoder has multiple audio PIDs, the audio PIDs being decoded can be selected here.
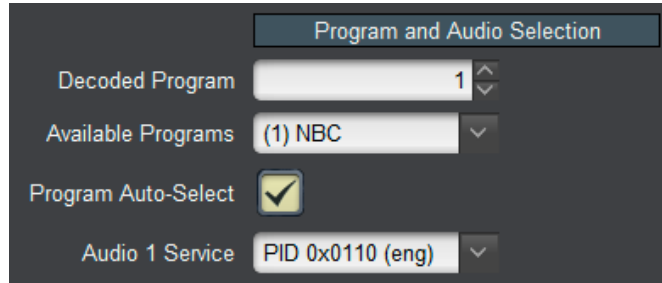
The parameters are:

- **Decoded Program**, **Available Programs:** These two parameters work together, and are used to select the program to be decoded in an MPTS. The program can be specified by number in the **Decoded Program** field, or selected in the **Available Programs** drop-down menu. If **Program Auto-Select** is checked, and a non-existing program number is entered in the **Decoded Program** field, the decoder will ignore the setting and stay on the current program.

- **Available Programs:** This control is pre-populated with a drop-down list of the programs available in the transport stream. If the program name can be determined, it will be shown, with the program number in parenthesis. If not, the program is shown as **Program X**, where **X** is the actual program number. In the example below, Program 1 has a name (NBC), so it shown as "**(1) NBC**", and Program 2 does not have a name, so it is shown as **Program 2**.
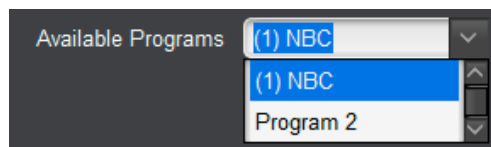
- **Program Auto-Select:** If checked, if the decoder does not find the configured program, it will automatically play the first program in the MPTS. Otherwise, it will not play any programs[5].

- **Audio 1 Service:** If the program has multiple audio services, the decoded one can be selected here. The selection is a drop-down menu with the audio PID values. If a language descriptor can be found for the audio service, the language code is displayed here as well. It is also possible to disable audio decoding altogether, by selecting the **Disabled** option. An example with three audio services (English, Portuguese and French) is shown below.

---
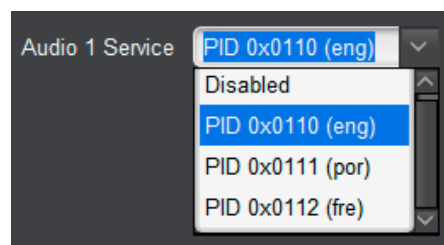
[5] In the current firmware version, this control is not available and is always checked.

Decoder Output Configuration

This set of controls configures the video outputs. The appearance of the controls depends on the selection made on the **Digital Output** parameter:
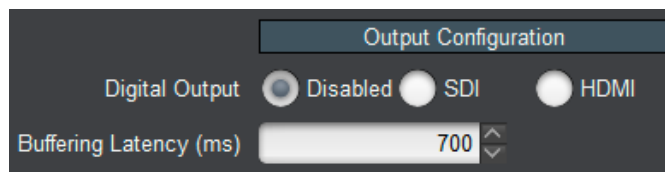
The following parameter is always available:

- **Buffering Latency (ms):** the buffering latency through the decoder can be configured using this parameter. The range is from 0 to 700 milliseconds. It can be used to reduce overall end-to-end latency depending on stream delivery conditions. **Values below 200 milliseconds must be used with care**. If this value is set too low for the network and encoding conditions, **the 9990-DEC-MPEG will stop decoding audio**. Increase the value in this case.

Digital Output: Disabled

No additional parameters are displayed in this case. Both the SDI and the HDMI outputs will be disabled, and video will be present only in the composite output. The composite output will present either an NTSC or PAL signal depending on the program being decoded.

Digital Output: SDI

This selection enables the SDI output. The composite and HDMI outputs will be disabled. **Note that, in this mode, the decoder may output a garbled signal on the HDMI output. Do not use the HDMI output when SDI is selected, even if there is a signal present.**

The available parameters are:
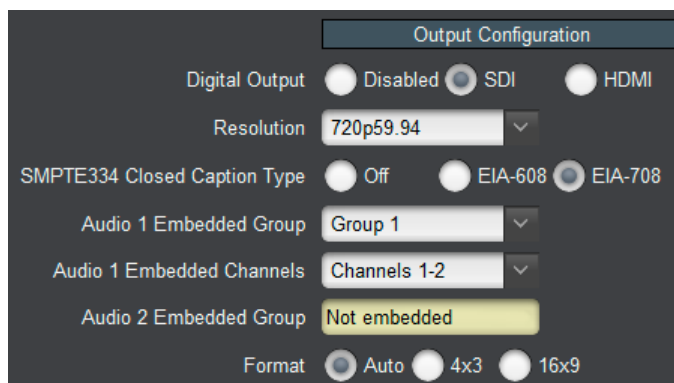
- **Resolution:** Select the SDI output resolution. The decoder can convert between formats and frame rates, so this selection can be made independent of the decoded signal. The

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available formats are:
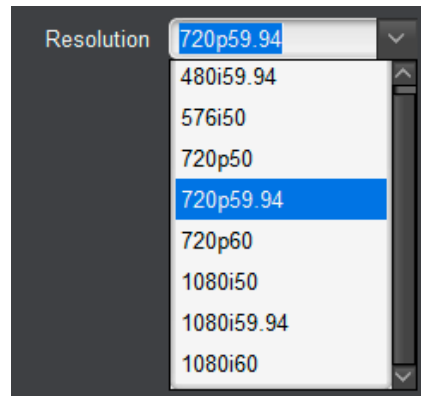
- **SMPTE-334 Closed-Caption Type:** The decoder supports Closed-Caption injection if the incoming bitstream has captions. The options are:
  - **Off:** no Closed-Captioning injection.
  - **EIA-608:** Inject Closed-Captioning in EIA-608 format.
  - **EIA-708:** Inject Closed-Captioning in EIA-708 format.
- **Audio 1 Embedded Group:** Select the group to embed the first decoded audio service. Groups 1 through 4 can be selected, or audio embedding can be disabled:

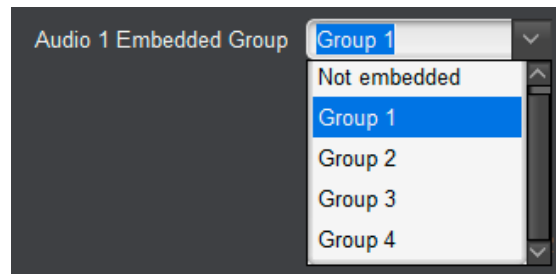- **Audio 1 Embedded Channels:** Select the channels to embed the first decoded audio. The available choices are **Channels 1-2** or **Channels 3-4**.
- **Audio 2 Embedded Group:** This version of the decoder firmware only supports decoding of one audio service, so this control is disabled. Decoding of a second audio service will be offered in a future firmware update.
- **Format:** This selects the output format. It is only relevant if the 9990-DEC-MPEG is decoding a Standard Definition (SD) signal and up-converting it to HD. Setting format to **4x3** will produce a pillarbox image (a 4x3 image with black bands on both sides). Setting format to **16x9** will stretch the image to full screen – this is recommended if the SD signal is anamorphic.


Digital Output: HDMI

This setting enables the HDMI output. The SDI output will be disabled. Depending on the HDMI resolution settings, an SD version of the signal may be present in the composite output.
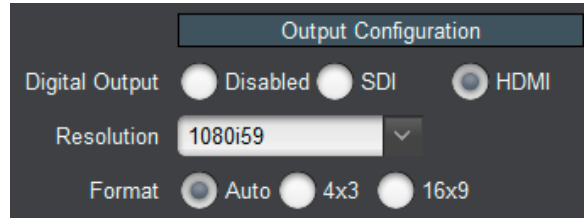
- **Resolution:** select the desired HDMI output resolution. You can choose a specific resolution, or select **Auto**. In **Auto** mode, the decoder will communicate with the HDMI monitor, determine its optimum resolution, and provide a signal of that resolution. Note the following for **Auto** mode:
  - o If the monitor requests a non-standard resolution, the decoder will comply, but the composite signal will be turned off. If a composite signal is required, select one of the standard modes.
  - o If the monitor does not complete the negotiation with the decoder, **no video will be displayed.** Select a standard resolution in this case.
- **Format:** This selects the output format. It is only relevant if the 9990-DEC-MPEG is decoding a Standard Definition (SD) signal and up-converting it to HD. Setting format to **4x3** will produce a pillarbox image (a 4x3 image with black bands on both sides). Setting format to **16x9** will stretch the image to full screen – this is recommended if the SD signal is anamorphic.

Decoder Analog Audio Configuration

This area configures the analog audio stereo output. It includes the following controls:
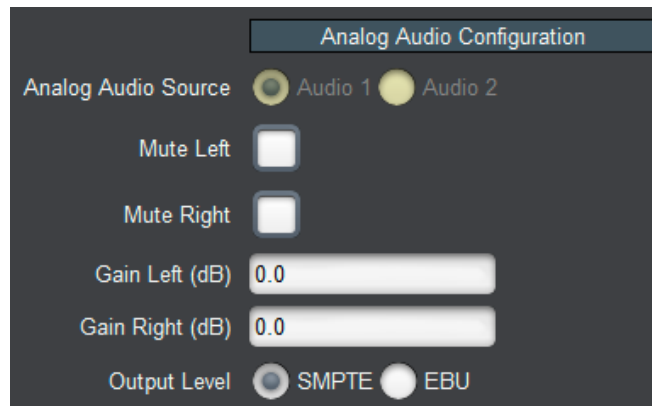
- **Analog Audio Source:** Selects between the first and the second decoded audio services for the analog output. This version of the firmware only supports the decoding of one service, so this control is not available. A future firmware update will enable this functionality.
- **Mute Left, Mute Right:** these controls will mute the corresponding audio analog output.
- **Gain Right, Gain Left:** these controls can provide independent audio gain or attenuation for the left/right channels. The range for these controls is from -12 dB to +12 dB, in steps of 0.5 dB.

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- **Output Level:** This control is only displayed if the decoder is fitted with balanced audio outputs. Select between **SMPTE** and **EBU** output levels.

Decoder Apply/Cancel Buttons

When the **Apply** button is clicked, the decoder configuration takes effect. All changes cause interruption to the video stream, except for changes related to audio – namely any changes in the Analog Audio Configuration or the Audio Service Selection.

If there are no errors, the Decoder configuration area closes. If any errors are detected, an error message is displayed by the **Apply** button. The possible error messages are:

- *Error: no available IP License*: the **Source** parameter in the Decoder Input Configuration is set to one of the IP protocols, and the unit does not have the IP License (check the Admin License Keys Tab). Contact Cobalt Digital Inc. if you need to acquire this license.
- *Error: no available Dolby License*: the incoming stream has Dolby audio, and the unit does not have the Dolby decoding license (check the Admin License Keys Tab). If the program has other audio services, select an alternate audio PID in the Decoder Program and Audio Selection area. Contact Cobalt Digital Inc. if you need to acquire this license.

If the **Cancel** button is clicked, all changes are discarded, and the parameters return to their original values.

Decoder Program Info Tab

The information available in the **Program Info** tab depends on the setting of the **Source** parameter in the Decoder Input Configuration.


Program Info Tab for ASI Input and UDP/RTP Stream

For ASI Inputs and UDP/RTP Streams, the Program Info tab displays the information about the transport stream being received:

- **Header Information:** The top header indicates the Transport Stream ID (TSID). For each program, an individual header is provided, showing the Program Number and the PMT PID.
- **Program Name:** If available, the Program Name is displayed. If the transport stream contains a Service Description Table (SDT), the Service Name is displayed here. If the transport stream contains a Virtual Channel Table (VCT – used in terrestrial ATSC broadcasts), this field will show the major and minor channel numbers, and the short channel name (as depicted above).

- **Elements:** For each program, a list of elements is provided. The list contains the Element PID, the element type (Audio/Video/other), and the type of compression if appropriate. For audio streams, if a language code is present, it is displayed here as well.

PMT PID   Transport Stream ID


Element PIDs
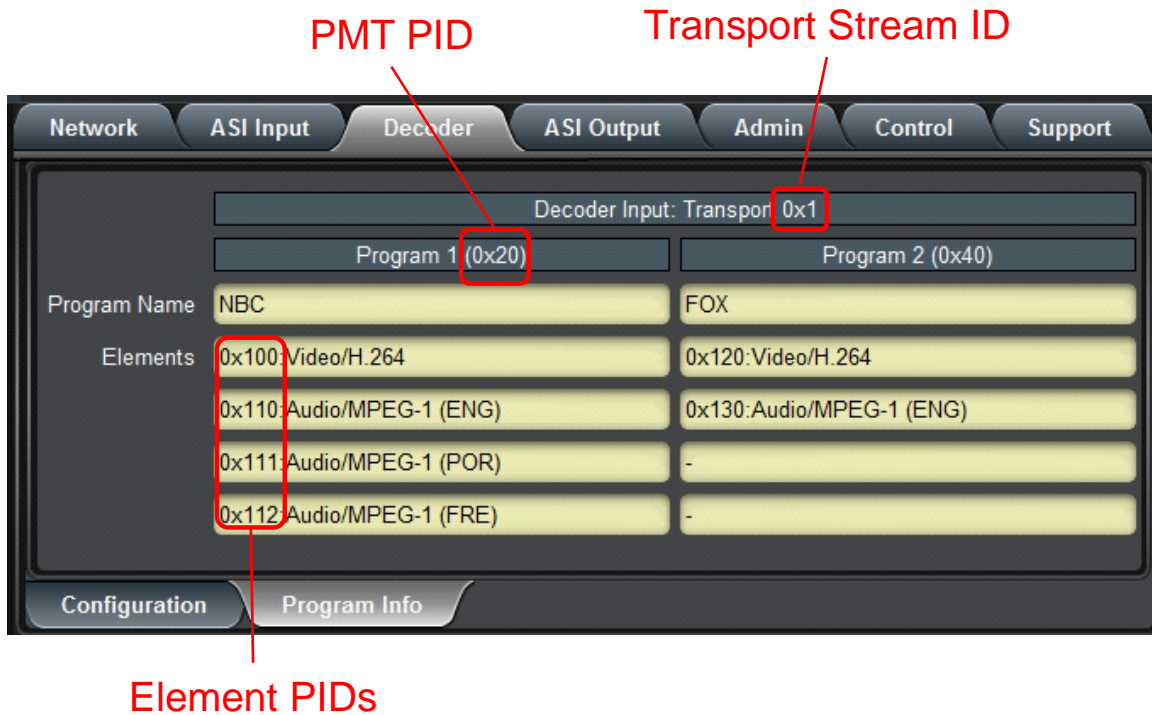
Program Info Tab for HLS Stream

For HLS Streams, the Program Info Tab shows the available profiles and their bit rates. It also shows which profile the decoder is currently downloading.
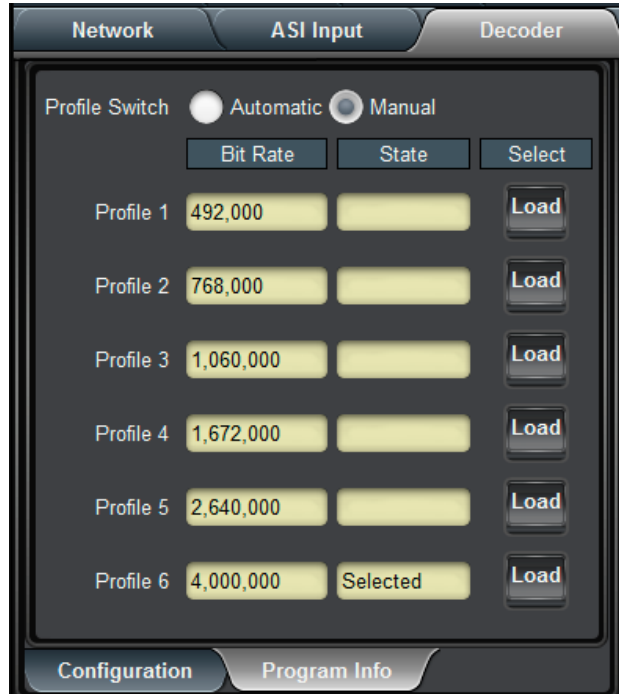
The controls available in this tab are:

- **Profile Switch:** If this is set to **Automatic**, the decoder will select the highest bit rate profile supported by its Internet connection. If this is set to **Manual**, the **Load** buttons in the **Select** column will become available, and a specific profile can be selected.
- **Load:** these buttons can be used to manually select one of the available profiles. If a button is pressed, the **State** entry next to it will indicate **Requested** until the decoder starts downloading that profile.

The table will also show the bit rate for each profile (as informed by the HLS server) and will indicate which profile is currently being downloaded – marked as **Selected** in the **State** column.
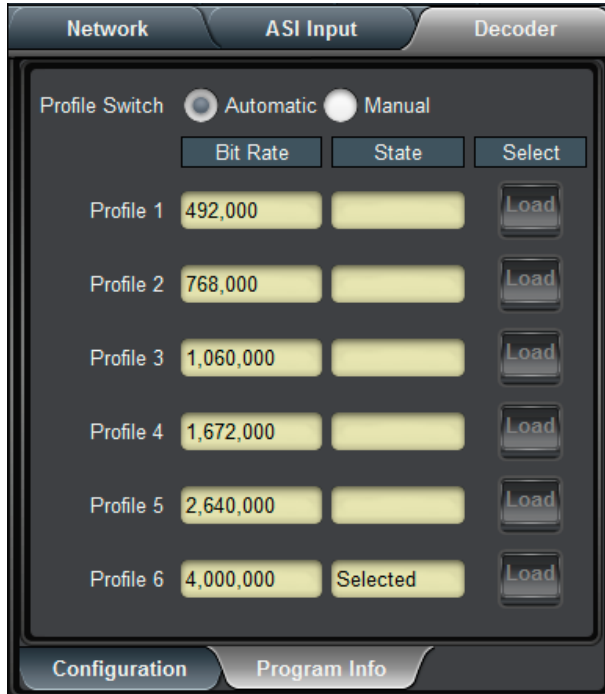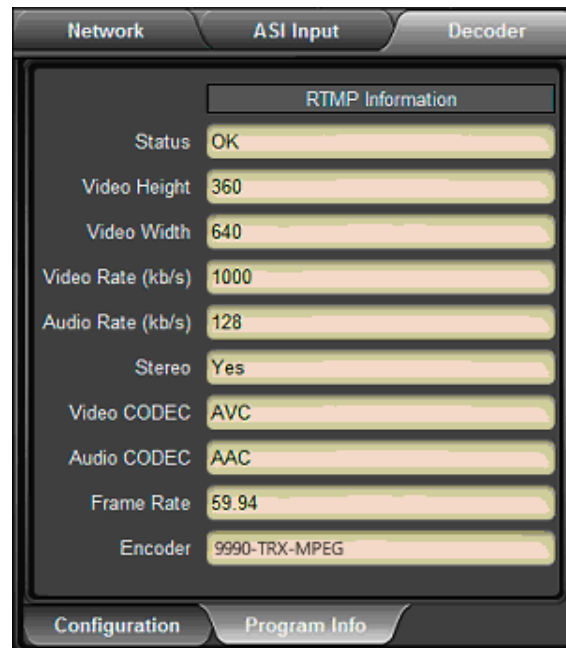
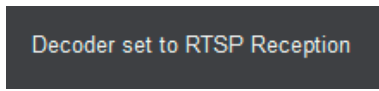**Automatic Profile Selection**　　　　**Manual Profile Selection**

Program Info Tab for RTMP Client and Server

For RTMP Streams, the Program Info Tab shows the RTMP Metadata, if it has been provided by the client or the server.

Program Info Tab for RTSP Streams

No additional information is presented for RTSP streams in the Program Info Tab:

Decoder set to RTSP Reception

Decoder Statistics Tab

The Decoder Statistics Tab is divided into three bottom tabs:

Status   Network   Configuration
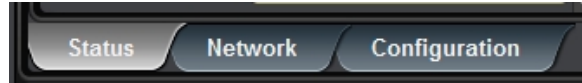
- The **Status** tab displays the current decoding status and information.
- The **Network** tab displays network statistics. It changes according to the decoder source selection.
- The **Configuration** tab is a mirror of the Configuration Tab and displays the current decoder configuration.

Status Tab

The Status Tab is depicted below:

Decoder State	🟢 Playing
	Program Information
Program Number	1
Program Name	NBC
PMT PID	0x20
PCR PID	0x101
	Video Information
Video PID	0x100
Video CODEC	H264
Video Resolution	720x480
Video Mode	Interlaced
	Audio 1 Information
Audio 1 PID	0x110
Audio 1 CODEC	MPEG
Audio 1 Language	eng
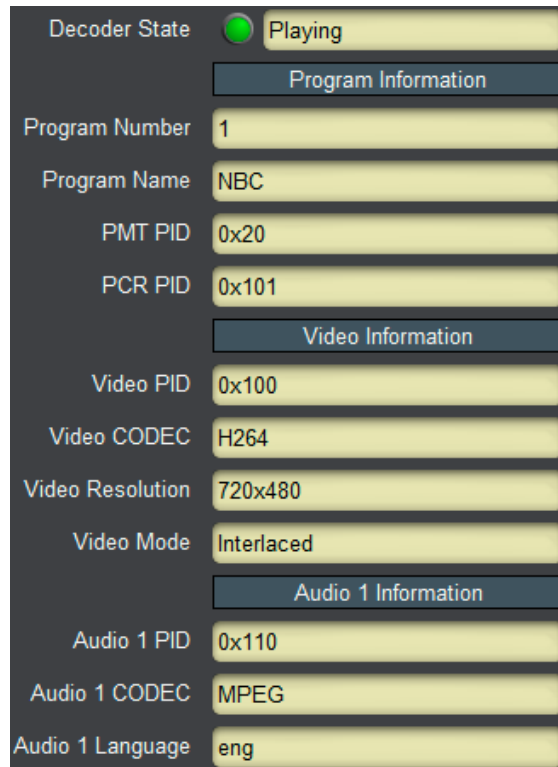
It contains information pertaining to the program currently being decoded. The **Decoder State** indicator will be green if valid content is being received by the decoder, and red otherwise.

Network Tab

The Network Tab contains protocol-specific statistics and changes according to the decoder source selection.

Network Tab for ASI Input

The only parameter displayed is the measured input bit rate from the ASI port. This is the same value also displayed in the ASI Input: Statistics Tab.

Network Tab for UDP/RTP Stream

The following statistics are displayed for UDP/RTP:

- **Received Rate (b/s):** indicates the measured rate in bits/second at the input of the decoder. This does not include FEC bit rate or UDP/IP overhead – it is the transport stream rate.
- **Protocol:** indicates the detected protocol, either UDP or RTP.
- **Stream Source IP Address:** indicates the current IP address from which the stream is being received.
- **SMPTE 2022 FEC:** Indicates the detected FEC mode, as follows:
  - **None:** SMPTE 2022 FEC transmission is not being detected by the 9990-DEC-MPEG.
  - **Column Only:** The 9990-DEC-MPEG is detecting SMPTE 2022 FEC in Column Only mode.

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- o **Row and Column:** The 9990-DEC-MPEG is detecting SMPTE 2022 FEC in Row and Column mode.
- o **Not Licensed:** The SMPTE 2022 functionality is not licensed in this unit (see the Admin License Keys Tab). If SMPTE 2022 FEC is present, it is being ignored by the 9990-DEC-MPEG.
- **Columns:** If SMPTE 2022 FEC is being received, this indicates the number of columns detected.
- **Rows:** If SMPTE 2022 FEC is being received, this indicates the number of rows detected.
- **Received Packets:** This indicates the number of packets received since the last time the statistics were reset. This count does not include the FEC packets, if any.
- **Lost Packets:** This indicates the total number of lost packets since the last time the statistics were reset. Note that the 9990-DEC-MPEG can only detect lost packets if the incoming protocol is RTP. It is not possible to detect lost packets with UDP as it lacks a sequence number.
- **Recovered Packets:** This indicates the total number of packets recovered with SMPTE 2022 FEC since the last time the statistics were reset.
- **Unrecovered Packets:** This indicates the total number of lost packets that could not be recovered with SMPTE 2022 FEC (either because of excessive loss or because SMPTE 2022 is not present).

The counts for Received Packets, Lost Packets, Recovered Packets and Unrecovered Packets can be reset at any time by clicking on the **Reset Network Statistics** button in the UDP/RTP Stream area of the Decoder Input configuration, also reproduced below:
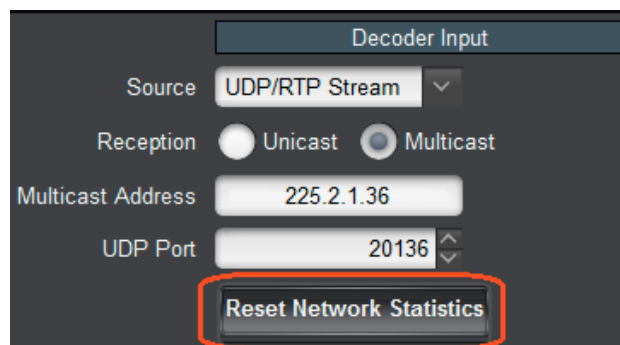

Network Tab for HLS Stream
The Network Tab statistics for the HLS Stream are show below:
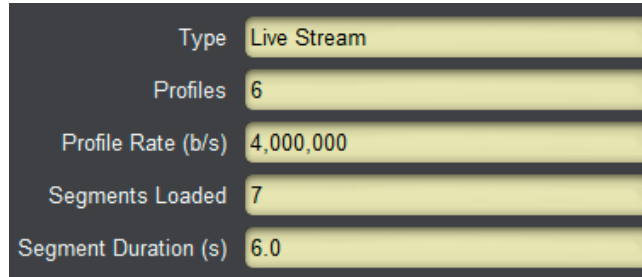
- **Type:** This field will contain the following values:
  - **Unknown:** the stream type is unknown.
  - **VOD:** the stream is VOD content. This means that it is finite, it has a well-defined end. The 9990-DEC-MPEG will stop playing the content at the end, use the **Restart HLS Playback** button in the HLS Stream configuration area to play it again.
  - **Live Stream:** the stream is live.
  - **Event:** the stream is an event. This means that it is finite, it has a well-defined end. The 9990-DEC-MPEG will stop playing the content at the end, use the **Restart HLS Playback** button in the HLS Stream configuration area to play it again.
- **Profiles:** indicates the number of profiles advertised by the server. You can get more information about the profiles in the Program Info Tab for HLS Stream.
- **Profile Rate:** indicates the bit rate of the current profile being downloaded, as advertised by the server.
- **Segments Loaded:** indicates the number of segments downloaded from the server since the connection was made.
- **Segment Duration (s):** Indicates the segment duration, in seconds, advertised by the server.

Network Tab for RTMP Client and Server

The Network Tab Statistics for the RTMP Client and Server modes is depicted below:
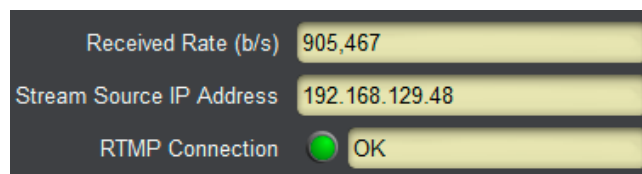
- **Received Rate (b/s):** indicates the measured rate in bits/second at the input of the decoder.
- **Stream Source IP Address:** if there is an RTMP connection, it indicates the IP address of the source. In RTMP Client mode, this is the IP address of the RTMP Server from which the decoder is pulling the stream. In RTMP Server mode, this is the IP address of the publishing client.
- **RTMP Connection:** this shows the RTMP connection state, as follows:

o **○ Connected**: The decoder has established a connection with the RTMP server or client and is transferring data.
o **○ Not Connected:** The decoder has not been able to connect to the RTMP server, or there is no RTMP client connected to it. If the decoder is in RTMP client mode, check the Admin Event Log Tab for possible reasons why it is unable to connect.

Network Tab for RTSP Client

The Network Tab Statistics for the RTSP Client is depicted below:

Received Rate (b/s)	804,147
Stream Source IP Address	192.168.129.112
RTSP Connection	○ OK
Video Protocol	RTP
Video UDP Port	59970
Video CODEC	H264
Video Frame Rate	30

- **Received Rate (b/s):** indicates the measured rate in bits/second at the input of the decoder.
- **Stream Source IP Address:** if there is an RTSP connection, it indicates the IP address of the source.
- **RTSP Connection:** this shows the RTSP connection state, as follows:
  o **○ Connected**: The decoder has established a connection with the RTSP server and is transferring data.
  o **○ Not Connected:** The decoder has not been able to connect to the RTSP server.
- **Video Protocol:** RTSP creates a separate connection to transfer the video bitstream. This field contains a textual representation of the protocol name, obtained from the RTSP server.
- **Video UDP Port:** RTSP creates a separate connection to transfer the video bitstream, and the UDP port used in this transfer is dynamically negotiated with the server. This field reports the UDP port number being used. Note that if the protocol is RTP, two consecutive ports are used. In the example above, port 59970 is being used for the video, and port 59971 is being used for RTCP.
- **Video CODEC:** This field contains a textual representation of the video CODEC, as reported by the server. The 9990-DEC-MPEG only supports H.264 in RTSP mode, but this field will always be updated.

- **Video Frame Rate:** This field contains the video frame rate, as reported by the RTSP server.
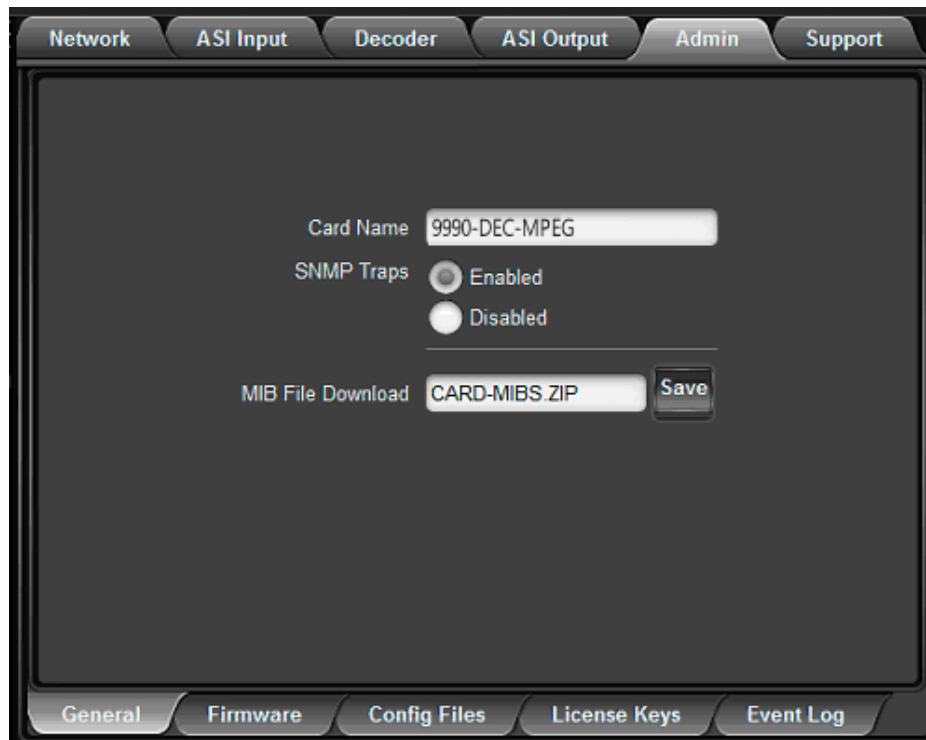
Configuration Tab

The Configuration Tab shows the current running configuration of the decoder. When the **Apply** button is pressed, the changes made in the configuration area are reflected here. It follows the same layout as the Decoder Configuration Tab. An example is shown below:

Decoder Input	
Source	UDP/RTP Stream
Reception	Multicast
Multicast Address	225.2.1.36
UDP Port	20136
Program and Audio Selection	
Decoded Program	1
Available Programs	(1) NBC
Program Auto-Select	Yes
Audio 1 Service	PID 0x0110 (eng)
Output Configuration	
Digital Output	HDMI
Resolution	1080i59
Analog Audio Configuration	
Analog Audio Source	Audio 1
Mute Left	No
Mute Right	No
Gain Left (dB)	0.0
Gain Right (dB)	0.0
Output Level	SMPTE

Admin

The Admin tab contains a number of general administrative functions, each on its own tab. The general layout is shown below:

The Admin tabs are:

- **General:** Manages a number of general card parameters; provides an SNMP MIB download.
- **Firmware:** Manages firmware images.
- **Config Files:** The 9990-DEC-MPEG has the ability to store multiple configurations, and it has a number of pre-set configurations as well. These are managed in this tab.
- **License Keys:** Contains the current licensing state of the 9990-DEC-MPEG, and allows for new license keys to be entered.
- **Event Log:** The 9990-DEC-MPEG contains a non-volatile event log. It can be inspected and downloaded from this tab.
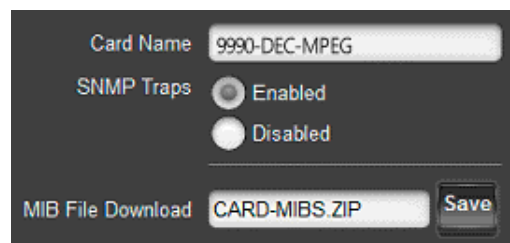
The Admin Statistics tabs are simplified read-only versions of the corresponding Admin Configuration tabs. They will not be explicitly described here.

Admin General Tab

The Admin General Tab includes the following parameters:

- **Card Name:** This field defaults to 9990-DEC-MPEG but can be set to any descriptive name. The name provided here will also appear in the Dashboard™ Tree View.
- **SNMP Traps:** This allows SNMP traps to be enabled or disabled[6]. Note that this setting does not take effect immediately – it will become active the next time the card is rebooted.
- **MIB File Download:** The 9990-DEC-MPEG provides an up-to-date copy of its MIBs. If you click on the **Save** button, a zip file with the relevant MIBs will be downloaded to your computer. This zip file contains the card MIBs, as well as the Ross Video and openGear MIBs required to compile the card MIBs.

The Admin General Tab is depicted below:

Admin Firmware Tab

The 9990-DEC-MPEG can hold up to three distinct firmware images: a **Factory** image, and two upgrade images, called **Image 1** and **Image 2**. The Factory image can never be overwritten, and will always be available as a fall-back in case of problems or failed updates. Image 1 and Image 2 can be updated at will. Since the card offers two upgrade images, it is always possible to fall back to the previous image if there are any problems with the current one. The card will also automatically fall back to the factory image if it detects a corrupted firmware image. Finally, the push buttons on the front of the card allow for a forced override to the factory image, as described in the Front Switches section.

The 9990-DEC-MPEG has one additional firmware image, called the **DSP Image.** The unit can hold up to 4 DSP images. DSP images will be rarely updated by Cobalt Digital Inc.. The decoder will only accept a firmware upgrade if the corresponding DSP image is already loaded in the unit; if Cobalt Digital Inc. releases a new DSP image, it must be loaded first. DSP images are automatically managed – the unit will never replace a DSP image required by any of the loaded firmware images.

9990-DEC-MPEG firmware and DSP images are updated in the same fashion as with any standard openGear™ card. Once you obtained the upgrade image from Cobalt Digital Inc., place it anywhere in your computer and click on the **Upload** button, as shown below. A dialog box allows you to select the upgrade file. Note that you can simultaneously upgrade all of your 9990-DEC-MPEG cards over multiple chassis if you wish. For more detail, consult the

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[6] SNMP is an optional feature in the openGear™ frame controller. The 9990-DEC-MPEG SNMP functions are only available if SNMP is licensed in the frame controller.

Dashboard User Manual, chapter 6, section **Upgrading Device Software**. The Dashboard manual can be downloaded from:

http://www.opengear.tv/dashboard-software

Note that uploading firmware to the 9990-DEC-MPEG does not affect its operation in any way and does not introduce any glitches in the inputs/outputs.

Click here to start firmware update

The fields in the Firmware Image Management tab are:

- **Factory Image, Image 1, and Image 2:** These contain version and release date information for the corresponding firmware images. If no image is present, this field will

indicate **No Image**. This field also shows the required DSP image for each of the firmware images.

- **Upload Location:** This field contains the location where the image upload will go. The 9990-DEC-MPEG automatically chooses a location that will not overwrite the currently running image.
- **Boot Location:** This field indicates which image will be used in the next boot. If an image is successfully uploaded through Dashboard, this automatically changes to point to that image. It can also be manually changed.
- **Auto-Reboot After Update:** This field controls whether or not the 9990-DEC-MPEG will automatically reboot after a successful firmware upload through Dashboard. By default, the 9990-DEC-MPEG will **not** reboot after an update. You can upload the firmware at any time, and reboot later during a maintenance window.
- **Available DSP Images:** this field has a list of loaded DSP images.

Admin Config Files Tab

As you make configuration changes to the 9990-DEC-MPEG, they are automatically persisted in non-volatile storage. If the card is rebooted or power-cycled, it will come back in the same configuration.

In addition to automatic configuration persistency, the 9990-DEC-MPEG also offers the ability to save up to 5 complete configurations, load them, and even export them. This can be used to quickly configure it for different scenarios, or for saving configuration "checkpoints" as a complex configuration is built. Since configurations can be exported, they can be archived outside the card as well.

Finally, the 9990-DEC-MPEG also offers 5 pre-saved configuration templates for some common scenarios.

The layout of the Admin Config Files tab is shown below.

User-Saved Configurations

The fields in the user-saved configuration are:

- **Status:** This indicates whether there is a saved configuration on that particular slot. It will contain the words **Saved** or **Empty**.
- **Name:** This is an optional name for the configuration. It is not required but highly advisable. The name can be edited at any time (even when there is no saved configuration).
- **Config Load Button:** If you click on this button, the corresponding configuration is loaded in the 9990-DEC-MPEG card. It will replace the currently-running configuration. Dashboard™ will take a few seconds to reload (longer if you are accessing over a wide-

area network), but the actual configuration in the 9990-DEC-MPEG is virtually instantaneous. The Status Message Area will indicate the result of the operation.

- **Config Delete Button:** If you click on this button, the corresponding configuration and its description are deleted.
- **Config Save Button:** If you click on this button, the current card configuration is saved on the corresponding slot, possibly replacing the configuration saved there if it is not empty.
- **Download Config:** If you click on the **Save** button, the corresponding file is downloaded to your computer. This feature is provided to allow configuration backups.

If you save a configuration to your computer, and later wish to restore it to the 9990-DEC-MPEG, use the following procedure:

1. On the Dashboard™ Tree View, right-click on the card, and select **Restore Configuration.** Follow the prompts and navigate to the file you wish to restore. This process is illustrated below
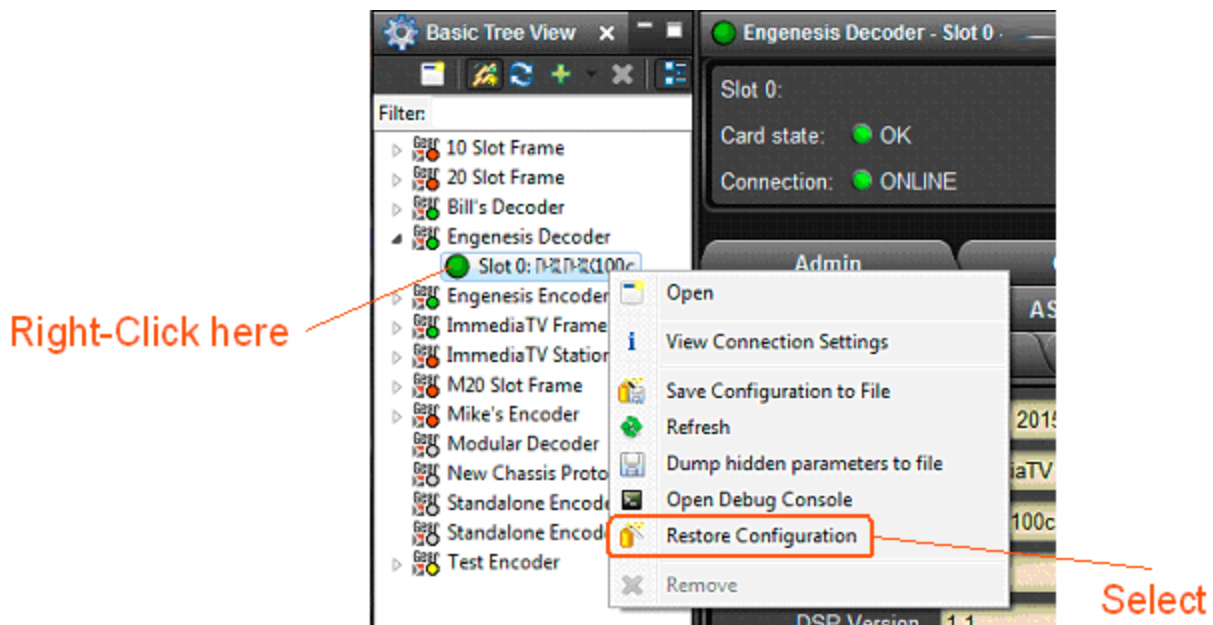
This process is discussed in further detail in the **Dashboard User Manual**, chapter 5, section **Restoring Configurations to Devices**.

Pre-defined Templates

The 9990-DEC-MPEG offers 5 pre-defined configuration templates, as indicated below.

To load a template, just click on the **Load** button next to it. The pre-defined templates are;

- **Decode ASI to HDMI/Composite**: This template assumes a signal present in the ASI Input, decode it, and simultaneously outputs it to the HDMI and composite ports.
- **Decode ASI to SDI**: This template assumes a signal present in the ASI Input, decode it, and simultaneously outputs it to the SDI port.
- **Decode UDP/RTP to SDI with 708 CC**: This template assumes a multicast stream present in the Ethernet streaming port, and decodes it to the SDI output. If the input stream has closed-captions, these are passed through as SMPTE-334M captions.
- **Decode HLS from the Internet**: This template loads a public HLS feed from the Internet and decodes it. If the decoder has access to the Internet via either the streaming port or the control port, and is configured with a DNS address, there may be actual video being displayed[7].
- **RTMP Server Mode**: This template puts the decoder in RTMP Server Mode. It will wait for a connection from an RTMP publishing client and display the stream.

Clear Current Configuration Button

The **Clear Current Configuration** button clears all the configured ports and streams as follows:
- The ASI Ports are enabled. The ASI Output is configured in automatic mode.
- The decoder is configured to decode from ASI.
- All decoder parameters are reset to their defaults.

The button does not affect the following areas:
- The settings in the **Network** tab are not changed.
- The settings in the **Admin General** tab are not changed.
- Saved configurations are not modified in any way.

Dashboard™ will take a few seconds to reload (longer if you are accessing over a wide-area network), but the actual configuration in the 9990-DEC-MPEG is virtually instantaneous. The Status Message Area will indicate the result of the operation.

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[7] Since the server is not operated by Cobalt Digital Inc., we cannot guarantee that video will actually play.

Admin License Keys Tab

The 9990-DEC-MPEG has a number of optional licensable features. The Admin License Keys Tab is used to manage these features. Using this tab, you can see how many licenses you have for each optional feature, and how many you are currently using.

The 9990-DEC-MPEG has the concept of a temporary license. If you want to try out a certain feature, contact Cobalt Digital Inc..   You will receive a license key that enables that feature for a specific period of running time (license time does not "count" when the device is off).

The Admin License Keys Tab includes a License Status table, and a configuration area, as shown below. The table rows are license counts, and the columns correspond to different licensable features. The rows are:

- **Permanent Licenses:** This is the number of non-expiring licenses for each feature.
- **Temporary Licenses:** This is the number of temporary licenses for each feature. Once the license period expires, they are removed.
- **Total Licenses:** This is the total number of licenses for each feature.
- **Used Licenses:** This is the number of licenses in use for each feature by the current card configuration.

If you have temporary licenses, the **Time Remaining** field indicates how long until they expire. If you do not have temporary licenses, this field has the message "No active temporary licenses".

The table columns correspond to the licensable features, as follows:

- **IP Protocols:** This field indicates whether or not the 9990-DEC-MPEG is licensed to accept content on its Ethernet port. Without this license, the unit will only decode from ASI.
- **Dolby Decoding:** This field indicates whether the unit is licensed to decode Dolby AC3/EAC3 audio. Without this license, if the 9990-DEC-MPEG is presented with a stream with Dolby, no audio decoding will be performed.
- **Genlock:** This field indicates whether or not the unit is licensed for output genlock.
- **SMPTE 2022 FEC:** This field indicates whether the unit is licensed to decode SMPTE 2022 FEC. Without this license, the unit will still decode the RTP flow containing the bitstream, but will ignore the SMPTE 2022 FEC packets.

If you want to request a license key from Cobalt Digital Inc., you will need to provide the card serial number. It can be found in the Product Tab and in the Admin License Key Tab as well. Once you receive the key from Cobalt Digital Inc., enter it in the **License Key** field shown above, and click on the **Apply License Key** button. If the key is accepted, you will see the message *License Key Installed OK*, as illustrated above. If there are any problems, you will see an error message in the same location. The following are the possible error messages:

- *Invalid key: missing characters*: the key you entered is too short. Double-check that you entered all the characters.
- *Invalid/Corrupted Key*: the key you entered has the correct number of characters, but it is invalid. Double check what you entered.
- *Serial number mismatch: this key is for serial xxxxxxxxxxx*: 9990-DEC-MPEG license keys are specific to a unit. You entered a valid license key, but it is intended for a different unit, whose serial number is displayed in the message. You must use this key on the correct unit.
- *This key has already been applied*: License keys can only be applied once. This is a valid key for this unit, but you have already applied it, and its features are already available.

Admin Event Log Tab

The 9990-DEC-MPEG includes an Event Log in non-volatile storage. This event log can be used for fault-finding, and to check for error conditions. The following information is included in each 9990-DEC-MPEG event in the log:

- **Date:** The calendar date in which the event occurred.
- **Time:** The time at which the event occurred.
- **Severity:** The severity of the event. The 9990-DEC-MPEG defines three severity levels:

- o **Error:** These are events that affect the operation of the device. For example, an ASI Input losing lock. An error will impact service until addressed.
- o **Warning:** These are events that may produce visible glitches, but they do not have a continuous service impact.
- o **Info:** These are informational events. All configuration actions are logged with this severity. When an error is cleared (for example, an ASI Input regains lock), the event is logged with this severity as well.
- **Subsystem:** The subsystem affected by the event. This may be a port, a stream, or the card itself.
- **Event:** This is a textual description of the event.

None of the 9990-DEC-MPEG models have a battery-backed real-time clock, so they depend on external time servers to synchronize to the current time. By default, the 9990-DEC-MPEG will initialize its internal time-of-day clock to January 1, 2010, GMT and synchronize with a time server if available.

For the 9990-DEC-MPEG, the NTP server IP address can be entered in the Control Tab.

The 9990-DEC-MPEG openGear card depends on the frame controller to obtain the current date and time, and the frame controller depends on an external Network Time Protocol (NTP) server to obtain current date and time.
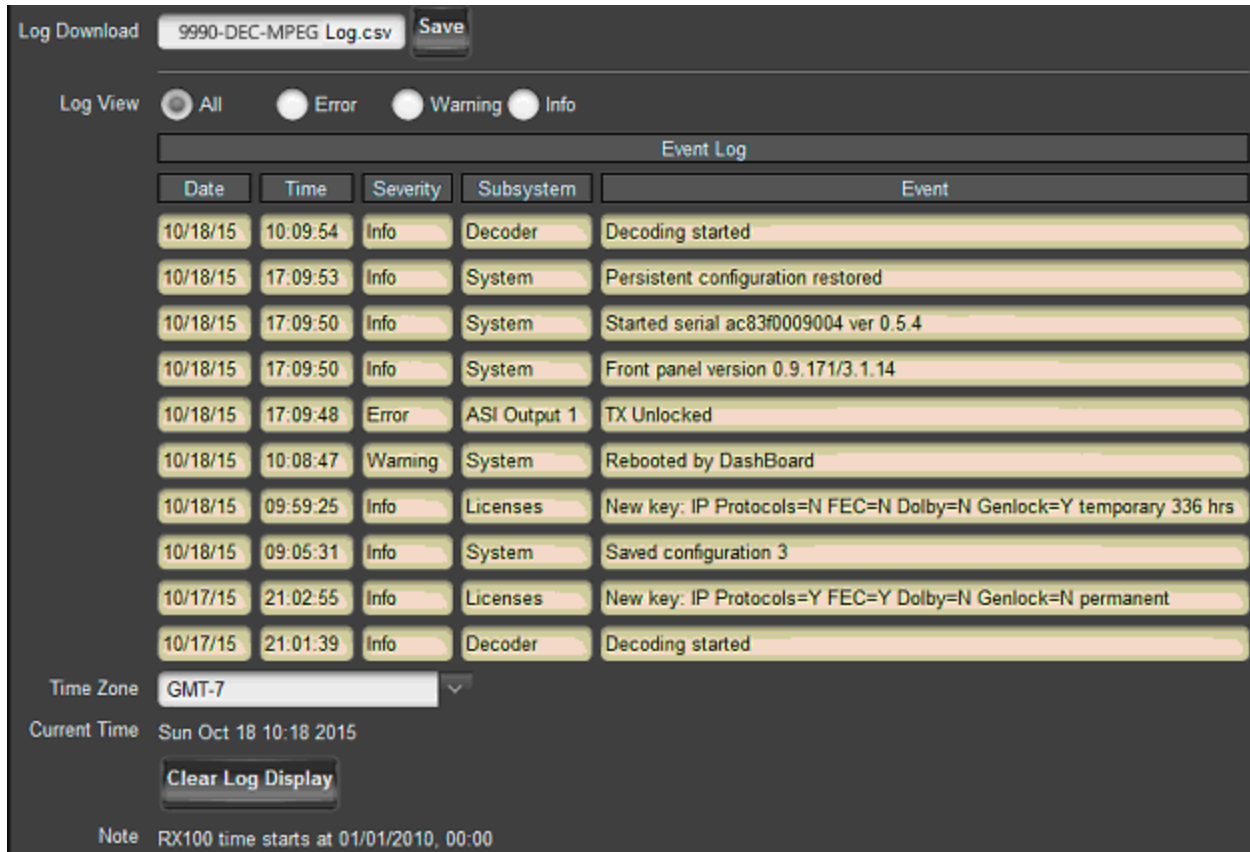
In order to configure the openGear chassis frame controller for NTP, open its configuration screen on Dashboard™, select the **Network** Tab, and enter the IP address of an available NTP server:
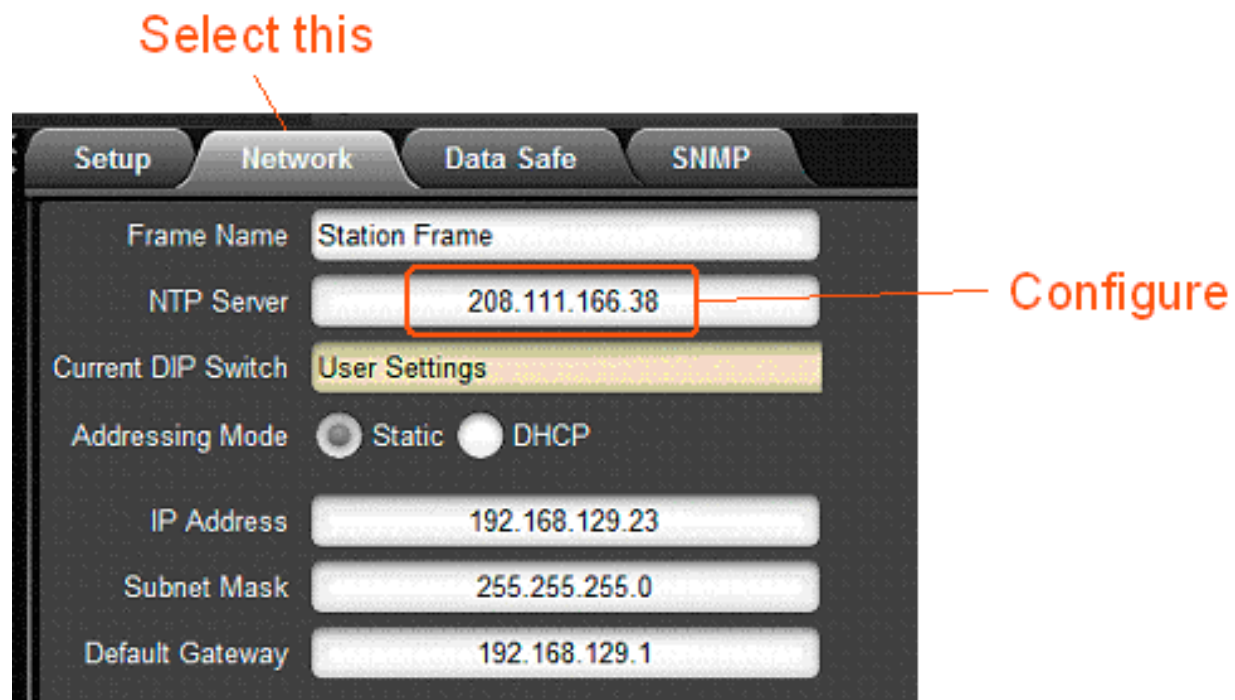
If your frame controller has access to the Internet, you can point it to one of the public NTP servers for your region. You can find more details on this link:

http://psp2.ntp.org/bin/view/Servers/WebHome

The full Admin Event Log tab is displayed below:

Log Download	9990-DEC-MPEG Log.csv	Save

Log View   ◉ All   ● Error   ● Warning ● Info

Date	Time	Severity	Subsystem	Event
10/18/15	10:09:54	Info	Decoder	Decoding started
10/18/15	17:09:53	Info	System	Persistent configuration restored
10/18/15	17:09:50	Info	System	Started serial ac83f0009004 ver 0.5.4
10/18/15	17:09:50	Info	System	Front panel version 0.9.171/3.1.14
10/18/15	17:09:48	Error	ASI Output 1	TX Unlocked
10/18/15	10:08:47	Warning	System	Rebooted by DashBoard
10/18/15	09:59:25	Info	Licenses	New key: IP Protocols=N FEC=N Dolby=N Genlock=Y temporary 336 hrs
10/18/15	09:05:31	Info	System	Saved configuration 3
10/17/15	21:02:55	Info	Licenses	New key: IP Protocols=Y FEC=Y Dolby=N Genlock=N permanent
10/17/15	21:01:39	Info	Decoder	Decoding started

Time Zone GMT-7

Current Time Sun Oct 18 10:18 2015

Clear Log Display

Note RX100 time starts at 01/01/2010, 00:00

The fields are:

- **Log Download:** The user interface only displays the last 10 events of each type. If you would like to see the whole event log, it can be downloaded to your computer by clicking on the **Save** button. The log will be in CSV format, and it can be opened by any utility that can read text files; ideally, you should use a spreadsheet program such as Microsoft Excel or similar so it is presented in tabular format. The log will be in chronological order, oldest entry to newest.
- **Log View:** The user interface can display the last 10 events. You can choose to see the last 10 events of any kind by selecting **All**, or you can restrict the view only to **Info**, **Warning**, or **Error**.
- **Event Log:** This table presents the last 10 events of the selected type.
- **Time Zone:** To simplify the correlation of the events with your local time, you can set your time zone using this drop-down menu. Note that the 9990-DEC-MPEG presents a simplified list, with standard GMT offsets. Note that standard GMT offsets do not

change back and forth with Daylight Savings; you will need to make this adjustment manually if it is relevant to you.

- **Current Time:** This field indicates the 9990-DEC-MPEG view of what the current date and time is. If your frame is not NTP-synchronized, this is useful to figure out "how long ago did this event happen".
- **Clear Log Display:** If you click on this button, it clears all log views. This is useful to quickly identify any new events after the unit has been set up. Note that this action does not clear the logs stored in non-volatile memory.

The 9990-DEC-MPEG will store up to about 400 kBytes of logs in non-volatile memory. When that limit is reached, the oldest half of the stored logs will be deleted to make space for new logs.
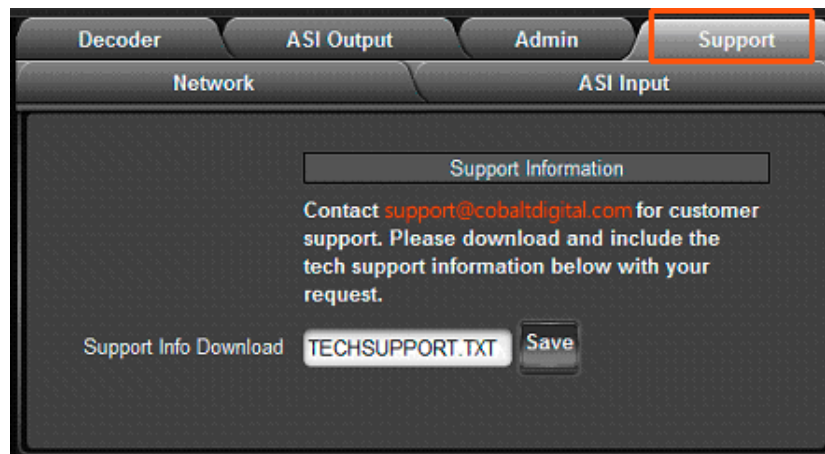
Support Tab

If you need support with your 9990-DEC-MPEG Decoder, you can contact Cobalt Digital Inc. Corporation by phone or e-mail:

- Phone number: +1 408 496-1256, Monday-Friday 9:00AM – 5:00PM Pacific Time
- E-mail: support@Cobalt Digital Inc..com

If you need to contact Technical Support, please be prepared to provide the following information:

1. A detailed description of the problem, and any actions taken to solve it.
2. A detailed description of the environment around the gateway. This includes the make and model of any connected devices being used, as well as the connection network (IP or ASI) between the gateway and any other devices.
3. The Technical Support information from the decoder itself. This is downloaded from the **Support** tab:

> Select the **Support** Tab, and click on the **Save** button next to **Support Info Download**. This will create a file called **TECHSUPPORT.TXT** in the computer running DashBoard. Please e-mail this file to address shown.

The **TECHSUPPORT.TXT** file contains the following information:
- The current configuration of the unit
- A copy of the Event Log (which can also be obtained via the Admin Event Log Tab)

This file does not contain any information that would allow remote access to the unit.

Control Tab

The Control Tab is used to configure the management Ethernet ports in the 9990-DEC-MPEG. This includes both the IP information, as well as the SNMP parameters. The Control Tab is only displayed for the 9990-DEC-MPEG.

The management port supports operation at 10, 100 and 1000 Mb/s, both half-duplex and full-duplex, with auto-negotiation and auto-crossover detection.

The Control Tab has two bottom tabs:
- **Control Port** is used to configure the IP parameters of the control port.
- **SNMP** is used to configure the SNMP parameters for the unit.

Control Port Configuration Tab

The control configuration window is depicted below:

The configuration parameters are:

- **Device Name:** This field controls the top-level name of the device in the Dashboard tree. It defaults to "Decoder". Changes to this field take effect immediately.
- **IP Configuration:** This field selects the control port IP configuration mode, as follows:
    - o **Static IP:** This option selects a static IP address, specified by the IP Address, Subnet Mask, and Default Gateway fields.

- o **DHCP:** This option selects control port IP address configuration by DHCP. If this option is selected, the IP Address, Subnet Mask and Default Gateway fields are not shown.
- **IP Address:** This field is only shown if **IP Configuration** is set to **Static IP**. Enter the desired control port IP address.
- **Subnet Mask:** This field is only shown if **IP Configuration** is set to **Static IP**. Enter the desired control port subnet mask.
- **Default Gateway:** This field is only shown if **IP Configuration** is set to **Static IP**. Enter the desired control port default gateway.
- **DNS Server:** This field is only shown if **IP Configuration** is set to **Static IP**. The 9990-DEC-MPEG needs DNS for the HLS and RTMP Client protocols, if you wish to specify the server by name instead of IP address. If you do not need DNS, you can leave this field at 0.0.0.0. If your 9990-DEC-MPEG is connected to the Internet and you do not have a local DNS server, a good option is the Google public DNS at 8.8.8.8.

NTP Server: If you want the unit to be NTP-synchronized (for logging purposes), enter the IP address of an accessible NTP server in this field. If you do not need NTP, you can leave this field at 0.0.0.0

- **Apply/Cancel:** Use these buttons to apply or cancel the changes to the control port IP configuration. The IP Address, Subnet Mask and Default Gateway entries will be checked for consistency and will be rejected if invalid.

Control Port Statistics Tab

The Control Port statistics screen is depicted below. It contains the current settings for the control port. If you have configured the unit for DHCP, it will include the current IP Address, Subnet Mask, Default Gateway and DNS server obtained from the DHCP server. It also includes the link state for the control Ethernet port.

SNMP Configuration Tab

The 9990-DEC-MPEG includes a built-in SNMP agent with support for SNMP V1 and V2C. It will respond to SNMP transactions only on the control port, for security reasons. This tab includes the parameters for the SNMP configuration. Changes to these parameters take effect immediately.

The SNMP parameters are as follows:

- **Read Community:** this is the SNMP Read-Only community string.
- **Write Community:** this is the SNMP Read-Write community string.
- **System Contact:** this configures the value for the MIB-II System variable System Contact. Whatever value entered here is returned for SNMP queries to that variable.
- **System Location:** this configures the value for the MIB-II System variable System Location. Whatever value entered here is returned for SNMP queries to that variable.
- **Trap Destinations:** the 9990-DEC-MPEG supports up to 5 trap destinations. Enter the desired IP addresses here. Note that the 9990-DEC-MPEG will only generate SNMP V2C traps.

SNMP Statistics Tab

The SNMP statistics tab displays the current SNMP configuration.

SNMP Configuration	
Read Community	public
Write Community	private
System Contact	Contact Not Set
System Location	Location Not Set
Trap Destinations	
Trap Destination 1	0.0.0.0
Trap Destination 2	0.0.0.0
Trap Destination 3	0.0.0.0
Trap Destination 4	0.0.0.0
Trap Destination 5	0.0.0.0