



MSE-8671 and MDE-8672 User Guide

Thank You for Choosing Ross

You've made a great choice. We expect you will be very happy with your purchase of Ross Technology. Our mission is to:

1. Provide a Superior Customer Experience
 - offer the best product quality and support
2. Make Cool Practical Technology
 - develop great products that customers love

Ross has become well known for the Ross Video Code of Ethics. It guides our interactions and empowers our employees. I hope you enjoy reading it below.

If anything at all with your Ross experience does not live up to your expectations be sure to reach out to us at solutions@rossvideo.com.



David Ross
CEO, Ross Video
dross@rossvideo.com

Ross Video Code of Ethics

Any company is the sum total of the people that make things happen. At Ross, our employees are a special group. Our employees truly care about doing a great job and delivering a high quality customer experience every day. This code of ethics hangs on the wall of all Ross Video locations to guide our behavior:

1. We will always act in our customers' best interest.
2. We will do our best to understand our customers' requirements.
3. We will not ship crap.
4. We will be great to work with.
5. We will do something extra for our customers, as an apology, when something big goes wrong and it's our fault.
6. We will keep our promises.
7. We will treat the competition with respect.
8. We will cooperate with and help other friendly companies.
9. We will go above and beyond in times of crisis. *If there's no one to authorize the required action in times of company or customer crisis - do what you know in your heart is right. (You may rent helicopters if necessary.)*

MSE-8671, MDE-8672 User Guide

- Ross Part Number: **8671DR-004-10**
- Release Date: June 18, 2019.

The information contained in this Guide is subject to change without notice or obligation.

Copyright

©2019 Ross Video Limited, Ross®, and any related marks are trademarks or registered trademarks of Ross Video Limited. All other trademarks are the property of their respective companies. PATENTS ISSUED and PENDING. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, mechanical, photocopying, recording or otherwise, without the prior written permission of Ross Video. While every precaution has been taken in the preparation of this document, Ross Video assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

Patents

Patent numbers US 7,034,886; US 7,508,455; US 7,602,446; US 7,802,802 B2; US 7,834,886; US 7,914,332; US 8,307,284; US 8,407,374 B2; US 8,499,019 B2; US 8,519,949 B2; US 8,743,292 B2; GB 2,419,119 B; GB 2,447,380 B; and other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Safety Notices

Refer to the “**Important Regulatory and Safety Notices**” document that accompanied your product.

Statement of Compliance

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

Compliance documentation, such as certification or Declaration of Compliance for the product is available upon request by contacting techsupport@rossvideo.com. Please include the product; model number identifiers and serial number and country that compliance information is needed in request.

EMC Notices

US FCC Part 15

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.

Notice — *Changes or modifications to this equipment not expressly approved by Ross Video Ltd. could void the user's authority to operate this equipment.*

Canada

This Class “A” digital apparatus complies with Canadian ICES-003 and part 15 of the FCC Rules.

Cet appareil numérique de la classe “A” est conforme à la norme NMB-003 du Canada.

European Union

This equipment is in compliance with the essential requirements and other relevant provisions established under regulation (EC) No 765/2008 and Decision No 768/2008/EC referred to as the “New Legislative Framework”.



Warning — *This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.*

Australia/New Zealand

This equipment is in compliance with the provisions established under the Radiocommunications Act 1992 and Radiocommunications Labeling (Electromagnetic Compatibility) Notice 2008.

Korea

This equipment is in compliance with the provisions established under the Radio Waves Act.

Class A equipment (Broadcasting and communications service for business use)

This device is a business-use (Class A) EMC-compliant device. The seller and user are advised to be aware of this fact. This device is intended for use in areas outside home.

Type of Equipment	User's Guide
A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A Equipment (Industrial Broadcasting & Communication Equipment)	This equipment is Industrial (Class A) electromagnetic wave suitability equipment and seller or user should take notice of it, and this equipment is to be used in the places except for home.

International

This equipment has been tested under the requirements of CISPR 22:2008 or CISPR 32:2015 and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this openGear product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the “**Contact Us**” section of this manual. All openGear 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 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, Ross Video 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 Ross Video for more information on the environmental performances of our products.

Company Address



Ross Video Limited

8 John Street
Iroquois, Ontario, K0E 1K0
Canada

Ross Video Incorporated

P.O. Box 880
Ogdensburg, New York
USA 13669-0880

General Business Office: (+1) 613 • 652 • 4886

Fax: (+1) 613 • 652 • 4425

Technical Support: (+1) 613 • 652 • 4886

After Hours Emergency: (+1) 613 • 349 • 0006

E-mail (Technical Support): techsupport@rossvideo.com

E-mail (General Information): solutions@rossvideo.com

Website: <http://www.rossvideo.com>

Contents

Introduction	11
Related Publications	11
Documentation Conventions	11
Interface Elements	11
User Entered Text	12
Referenced Guides	12
Menu Sequences	12
Important Instructions	12
Contacting Technical Support	12
Before You Begin	13
Overview	13
Features	13
Supported Input Video Signals	14
Functional Block Diagrams	14
ASI/IP Streaming	14
OTT Protocols	15
User Interfaces	15
DashBoard Control System	15
Card-edge Monitoring	15
Protocol Overview	17
Raw User Datagram Protocol (UDP)	17
Raw UDP via IP	17
Raw UDP via ASI	18
Direct HTTP Streaming	18
HTTP Live Streaming (HLS)	18
Real-Time Messaging Protocol (RTMP) Streaming	19
Protocol Summary	20
Hardware Overview	21
Card-edge Controls	21
Card-edge Monitoring Features	21
Rear Module Monitoring Features	22
Physical Installation	25
Before You Begin	25
Static Discharge	25
Unpacking	25
Installing the Encoder	25
Supported Rear Modules	25
Installing a Card	25
Cabling	27
R2-8671 and R2-8672 Rear Modules	27
R2C-8671 and R2C-8672 Rear Module	27
Using DashBoard	29
Accessing the Cards in DashBoard	29
DashBoard Interfaces Overview	30

Getting Started	31
Before You Begin	31
Installing the openGear Frame	31
Enabling NTP	31
SNMP Support	31
Installing the Encoder	31
Using DashBoard to Access the Encoder	31
Setup Network Communication	32
Configuring the Network Settings	32
DNS Server Setup	33
Configuring the Encoder Settings	34
Basic Configuration	34
Advanced Configuration	36
Encoding VBI/Ancillary Data	37
Configuring the Encoder Output	37
Configuring for ASI/IP Streaming	37
Configuring for HTTP Live Streaming	38
Configuring for Direct HTTP Streaming	39
Configuring for Real Time Messaging Streaming	39
Saving the Configuration to a User Preset	40
 Network Tab	 43
Interfaces Tab	43
Notes	44
DNS Tab	44
 Encoder Setup	 47
Configuration Overview	47
Using the Apply/Cancel Buttons	47
Video Input Auto-Detection	48
Multiple Audio Support	48
MSE-8671 Encoders	48
MDE-8672 Encoders	49
Selecting an Output Resolution	50
Manual Selection	50
Auto Detected	50
Using the Basic Tab	51
Encoder Configuration	51
Video Parameters	52
Audio Parameters	53
Additional Audio Support	55
Secondary Audio Support	55
Using the Advanced Configuration Tab	56
Video Parameters	57
VBI/Ancillary Data Insertion	59
Audio Parameters	62
Multiplexer Parameters	64
Using the Encoder Connections Tab	66
ASI/IP Streaming	67
HTTP Live Streaming	67
Uploading to an External Server	67
Using the Built-in Server in the Encoder	69
HLS Implementation Notes	69
Direct HTTP Streaming	70
Real Time Messaging Protocol	70
Notes	72

ASI Outputs Tab	75
ASI Outputs Configuration Tab	75
ASI Outputs Configuration	76
IP Outputs Tab	77
Getting Started	77
Configuration Overview	77
IP Output Parameters — Basic View	78
Active IP Outputs	78
IP Output Parameters — Advanced View	79
SMPTE 2022 FEC Support	80
FEC Mode	80
Columns	81
Rows	81
FEC Overhead	81
Constraints	81
Completing the Configuration	81
Active IP Outputs Table	82
Basic View	82
Advanced View	83
Managing Unicast MAC Addresses	83
Connections Tab	85
Connections Configuration Tab	85
Source Selection	85
Destination Selection	85
Source Selection in the Output Ports	86
Established Connections Table	86
MPTS Configuration Tab	87
MPTS Configuration Parameters	88
MPTS PID/Program Allocation	88
Admin Tab	91
General Tab	91
Firmware Tab	92
Config Files Tab	94
Configuration Management Area	94
Managing the Local Configurations	95
Managing the Configuration Files	95
Preset Configurations Area	96
Using the Clear Current Configuration Button	97
Test Packet Generator Tab	97
TPG Configuration Parameters	98
License Keys Tab	99
License Status	99
Requesting a License Key	100
Event Log Tab	100
Timestamps	101
Other Fields in the Event Log Tab	102
Playing Video on a Web Page	103
Using HTML 5	103
Using a Web-browser Plug-in	103
Web Browser Support	103
Web Pages Served by the Encoder	103

Getting Started	104
Multicast Streaming	104
HTTP Live Streaming	105
Direct HTTP Streaming	106
Using a Firewall	106
Status Menus	107
Product Tab	107
Network Status Tabs	108
Encoder Status Tabs	109
Notes on the Video Detected Field	111
HTTP Live Streaming Status	112
Direct HTP Streaming Status	112
RTMP Status	112
ASI Outputs Status Tab	114
IP Outputs Status Tab	114
Connections Status Tab	115
Connections Tab	115
MPTS Tab	115
Software Upgrades	117
Specifications	119
SDI Inputs Specifications	119
Audio Inputs Specifications	119
ASI Outputs Specifications	119
Network Specifications	120
Video Encoding Specifications	120
Output Video Resolution Specifications	120
Audio Encoding Specifications	121
Video Preprocessing Specifications	121
Management and Control Specifications	121
Environmental Specifications	122
Power Specifications	122
Service Information	123
Troubleshooting Checklist	123
Bootload Button	123
Contacting Technical Support	123
Warranty and Repair Policy	124
Glossary	125

Introduction

This guide covers the installation, configuration, and use of the MSE-8671 and MDE-8672. The following chapters are included:

- “**Introduction**” summarizes the guide and provides important terms, and conventions.
- “**Before You Begin**” provides general information to keep in mind before installing and configuring your card.
- “**Protocol Overview**” provides a brief overview of each of the streaming methods supported by the MSE-8671 and MDE-8672 encoders.
- “**Hardware Overview**” provides a basic introduction to the card features including the monitoring features of the rear module.
- “**Physical Installation**” provides instructions for the physical installation of the card and its rear module into an openGear frame.
- “**Using DashBoard**” provides a general overview of the DashBoard user interfaces available on your encoder.
- “**Getting Started**” provides a quick summary of the steps to get you started with H.264 encoding.
- “**Network Tab**” discusses the options available in the Network tab.
- “**Encoder Setup**” discusses the function and options of each Encoder tab.
- “**ASI Outputs Tab**” discusses the functions and options in the ASI Outputs tab.
- “**IP Outputs Tab**” discusses the IP Outputs options.
- “**Connections Tab**” summarizes the options for creating, deleting, and managing the input-output connections.
- “**Admin Tab**” outlines the general administrative functions available in DashBoard for each encoder.
- “**Playing Video on a Web Page**” outlines the available methods of playing video on a web page for the encoder.
- “**Status Menus**” summarizes the monitoring menus and parameters available in DashBoard.
- “**Software Upgrades**” outlines how to upgrade the card via DashBoard.
- “**Specifications**” provides the specifications for the card.
- “**Service Information**” provides information on the warranty and repair policy for your card.
- “**Glossary**” provides a list of terms used throughout this guide.

Related Publications

It is recommended to consult the following Ross documentation before installing and configuring your MSE-8671 and MDE-8672:

- *DashBoard User Manual*, Ross Part Number: 8351DR-004
- *MFC-OG3-N User Manual*, Ross Part Number: 8322DR-004
- *OG3-FR Series User Manual*, Ross Part Number: 8322DR-005
- *OGX-FR Series User Manual*, Ross Part Number: 8322DR-204

Documentation Conventions

Special text formats are used in this guide to identify parts of the user interface, text that a user must enter, or a sequence of menus and sub-menus that must be followed to reach a particular command.

Interface Elements

Bold text is used to identify a user interface element such as a dialog box, menu item, or button. For example:

In the **Network** tab, click **Apply**.

User Entered Text

Courier text is used to identify text that a user must enter. For example:

In the **Language** box, enter **English**.

Referenced Guides

Text set in bold and italic represent the titles of referenced guides, manuals, or documents. For example:

For more information, refer to the ***DashBoard User Manual***.

Menu Sequences

Menu arrows are used in procedures to identify a sequence of menu items that you must follow. For example, if a step reads “**File > Save As**,” you would click the **File** menu and then click **Save As**.

Important Instructions

Star icons are used to identify important instructions or features. For example:

- ★ Contact your IT department before connecting to your facility network to ensure that there are no conflicts. They will provide you with an appropriate value for the IP Address, Subnet Mask, and Gateway for your device.

Contacting Technical Support

At Ross Video, we take pride in the quality of our products, but if problems occur, help is as close as the nearest telephone.

Our 24-hour Hot Line service ensures you have access to technical expertise around the clock. After-sales service and technical support is provided directly by Ross Video personnel. During business hours (Eastern Time), technical support personnel are available by telephone. After hours and on weekends, a direct emergency technical support phone line is available. If the technical support person who is on call does not answer this line immediately, a voice message can be left and the call will be returned shortly. This team of highly trained staff is available to react to any problem and to do whatever is necessary to ensure customer satisfaction.

- **Technical Support:** (+1) 613-652-4886
- **After Hours Emergency:** (+1) 613-349-0006
- **E-mail:** techsupport@rossvideo.com
- **Website:** <http://www.rossvideo.com>

Before You Begin

The MSE-8671 (single channel), and the MDE-8672 (dual channel) are H.264 SD/HD encoders. Each card supports up to four stereo pairs of audio encoding. One stereo pair is dedicated to each video encoder, and the remaining two stereo pairs can be individually associated with either channel. Ethernet and ASI outputs are supported. Both SPTS and MPTS outputs are supported.

Overview

The following inputs are available:

- Software-configurable Composite or SDI video inputs, with auto-detection capability
- SDI video inputs support SD-SDI and HD-SDI with auto-detection capability
- Analog audio stereo inputs
- SDI embedded audio support
- Two internal test packet generators (which can be used to generate ASI or IP test streams)

The following outputs are available: two ASI outputs and two Ethernet outputs. The Ethernet outputs support full-duplex 100Mb/s or 1Gb/s operation.

Each of the MSE-8671 and MDE-8672 channels can operate in one of two modes:

- **ASI/IP Streaming** — used in traditional broadcast applications. The encoded bitstream be transmitted over ASI or IP using UDP protocols, with replication capability.
- **OTT Protocols** — used for Internet streaming. These include RTMP, HSL and Direct HTTP.

Features

The MSE-8671 and MDE-8672 includes the following features:

- Video Encoding support: up to two channels of SD or HD H.264 encoding, with a maximum resolution of 1920x1080i 60 per channel
- Audio Encoding support: up to two channels of MPEG-1 Layer II or AAC-LC, and up to two additional channels of MPEG-1 Layer II
- Video inputs support composite, SD-SDI, and HD-SDI¹
- Audio inputs support unbalanced or balanced analog audio², and SDI embedded digital audio
- Outputs are provided on two ASI ports and two Ethernet ports
- UDP/IP streams can be replicated on both ASI ports or 4 times on each Ethernet port
- Support for UDP on Ethernet
- Support for Over-The-Top (OTT) protocols: HTTP Live Streaming, RTMP, Direct HTTP
- Support for SMPTE 2022 FEC on Ethernet
- Support for inserting generic ancillary data packets in the transport stream using SMPTE-2038, with frame accuracy; up to 4 DID/SDID pairs can be supported.
- Closed-Captioning support (both EIA-608 and EIA-708 captions)
- Filter out SMPTE-334M 608 and/or 708 Closed-Captions
- AFD extraction and insertion support

1. Support for the following input signal types (on HD-SDI): 1920x1080p25, 1920x1080p29.97, 1920x1080p30, 1280x720p25, 1280x720p29.97, 1280x720p30.

2. Rear module dependent. Refer to the chapter “Cabling” on page 27 for details.

- Support for Dolby® AC-3 pass-through embedded in SDI inputs
- Support for SCTE-104 to SCTE-35 conversion
- Multiplexing support: each output can be configured to carry either encoder as a Single Program Transport Stream (SPTS), or both encoders as a Multi Program Transport Stream (MPTS)
- 5 year transferable warranty

Supported Input Video Signals

Table 2.1 lists the supported input video signals.

Table 2.1 Supported Input Signals	
Composite Signals	SDI Signals
NTSC	720x480i 59.94
PAL B/G	720x576i 50
	1280x720p 50
	1280x720p 59.94
	1280x720p 60
	1920x1080p 23.98
	1920x1080p 24
	1920x1080p 50
	1920x1080p 59.94
	1920x1080p 60
	1920x1080i 50
	1920x1080i 59.94
	1920x1080i 60

Functional Block Diagrams

This section provides general workflow diagrams for the two operating modes: ASI/IP Streaming, and OTT Protocols.

ASI/IP Streaming

For ASI/IP streaming, configuring the MSE-8671 and MDE-8672 includes the following steps:

1. Configure the encoders.
2. Configure the outputs (ASI or IP).
3. Make connections between inputs and outputs.

The connections between inputs and outputs can be made as part of the input or output configuration steps. The MSE-8671 and MDE-8672 supports many-to-many connections.

Figure 2.1 describes the overall architecture of the MSE-8671 and MDE-8672 in the ASI/IP Streaming mode.

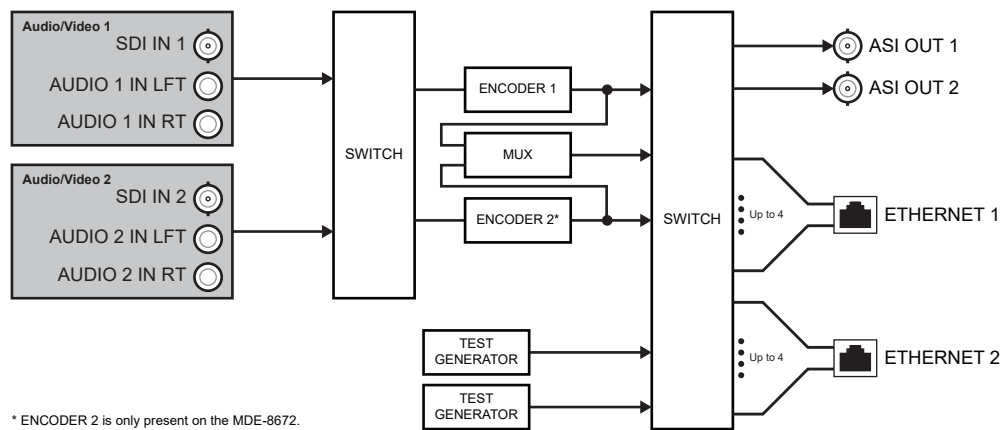


Figure 2.1 Simplified Diagram — ASI/IP Streaming

OTT Protocols

For OTT Protocols, all the configuration steps happen at the encoder — there is no connection phase.

Figure 2.2 describes the overall architecture in OTT Protocols mode.

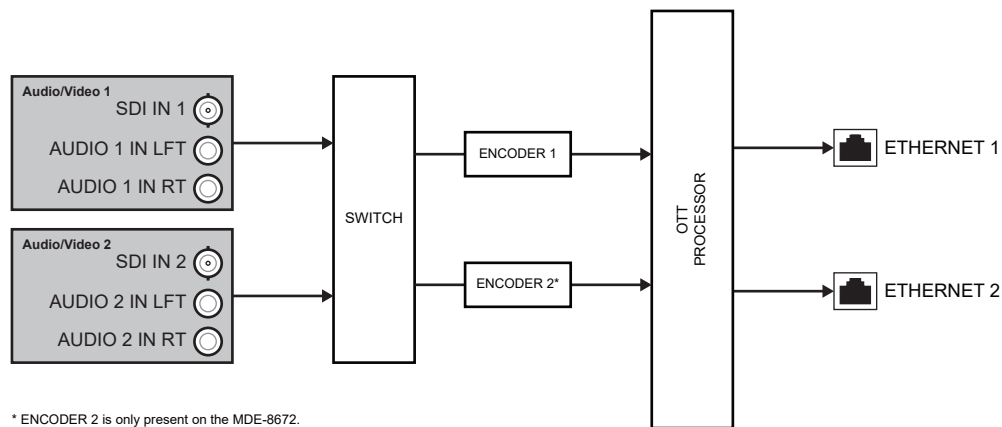


Figure 2.2 Simplified Diagram — OTT Protocols

User Interfaces

The following interfaces are available for control and monitoring of your MSE-8671 and MDE-8672.

DashBoard Control System

DashBoard enables you to monitor and control openGear frames and cards from a computer. DashBoard communicates with cards in the openGear frame through the Network Controller card.

For More Information on...

- the menus in DashBoard, refer to the section “**Status Menus**” on page 107.
- installing and using DashBoard, refer to the ***DashBoard User Manual***.

Card-edge Monitoring

The card-edge provides LEDs for monitoring the status of the input signals, the output signals, and communication activity.

For More Information on...

- the card-edge LEDs, refer to the section “**Card-edge Monitoring Features**” on page 21.

Protocol Overview

This chapter provides a brief overview of each of the streaming methods supported by the MSE-8671 and MDE-8672 encoders.

Raw User Datagram Protocol (UDP)

Raw User Datagram Protocol (UDP) is the simplest form of compressed video transport. The bitstream is divided into packets and sent them directly over UDP. Since UDP has no packet recovery or re-ordering capabilities, this can only be used in very clean and well-managed networks. However, the protocol latency is negligible, so it is a good choice for internal well-managed networks.

Raw UDP via IP

In this mode, the encoder pushes content to a specific destination address, or to a multicast group. Content is carried in an MPEG Transport Stream (MPEG-TS) wrapper via one of the Ethernet ports on the rear module.

Unicast versus Multicast

Unicast streaming delivers the content to a single device at a specified address. In order to stream to multiple devices using unicast, multiple streams must be transmitted from the encoder. The MSE-8671 and MDE-8672 support only a single stream per port. (**Figure 3.1**)

If streaming to multiple devices is required, then Multicast streaming should be used. In this scenario, the encoder streams to a special multicast IP address. Other connected devices then subscribe to this address, and will then receive the stream. The local network routers and switches must be configured for multicast routing. Once setup, the encoder transmits a single UDP stream, which is then delivered to all subscribed clients simultaneously.

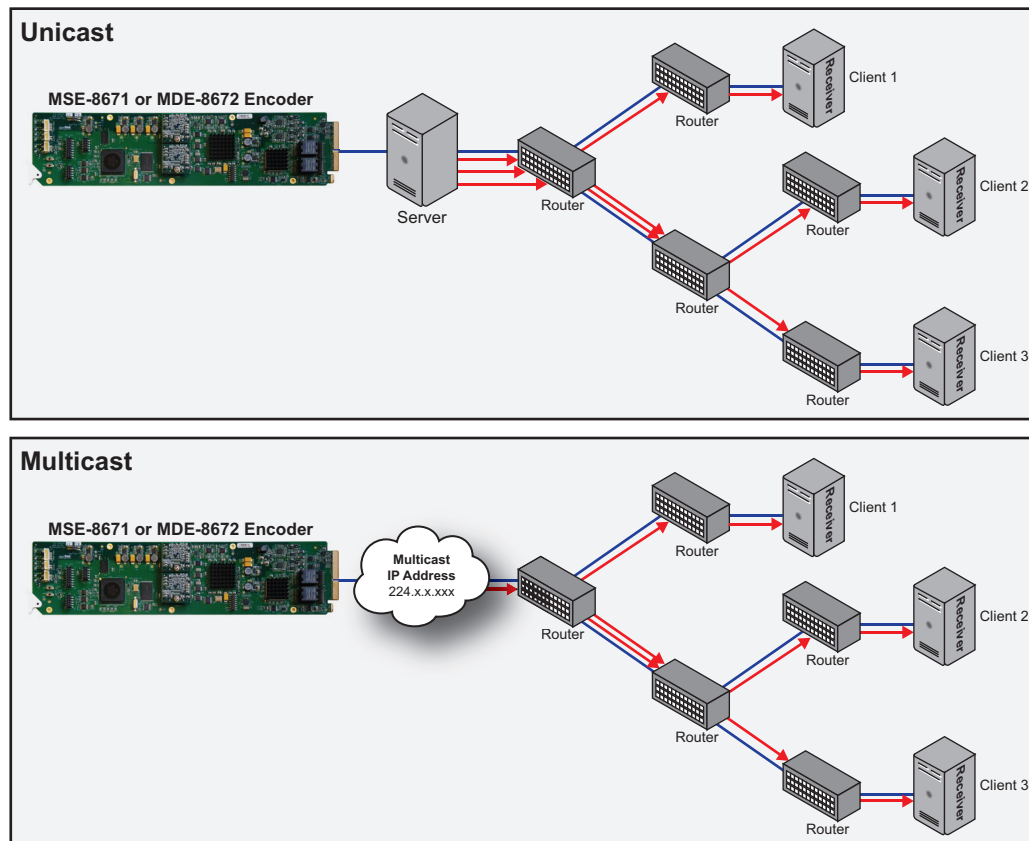


Figure 3.1 Workflow Comparison — Unicast versus Multicast

Table 3.1 outlines the reserved IP addresses that are recognized.

Table 3.1 Reserved IP Addresses

Address Range	Description
224.0.0.0 to 224.0.0.255	Reserved for special “well-known” multicast addresses
224.0.1.0 to 238.255.255.255	Globally-scoped (Internet-wide) multicast addresses
239.0.0.0 to 239.255.255.255	Administratively-scoped (local) multicast addresses

★ The MSE-8671 and MDE-8672 support delivery to multiple clients through multicast only.

Raw UDP via ASI

Raw UDP ASI streaming encapsulates the encoded video and audio content into an MPEG-TS wrapper and transmits it through one or more ASI ports. Additionally, multiple program streams may be muxed into a single Multiprogram Transport Stream (MTS) and transmitted through the same ASI port.

ASI is a point-to-point interface with very low latency, but has no error recovery mechanisms, and is therefore designed to run on reliable infrastructure.

Direct HTTP Streaming

Direct Hypertext Transfer Protocol (HTTP) Streaming is the simplest form of video transmission over Transmission Control Protocol (TCP). The encoder is a server, and the decoder actively connects to it. Once the connection is established, the decoder issues an HTTP GET command, and the encoder responds with the bitstream. Content is carried in an MPEG-TS wrapper. The latency and packet loss reliability of this method are the intrinsic ones from the underlying TCP.

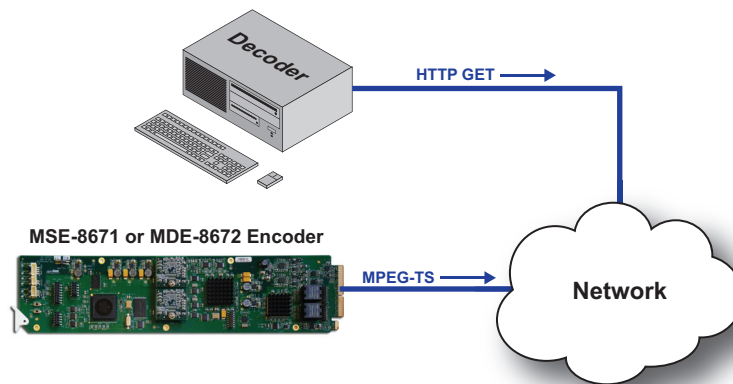


Figure 3.2 Example Workflow for Direct HTTP Streaming

It should be noted that TCP translates “lack of bandwidth” or “excessive packet loss” into “flow control”. Since a Constant Bit Rate (CBR) encoder cannot be flow-controlled, the equipment has a buffer at the sending side, and if the data cannot be sent fast enough, it will be dropped at the encoder side.

HTTP Live Streaming (HLS)

HTTP Live Streaming (HLS) is one example of a class of protocols used for Adaptive Streaming - making available multiple bit rate/resolution profiles to a decoder and letting it dynamically choose which one to display. The HLS protocol was designed by Apple® with the objective of delivering live streaming using an unmodified web server.

The protocol works by breaking the bitstream into “chunks”, which are placed in a standard web server as files. Each chunk is independently decoded; the chunk size can vary between 1 and 30 seconds, with 10 seconds being a

typical number. There is also a “manifest” file that gives the decoder the file names of the current chunks; in HLS, this file is an m3u8 play-list. The decoder first downloads the manifest file, then retrieves the next chunk, plays it, and repeats the process.

Figure 3.3 provides an example of a workflow using a local HLS server.

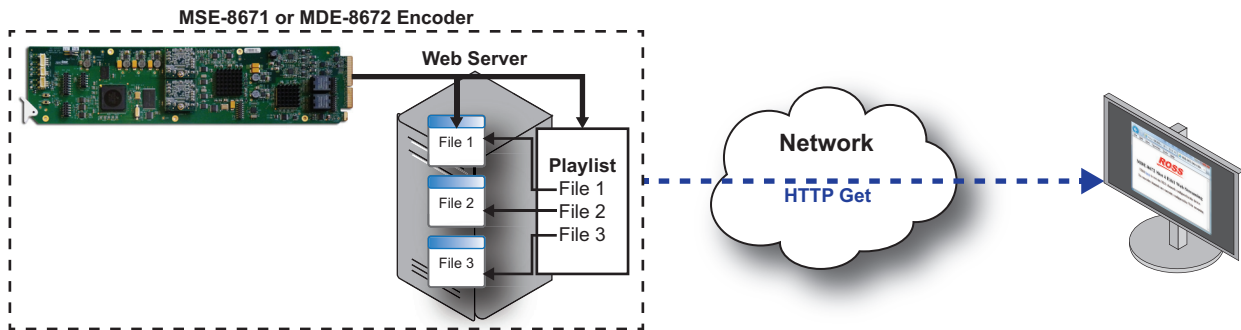


Figure 3.3 Workflow Example — HTTP Live Streaming (HLS), Local Server

Figure 3.4 provides an example of a workflow using an external HLS server.

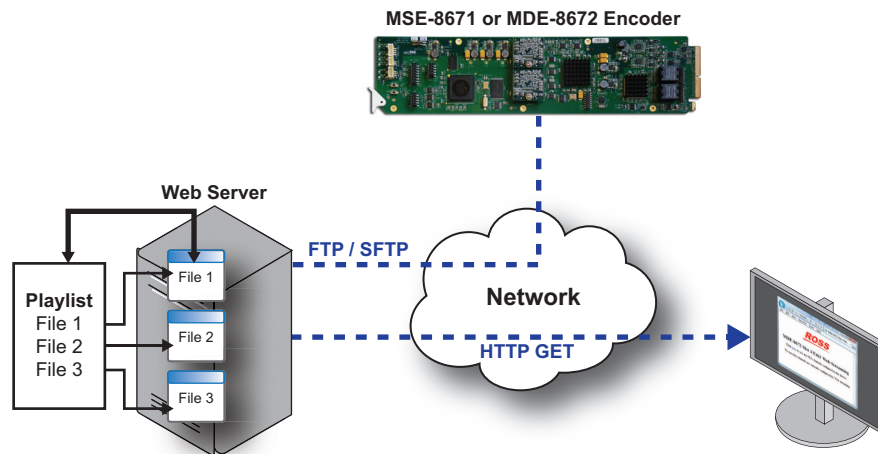


Figure 3.4 Workflow Example — HTTP Live Streaming (HLS), External Server

Real-Time Messaging Protocol (RTMP) Streaming

The Real-Time Messaging Protocol (RTMP) was originally designed by Macromedia® as part of their Flash product, which is now part of Adobe®. In its most common form, a client opens an RTMP connection to a server (typically a large computer) to retrieve a live or stored stream. Additionally, the protocol has an option to allow the client to publish a stream to the server; this is what encoders use and is the de-facto Internet standard for pushing a live stream to a Content Distribution Network (CDN). This is illustrated in **Figure 3.5**. A server tasked with receiving live streams from encoders is typically called the “Origin Server”. RTMP is similar to Direct HTTP in the sense that the bitstream is being encoded to a TCP connection.

However, in this case the encoder is a client, not a server, and the scalability problem moves to the server - the decoders connect to the server, not to the encoder. The encoder-to-decoder latency can be high, depending on how much processing is done in the server.

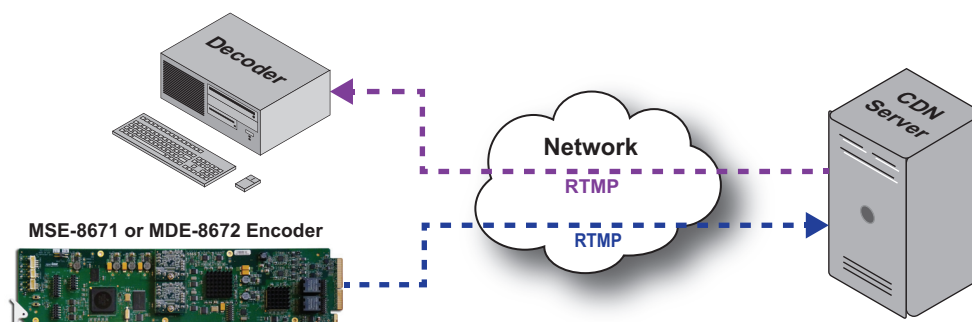


Figure 3.5 Workflow Example — RTMP Streaming

Protocol Summary

Table 3.2 provides an overview of the protocols.

Table 3.2 Protocol Summary

Protocol	Latency	Packet Loss Recovery	Decoder Support	Point to Multi-point	Scalability
Raw UDP	Negligible	None	Professional IRDs, set-top boxes, software decoders	IP Multicast	Good, within internal network
Direct HTTP	Medium-to-High, network dependent	Very Good	Software decoders	Multiple connections to encoder	Poor
HTTP Live Streaming	Very high	Very Good	Software decoders, mobile devices, set-top boxes	Multiple connections	Good, scales at server
RTMP	High, depends on network and server	Very Good	Adobe® Flash® Player	Multiple connections	Good, scales at server

Unfortunately, not all decoders support all protocols. The protocol selection will often be primarily driven by the capabilities of the decoder as outlined in Table 3.3.

Table 3.3 Protocol Selection — Decoders

Decoder	UDP	HTTP	RTMP	HLS
IP Set-top Boxes	✓			✓
Professional IRDs	✓			
Software Decoders	✓	✓		✓
Adobe® Flash® Player			✓	
Mobile Devices				✓

Hardware Overview

This chapter describes the buttons located on the card surface and the monitoring feature of both the card and the rear modules.

Card-edge Controls

There are no other card-edge controls as all configuration and setup is done using the menus in DashBoard.

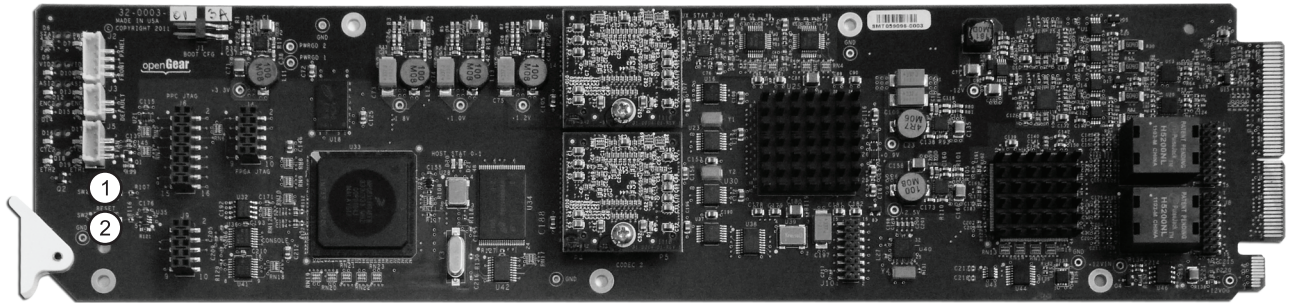


Figure 4.1 Card-edge Controls

1. Default Button

This switch is used to recover the board in the unlikely case of a corrupted or broken firmware update. Do not use this button unless guided by Ross Technical Support.

2. Reset Button

Pressing this push-button switch causes the card to reset.

Card-edge Monitoring Features

The following sections describe the card-edge LEDs. Refer to **Figure 4.2** for LED locations.

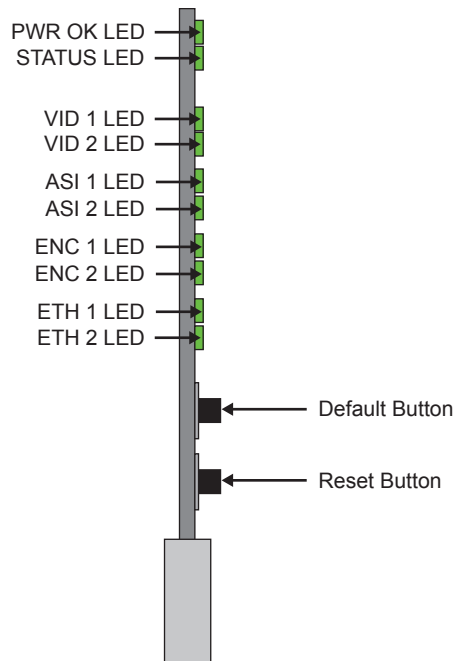


Figure 4.2 LED Locations

Basic LED displays and descriptions are provided in **Table 4.1**.

Table 4.1 Status LEDs

LED	Color	Display and Description
PWR OK	Green	When lit green, this LED indicates that power is received from the openGear frame.
	Off	When off, this LED indicates the absence of power, or insufficient voltage. Verify the power status of the openGear frame.
STATUS	Green	When lit green, this LED indicates the MSE-8671 and MDE-8672 is operating without errors.
	Red	When lit red, this LED indicates that the MSE-8671 and MDE-8672 is experiencing at least one critical alarm. When inserting an MSE-8671 and MDE-8672 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 stay red if there is at least one alarm.
VID #	These LEDs report the same information as the SDI IN LEDs on the rear module.	
ASI #	These LEDs report the same information as the ASI OUT LEDs on the rear module.	
ENC#	Green	When not flashing, these LEDs indicate the encoder is stopped (either by explicit configuration or by lack of input) or if it is in one of the Web streaming modes (HTTP Live Streaming or Direct HTTP Streaming).
	Flashing Green	When flashing, these LEDs indicate the corresponding encoder is running, with output available for routing to ASI, or UDP.
ETH #	Green	When lit green, these LEDs indicate a valid ethernet connection and but there is no communication activity occurring.
	Flashing Green	When flashing green, these LEDs indicate a valid ethernet connection and the specified port is transmitting and/or receiving packets.
	Off	When unlit, these LEDs indicate the absence of a valid ethernet connection.

Rear Module Monitoring Features

This section describe the rear module LEDs and their monitoring features.

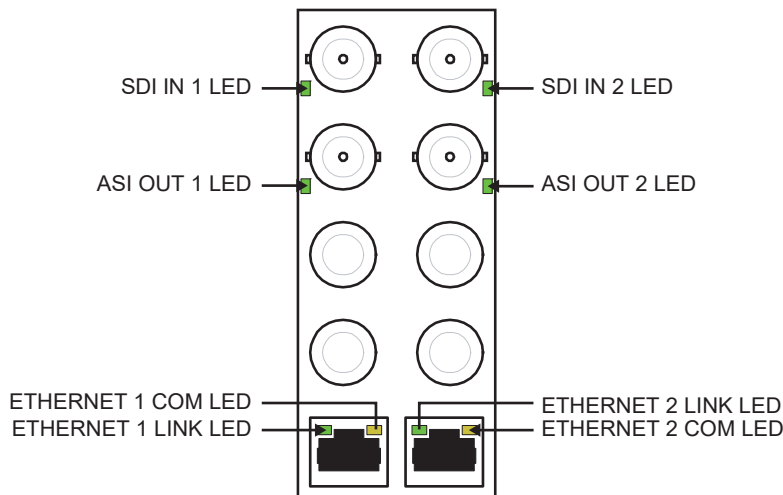


Figure 4.3 LED Locations — R2-8671 and R2-8672 Rear Modules

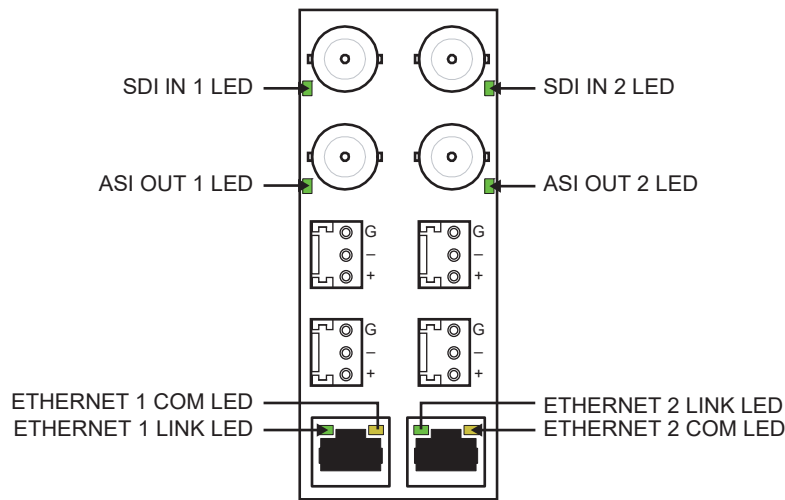


Figure 4.4 LED Locations — R2C-8671 and R2C-8672 Rear Modules

Basic LED displays and descriptions are provided in **Table 4.2**.

Table 4.2 Rear Module Status LEDs

LED	Color	Display and Description
SDI IN #	Flashing Green	When flashing green approximately once per second, this LED indicates the video input is locked to an SD-SDI video signal.
		When flashing green approximately twice per second, this LED indicates the video input is locked to an HD-SDI video signal.
	Off	When unlit, this LED indicates there is no video signal detected, or the input is not configured.
ASI OUT #	Flashing Green	When flashing green, this LED indicates the specified ASI output is configured and enabled.
	Off	When unlit, this LED indicates the specified ASI output is disabled.
ETHERNET # LINK	Green	When lit green, this LED indicates a valid link.
	Off	When unlit, this LED indicates an invalid or unavailable link.
ETHERNET # COM	Flashing Yellow	When flashing yellow, this LED indicates the specified port is currently transmitting and/or receiving.
	Off	When unlit, this LED indicates no activity is occurring on the specified port.

Physical Installation

This chapter provides instructions for installing the rear module for your MSE-8671 and MDE-8672, installing the card in the frame, cabling details, and how to upgrade the software on your card(s).

Before You Begin

Before proceeding with the instructions in this chapter, ensure that your openGear frame is properly installed according to the instructions in the manual that accompanied your frame.

Static Discharge

Throughout this chapter, please heed the following cautionary note:



ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments such as carpeted areas and when synthetic fiber clothing is worn. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each card you received from the shipping container and ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Installing the Encoder

The procedure for installing the rear module and card in your openGear frame. The MSE-8671 and MDE-8672 can be installed in the DFR-8321 series frames and the OG3-FR series frames using the supported rear module.

- ★ The MSE-8671 and MDE-8672 are incompatible with the MFC-8322-S. You must install the MSE-8671 and MDE-8672 in an openGear frame that includes an MFC-8322-N series or an MFC-OG3-N series Network Controller Card.

Supported Rear Modules

The MSE-8671 supports the R2-8671 and R2C-8671 rear modules.

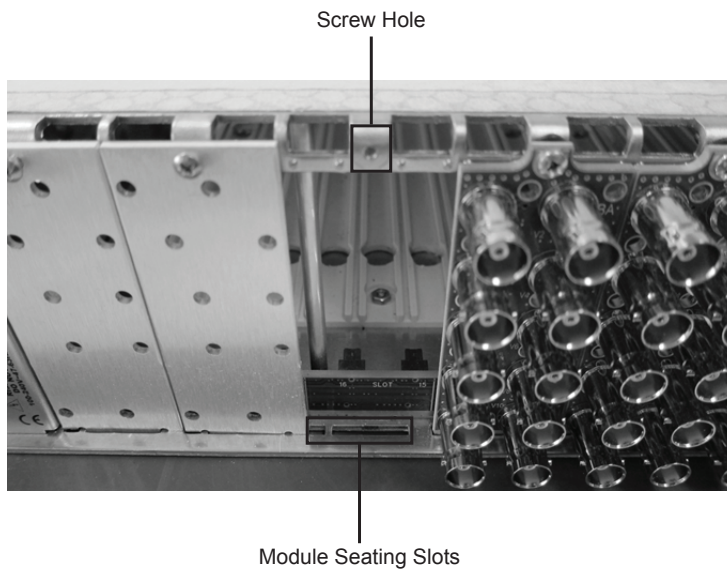
The MDE-8672 supports the R2-8672 and R2C-8672 rear modules.

Installing a Card

You must first install the rear module in the openGear frame and then install the card in the appropriate slot within the frame. This section outlines how to perform both tasks.

To install the rear module in the openGear frame

1. Refer to the frame manual to ensure that the frame is properly installed.
2. On the rear of the frame, locate the card frame slot.
3. Remove the Blank Plate from the rear of the slot you have chosen for card installation.
4. As shown below, seat the bottom of the rear module in the seating slot at the base of the frame's back plane.



5. Align the top hole of the rear module with the screw hole on the top edge of the frame back plane.
6. Using a Phillips screwdriver and the supplied screw, fasten the rear module to the back plane. Do not over-tighten.
7. Verify whether your Rear Module Label is self-adhesive by checking the back of the label for a thin wax sheet. You must remove the wax sheet before affixing the label.
8. Affix the supplied Rear Module Label to the BNC area of the Rear Module.
9. Ensure proper frame cooling and ventilation by having all rear frame slots covered with rear modules or blank metal plates.

To install the card in the openGear frame

1. Locate the Rear Module you installed in the procedure “**To install the rear module in the openGear frame**” on page 25.
2. Hold the card by the edges and carefully align the card edges with the slots in the frame.
3. Fully insert the card into the frame until the rear connection plugs are properly seated on the midplane and rear modules.

Cabling

Each rear module occupies two slots and accommodates one card.

R2-8671 and R2-8672 Rear Modules

These rear modules each provide two software-configurable Composite/SDI video inputs on BNC connectors, two ASI output ports on BNC connectors, four unbalanced analog audio inputs on RCA connectors, and two 100/1000 Mb/s Ethernet ports on RJ45 connectors. (**Figure 6.1**)

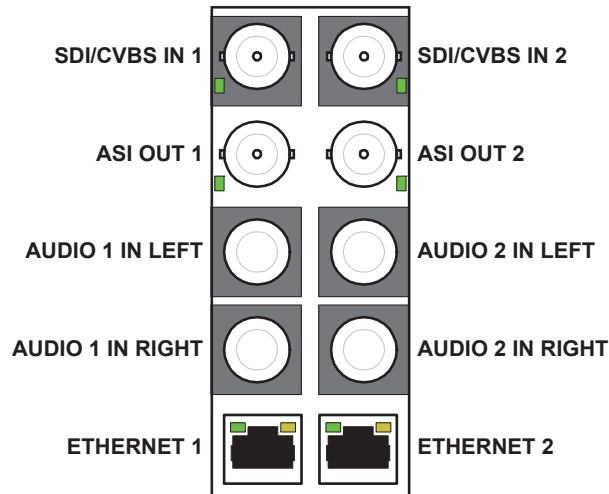


Figure 6.1 Cabling — R2-8671 and R2-8672 Rear Modules

R2C-8671 and R2C-8672 Rear Module

The R2C-8671 and R2C-8672 rear modules each provide two software-configurable Composite/SDI video inputs on BNC connectors, two ASI output ports on BNC connectors, four balanced analog audio inputs on 3-pin connectors, and two 100/1000 Mb/s Ethernet ports on RJ45 connectors. (**Figure 6.2**)

★ Use Phoenix Contact part number 1803581 (Ross Video part number 30-00983) if replacement analog audio connectors are needed.

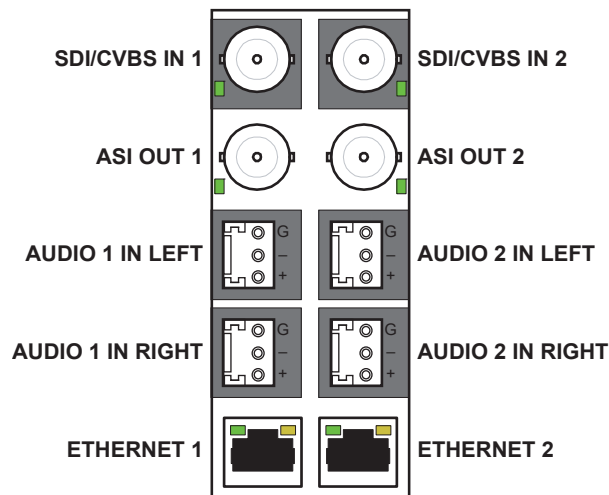


Figure 6.2 Cabling — R2C-8671 and R2C-8672 Rear Modules

Using DashBoard

This chapter provides a general overview of the DashBoard user interfaces available on your encoder.

Accessing the Cards in DashBoard

Before proceeding, ensure that the DashBoard Control System is installed on a PC connected to your facility network. The DashBoard software and user manual area available from the Ross Video website.

For More Information on...

- installing DashBoard, refer to the *DashBoard User Manual*.

To launch DashBoard

1. Ensure that you are running DashBoard software version 6.2.0 or higher.
2. Launch DashBoard by double-clicking its icon on your desktop.
3. Ensure that the openGear frame with your encoder card(s) is displayed in the Tree View located on the left-side of the DashBoard window.

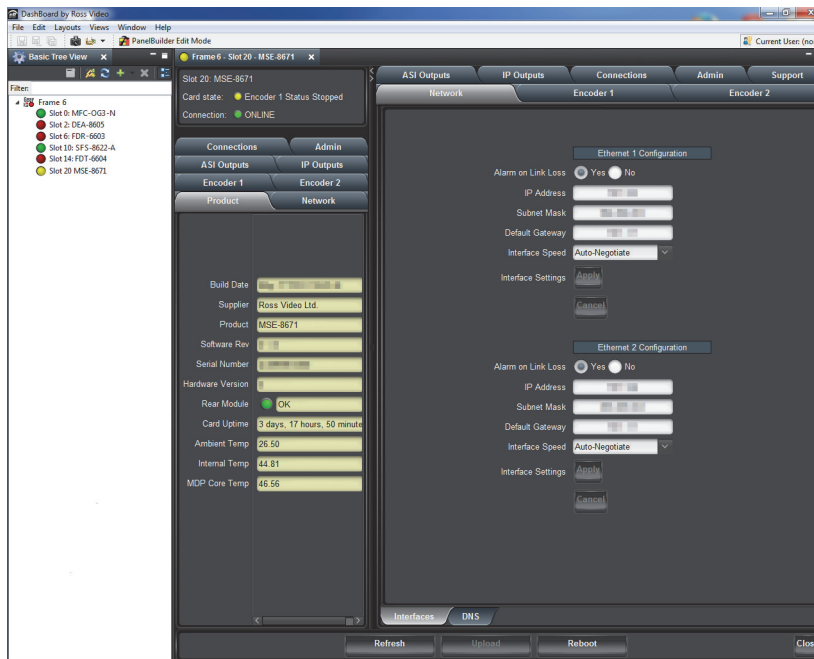
★ It may take 30 seconds or more to update the Tree View. Consult the *MFC-OG3 Series User Manual* and *DashBoard User Manual* should the Tree View not display the card.

To access a card in DashBoard

1. From the **Tree View**, expand the node for the openGear frame your cards are installed in.

A list of cards installed in the frame is now displayed. In the example below, the node for Frame 6 is expanded to show a list of cards including an MSE-8671.

2. Double-click the node for a card to display its menus in the **Device View** of DashBoard (right-side of the DashBoard window).



★ The status tabs are located in the left pane of the Device View window. The right pane of the Device View displays the tabs used for configuration.

DashBoard Interfaces Overview

You configure your encoder using the free DashBoard application, which is available from our website. The DashBoard user manual can also be downloaded from our website.

The encoder user interface is depicted below. It is divided into a status 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.

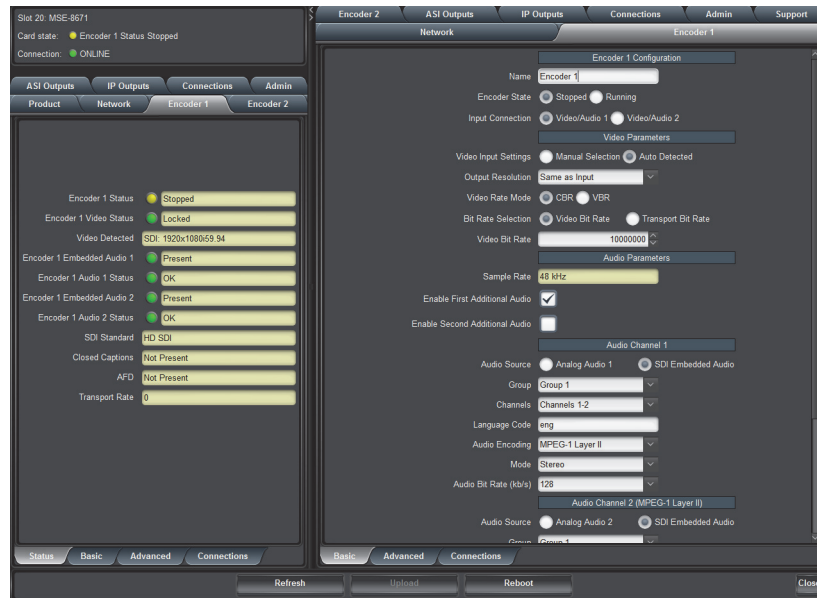


Figure 7.1 Example of Encoder Interface in DashBoard

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 Status area.
- **Network** — This tab is used to configure the IP addresses and network information for the Ethernet ports. The status tabs includes some additional information such as link state.
- **Encoder 1, Encoder 2** — These tabs are used to configure the two encoder channels.
- **ASI Outputs** — This tab is used to configure/monitor the ASI ports.
- **IP Outputs** — This tab is used to configure/monitor the IP Output ports. The configuration panel provides the facilities to create, manage and delete ports; the status tab includes transmission status information.
- **Connections** — This tab is used to configure/monitor connections. The configuration tab provides facilities to create, edit and delete connections; the status tab provides a table where the status of all the connections in the unit can be inspected at a glance.
- **Admin** — This tab is used for general administrative functions, such as firmware upgrades, licensing, logs, and configuration management. The Test Packet Generator configuration is also found under this tab.

Each tab is discussed in a separate chapter of this manual.

Getting Started

This chapter provides a quick summary of the steps to get you started with H.264 encoding.

Before You Begin

This section provides general information for setting up the openGear frame, cards, and DashBoard before you can proceed to setup your MSE-8671 and MDE-8672.

★ Contact your IT Department before connecting to your facility network to ensure that there are no conflicts.

Installing the openGear Frame

The openGear frame is a 2RU high density modular frame, designed to accommodate up to 20 openGear cards. When you are facing the openGear frame front, the Network Controller Card is located in the furthest slot to the right. This card features an ethernet interface which allows the openGear cards in the frame to be monitored and controlled using DashBoard.

Enabling NTP

Ensure the Network Controller Card is configured to use NTP as a time source. This will provide the time source for the MSE-8671/MDE-8672.

SNMP Support

Ensure the Network Controller Card is enabled for SNMP if you will use Simple Network Management Protocol (SNMP) to monitor your MSE-8671 and MDE-8672.

For More Information on...

- physically installing your frame, refer to the *OGX-FR Series User Manual*.
- configuring the Network Controller Card, refer to the *MFC-OG3 Series User Manual*.

Installing the Encoder

Once your frame is installed and the Network Controller Card is configured:

1. Physically install the rear module for the MSE-8671 and MDE-8672 into the openGear frame as outlined in the section “**To install the rear module in the openGear frame**” on page 25.
2. Physically install the encoder into the appropriate slot in the frame as outlined in the section “**To install the card in the openGear frame**” on page 26.
3. Cable the inputs and outputs for the MSE-8671 and MDE-8672 as outlined in the chapter “**Cabling**” on page 27.

Using DashBoard to Access the Encoder

Before proceeding, ensure that the DashBoard client software is installed on a PC connected to the same network as your openGear frame. The DashBoard software and user manual are available from our website. The procedures in this chapter assume you have the tabs open in DashBoard for your MSE-8671 and MDE-8672.

For More Information on...

- launching DashBoard, refer to the section “**To launch DashBoard**” on page 29.

Setup Network Communication

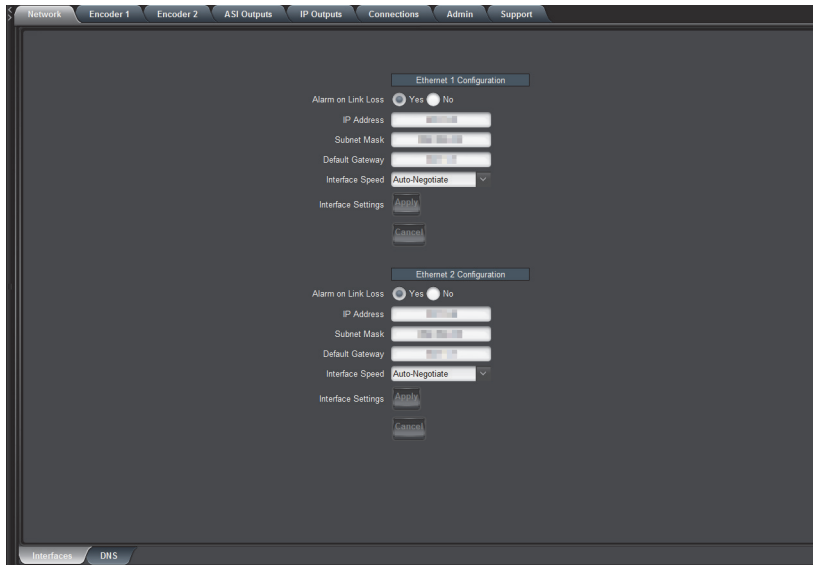
Contact your IT Department for the appropriate network settings for your MSE-8671 and MDE-8672.

Configuring the Network Settings

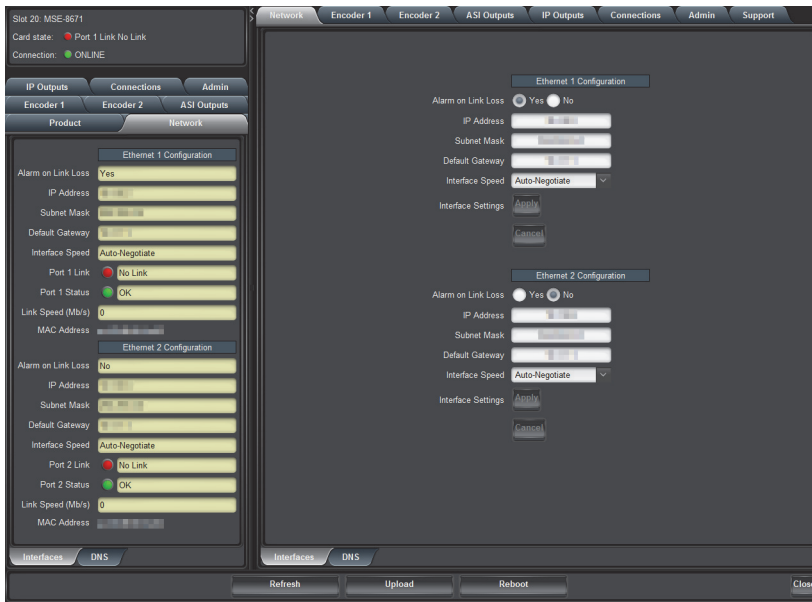
Configure the settings for each Ethernet port in use on the rear module.

To configure the network settings

1. Ensure the **Interfaces** sub-tab in the **Network status** tab is displayed.
2. Select the right-most **Network** tab.
3. Select the **Interfaces** sub-tab located at the bottom of the **Network** tab.



4. Specify the network settings for each Ethernet port as required. Refer to the section “**Interfaces Tab**” on page 43 for details on the available options.
5. For most applications, the **Interface Speed** can be set to **Auto-Negotiate**.
6. Click **Apply** to save and apply your changes.
7. Verify the following read-only fields for each Ethernet port displayed in the **Interface** status tab:
 - IP Address
 - Subnet Mask
 - Default Gateway
 - MAC Address

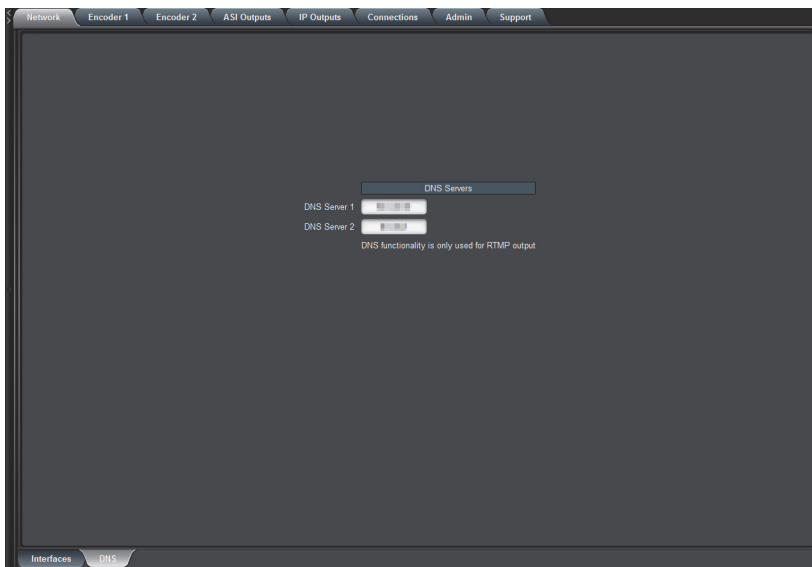


DNS Server Setup

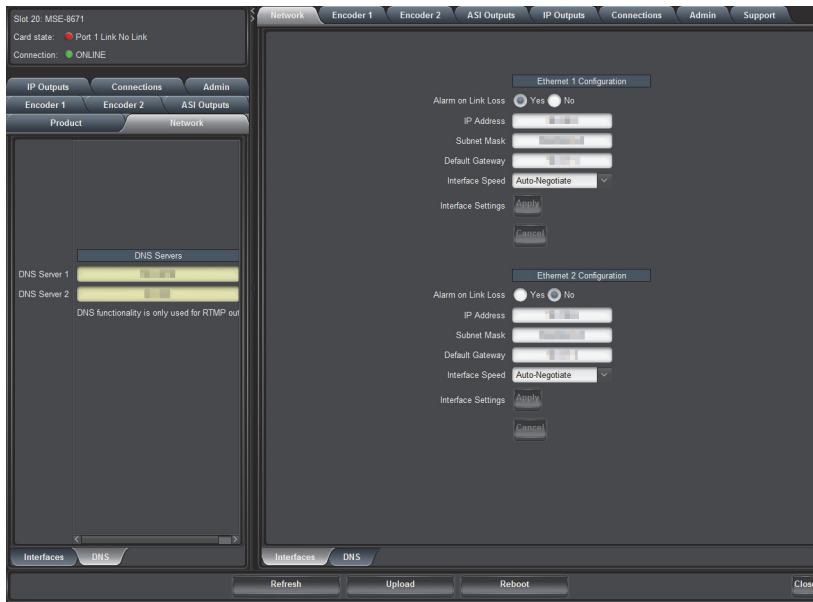
If you are using RTMP protocol for encoding, you must set the addresses for up to two DNS Servers. Contact your IT Department for the address(es) of the DNS Servers your facility uses.

To set the address for a DNS Server

1. Ensure the **DNS** sub-tab in the **Network status** tab is displayed.
2. Select the right-most **Network** tab.
3. Select the **DNS** sub-tab located at the bottom of the **Network** tab.



4. Specify the address for each DNS server as provided by your IT Department. Refer to the section “**DNS Tab**” on page 44 for details on the available options.
5. Verify the settings displayed on the **DNS** status tab.



Configuring the Encoder Settings

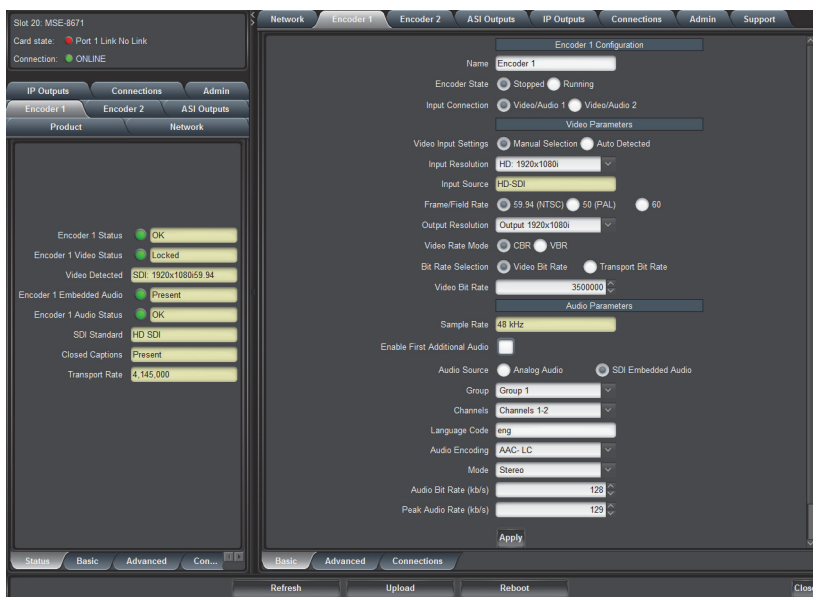
The MSE-8671 includes one MSE-8671 and MDE-8672 channel and the MDE-8672 includes two MSE-8671 and MDE-8672 channels. This section outlines how to configure one channel, but the steps can be repeated to configure a second channel if required.

Basic Configuration

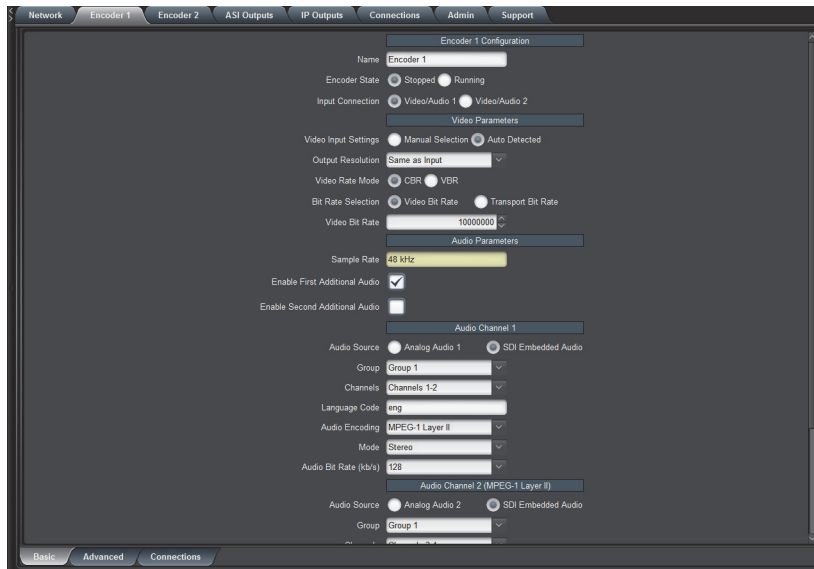
The basic configuration for an MSE-8671 and MDE-8672 specifies which physical input (or both) are running, sets how the card identifies the input video signal, specifies the input source type and resolution, and enables you to select the applicable video bit rates. You can also select the audio source, the language code, the audio encoding modes and applicable audio bit rates.

To configure the basic settings for an MSE-8671 and MDE-8672 channel

1. Ensure the **Basic** sub-tab in the **Encoder status** tab is displayed in the left side pane of the **Device View** in Dashboard.



2. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
3. Select the **Basic** sub-tab located at the bottom of the **Encoder 1** tab.



4. Type a unique identifier for the encoder channel in the **Name** field.
5. Set the **Encoder State** to **Running**.
6. Set the **Video Input Settings** to **Auto Detected**.
7. Specify an **Output Resolution**.
8. Set the **Video Rate Mode** to **CBR** (Constant Bit Rate) or **VBR** (Variable Bit Rate).
9. Use the **Video Bit Rate** to specify the transport bit rate. **Table 8.1** outlines the maximum bit rate that you can set the encoder based on the protocol. If you try to configure a higher bit rate that supported by the protocol, an error message is displayed when Apply is selected and the encoder rejects the settings.

Table 8.1 Maximum Bit Rates

Protocol	Maximum Bit Rate
UDP	30Mb/s
HLS (local or remote)	15Mb/s
RTMP	12Mb/s (this is an overall limit per board regardless of the number of encoder channels it provides)
Direct HTTP	20Mb/s per Ethernet port

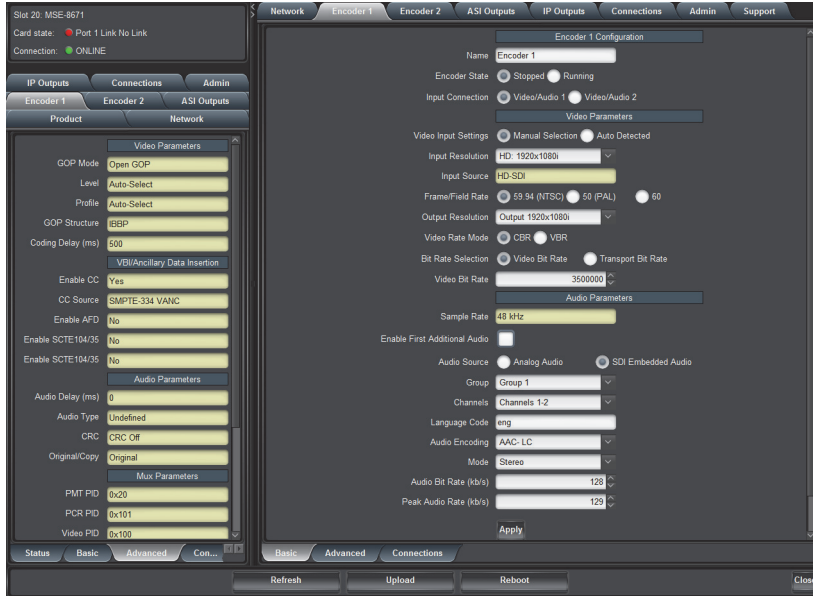
10. To define the audio source:
 - Use the **Audio** menu to select the audio source. Refer to section “**Audio Source**” on page 53 for a list of options.
 - Use the **Language Code** field to specify the 3-letter **ISO 639-S** code for the audio.
 - Use the **Audio Encoding** menu to specify the audio encoding algorithm and determine the options available in the **Mode** menu. Refer to the section “**Audio Encoding**” on page 54 for details.
 - Use the **Mode** menu to specify type of audio to be encoded. Refer to the section “**Mode**” on page 54 for details.
11. Click **Apply** to save and apply your changes.
12. Verify the read-only fields for the Encoder channel display in the **Encode** status tab.

Advanced Configuration

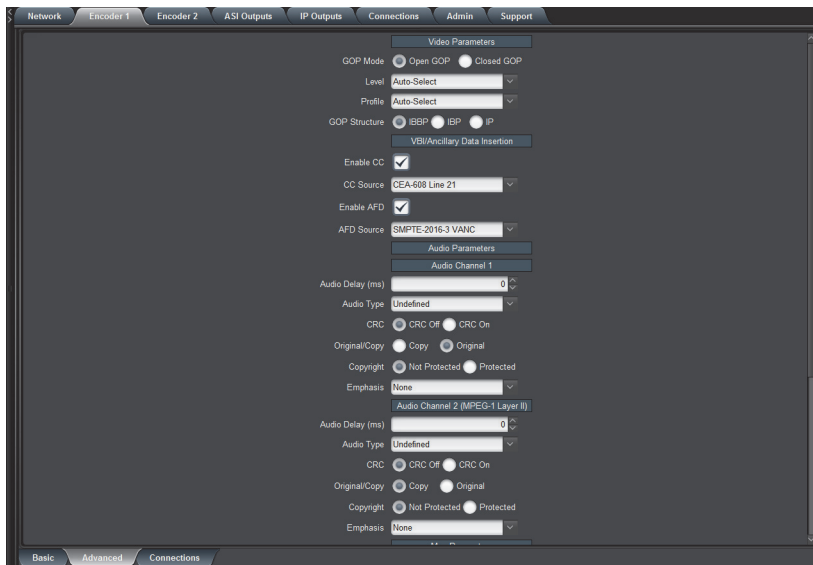
The video settings for your MSE-8671 and MDE-8672 includes options for selecting the Group of Pictures mode and details, the H.264 level in the bit stream, aspect ratio, and whether to apply a Coded Picture Buffer.

To configure the advanced settings for an MSE-8671 and MDE-8672 channel

1. Ensure the **Advanced** sub-tab in the **Encoder status** tab is displayed in the left side pane of the **Device View** in DashBoard.



2. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
3. Select the **Advanced** sub-tab located at the bottom of the **Encoder** tab.



4. Set the **Level** field to **Auto-Select**.
5. Set the **Profile** to **Auto-Select**.
6. If required, use the **Audio Delay** field to advance the audio in relation to the video in milliseconds (ms).
7. Use the **Audio Type** menu to add a description to the PMT data.

8. Configure the audio/video multiplexing and the PSI tables as outlined in the section “**Multiplexer Parameters**” on page 64.
9. Click **Apply** to save and apply your changes.
10. Verify the read-only fields for the Encoder channel display in the **Encode** status tab.

Encoding VBI/Ancillary Data

The MSE-8671 and MDE-8672 can extract Closed Captioning (CC) and Active Format Description (AFD) data from the video input and insert the data into the compressed video output. The MSE-8671 and MDE-8672 automatically re-formats the closed captions to suit any combination of input/output frame rates and interlaces modes.

To encode closed captions

1. Navigate to the **Basic** tab.
2. Set the **Video Input Settings** to **Auto Detected**.
3. Navigate to the **Advanced** tab.
4. Select the **Enable CC** box.
5. Use the **CC Source** field to specify where the encoder extracts closed captions from. Refer to the section “**Closed Captioning**” on page 59 for details.
6. In the **Audio Parameters** area, select the **CRC On** box.
7. Click **Apply** to save and apply your changes.

To encode AFD data

1. Navigate to the **Basic** tab.
2. Set the **Video Input Settings** to **Auto Detected**.
3. Navigate to the **Advanced** tab.
4. Select the **Enable AFD** box.
5. Use the **AFD Source** field to specify where the AFD data is coming from. Refer to the section “**Active Format Description**” on page 60 for details.
6. Click **Apply** to save and apply your changes.

Configuring the Encoder Output

Note that the Connections tab only displays the Output Protocol menu until a protocol is selected. The options displayed in the Output tab are dependent on the protocol selected.

For More Information on...

- the available protocols, refer to the section “**Using the Encoder Connections Tab**” on page 66.

Configuring for ASI/IP Streaming

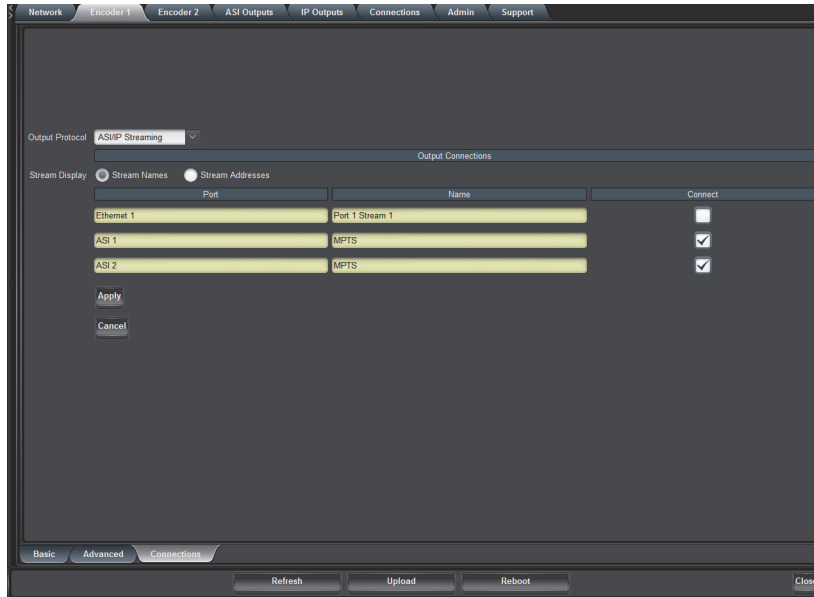
The encoder output can be transmitted using either one of the two ASI ports or one of the streaming Ethernet ports on the rear module.

For More Information on...

- ASI/IP streaming, refer to the section “**ASI/IP Streaming**” on page 67.

To configure the output for ASI/IP Streaming

1. Ensure the Ethernet port or ASI port you wish to use for the streaming output is configured.
 - If you are using an Ethernet port, refer to the chapter “**IP Outputs Tab**” on page 77
 - If you are using an ASI port, refer to the chapter “**ASI Outputs Tab**” on page 75.
2. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
3. Select the **Connections** sub-tab located at the bottom of the **Encoder** tab.
4. Set the **Output Protocol** menu to **ASI/IP Streaming**.



5. Use the **Stream Display** options to specify the destination of all defined Ethernet and ASI ports. Choose from the following:
 - **Stream Names** — the user-defined name for the ASI/IP output is displayed in the DashBoard interfaces.
 - **Stream Addresses** — the destination IP addresses and UDP ports and the values for the ASI ports are displayed in the DashBoard interfaces.
6. Select the **Connect** box for the port you want to enable for ASI/IP streaming. Only those ports already configured will display in the tab.
7. Click **Apply** to save and apply your changes.

Configuring for HTTP Live Streaming

HTTP Live streaming is supported in the encoder. The content can be uploaded to an external server, or served directly from the unit.

For More Information on...

- HTTP Live streaming, refer to the section “**HTTP Live Streaming**” on page 67.

To configure for HTTP Live Streaming to an external server

1. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
2. Select the **Connections** sub-tab located at the bottom of the **Encoder** tab.
3. Set the **Output Protocol** menu to **HTTP Live Streaming**.
4. Set the **Server Location** to **Remote**.

5. Use the **Transfer Protocol** menu to specify the protocol to be used between the MSE-8671 and MDE-8672 and the web server for uploading files.
6. Use the **Server Address** field to specify the IP Address for the web server.
7. Use the **Username** field to specify the user account to use when uploading files to the server.
8. Use the **Server Path** field to specify the server path for the directory where the files will be located.
9. Specify the base file name for the files created in the server. Refer to the section “**Program Name**” on page 69 for details.
10. Use the **Segment** field to define the approximate size (in seconds) for the bit stream encoded files.
11. Use the **Number of Segments** field to specify the number of bit stream segments in the play-list.
12. Click **Apply** to save and apply your changes.

To configure for HTTP Live Streaming directly from the encoder

1. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
2. Select the **Connections** sub-tab located at the bottom of the **Encoder** tab.
3. Set the **Output Protocol** menu to **HTTP Live Streaming**.
4. Set the **Server Location** to **Local**.
5. Use the **Segment** field to define the approximate size (in seconds) for the bit stream encoded files.
6. Use the **Number of Segments** field to specify the number of bit stream segments in the play-list.
7. Click **Apply** to save and apply your changes.

Configuring for Direct HTTP Streaming

Direct HTTP Streaming is an output mode whereby clients open a standard HTTP connection to the MSE-8671 and MDE-8672 and issue a standard HTTP GET request.

For More Information on...

- direct HTTP streaming, refer to the section “**HTTP Live Streaming**” on page 67.

To configure the output for Direct HTTP Streaming

1. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
2. Select the **Connections** sub-tab located at the bottom of the **Encoder** tab.
3. Set the **Output Protocol** menu to **Direct HTTP Streaming**.
4. Use the **Listening to Port** field to specify the TCP port to be used by the MSE-8671 and MDE-8672 to listen to HTTP connections.
5. Click **Apply** to save and apply your changes.

Configuring for Real Time Messaging Streaming

The MSE-8671 and MDE-8672 can operate as a Real Time Messaging protocol (RTMP) client, and publish a real-time, live bit stream to an RTMP server. An RTMP server publishing point is defined by the following nomenclature: `rtmp[t][e][s]://servername/app`.

- ★ Ensure the DNS Server address(es) are specified in the Network tab before proceeding. Refer to the section “**DNS Tab**” on page 44 for details.

For More Information on...

- RTMP streaming, refer to the section “**Real Time Messaging Protocol**” on page 70.

To configure for HTTP Live Streaming directly from the encoder

1. Select the **Encoder** tab for the channel you want to configure from right side pane in the **Device View**.
2. Select the **Connections** sub-tab located at the bottom of the **Encoder** tab.
3. Set the **Output Protocol** menu to **RTMP**.
4. Configure the settings for output to the primary server:
 - Use the **Primary Server** field to specify the host name or IP address of the primary (or single) RTMP server to be contacted as described in the section “**Primary Server**” on page 71.
 - Use the **Primary Network Interface** menu to specify the Ethernet port on the MSE-8671 and MDE-8672 rear module to use when contacting the primary server as described in the section “**Primary Network Interface**” on page 71.
 - Use the **Primary App** menu to define the application name in the primary server as described in the section “**Primary App**” on page 71.
 - Use the **Primary Stream** field to specify the stream name for the primary server as outlined by your server documentation or CDN.
5. Configure the settings for output to the backup server:
 - Use the **Backup Server** field to specify the host name or IP address of the backup (or single) RTMP server to be contacted.
 - Use the **Backup Network Interface** menu to specify the Ethernet port on the MSE-8671 and MDE-8672 rear module to use when contacting the backup server.
 - Use the **Backup App** menu to define the application name in the backup server.
 - Use the **Backup Stream** field to specify the stream name for the backup server as outlined by your server documentation or CDN.
 - Use the **Redundancy Switch Time** field to set the timeout for the MSE-8671 and MDE-8672 to switch servers after the server stops accepting data.
6. If your RTMP server requires a username/password authentication for access:
 - Set **Authentication** to **Yes**.
 - Use the provided username and password fields to specify the information for authentication.
 - Set **Connect** to **Yes** to immediately establish a connection with the server.
7. Click **Apply** to save and apply your changes.

Saving the Configuration to a User Preset

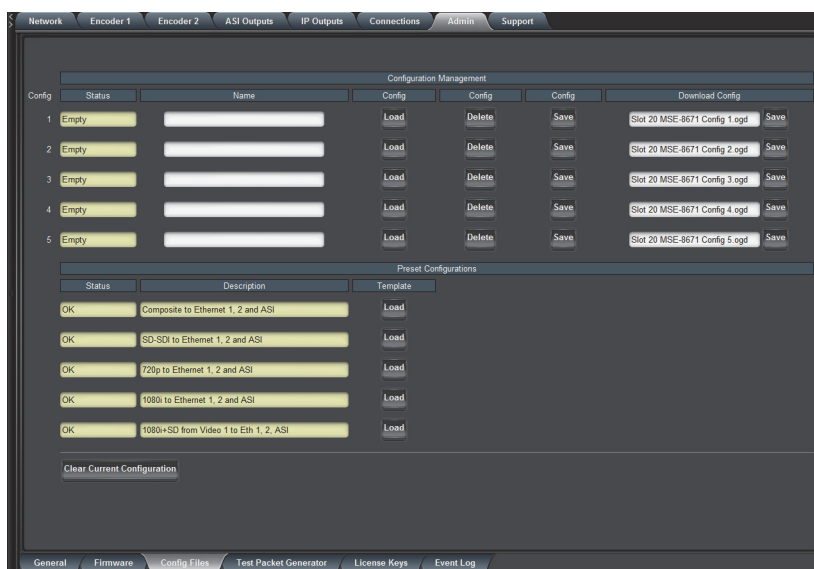
Each MSE-8671 and MDE-8672 keeps up to five user presets and five pre-defined presets. This can be used to quickly configure an MSE-8671 and MDE-8672 for different scenarios, or for saving configuration “checkpoints” as a complex configuration is built. Or, once you have all the settings configured for your MSE-8671 and MDE-8672, you may wish to save the configuration to a user preset.

For More Information on...

- managing presets, refer to the section “**Config Files Tab**” on page 94.

To save your settings to a user preset

1. Ensure the **Config Files** sub-tab in the **Admin status** tab is displayed.
2. Select the right-most **Admin** tab.
3. Select the **Config Files** sub-tab located at the bottom of the **Admin** tab.



4. In the **Configuration Management** area, locate a preset reporting an `Empty` status. In the example above, all profiles are empty.
5. Use the **Name** field to specify an identifier for the new preset.
6. Click **Save** to save the current card settings to the new preset.

Network Tab

The **Network** tab allows for configuration/monitoring of the two streaming Ethernet ports, and optional configuration of DNS servers. The **Network** tab is further divided into two sub-tabs: Interfaces, and DNS. This chapter discusses both sub-tabs.

Interfaces Tab

The **Interfaces** tab is used to set the individual parameters for each of the streaming Ethernet ports. The MSE-8671 and MDE-8672 Ethernet interfaces support two manual modes: 100Mbps Full-Duplex, and 1Gbps Full-Duplex.

- ★ Support for 10Mbps and Half-Duplex modes are disabled as these are unsuitable for MPEG transport over IP applications.

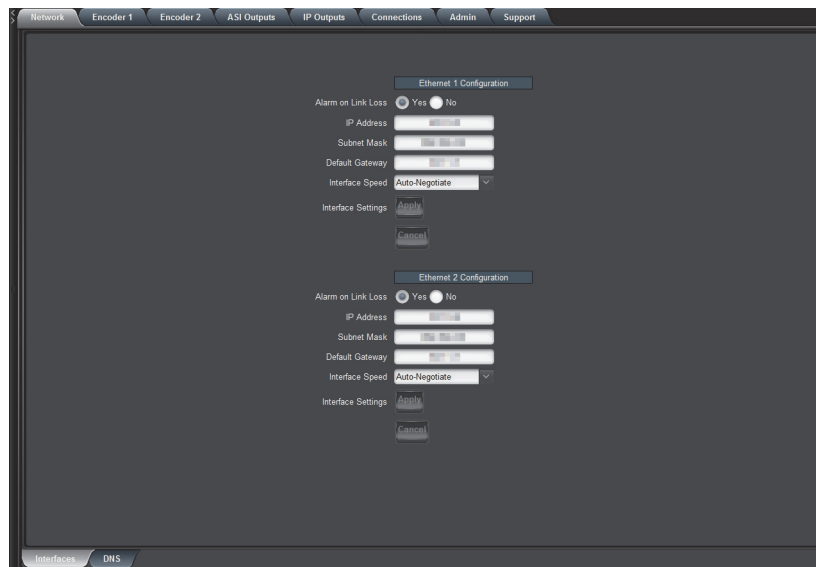


Figure 9.1 Network — Interfaces Tab

Alarm on Link Loss

Choose one of the following:

- **Yes** — Encoder raises an alarm if this Ethernet interface loses link. The **Card State** indicator in DashBoard and the front **Status** LED will both be red. It is recommended to enable the alarm for ports that are in use.
- **No** — Encoder will still report loss of link in the status tab but no alarm will be raised. It is recommended to disable the alarm only if you do not plan to connect the port to a network.

IP Address

Sets the IP address of the specified port.

Subnet Mask

Sets the subnet mask of the specified port.

Default Gateway

Sets the default gateway for the specified port. Use 0.0.0.0 if no gateway is available.

Interface Speed

Choose one of the following:

- **Auto-Negotiate** — The specified port auto-negotiates the speed.
- **100Mb/s Full-Duplex** — Forces the port to 100Mbps Full-Duplex mode. The port still performs auto-negotiation, but it will only display this mode.
- **1Gb/s Full-Duplex** — Restricts the operation to 1Gbps Full-Duplex mode. The port still performs auto-negotiation, but it will only display this mode.

Interface Settings

Choose one of the following:

- **Apply** — Select if you have made changes to the fields in the **Interfaces** tab. Notice that the buttons are grayed out if no changes are made. Once this button is selected, a status message displays just below the **Cancel** button.
- **Cancel** — Reverts the fields back to the last saved values.

Notes

Keep the following in mind when configuring the streaming ports:

- The encoder checks the consistency of the data entered and rejects invalid combinations (e.g. combinations where the gateway is outside the interface subnet).
- If the streaming Ethernet interfaces are connected to a 10Mbps switch, hub, or network feed, link will not be established and the port will not recognize the connection.
- If you select **100Mb/s Full-Duplex** or **1Gb/s Full-Duplex** and the corresponding streaming Ethernet interface is connected to a switch, hub or network feed that does not support the selected speed, link will not be established and the port will not recognize the connection.
- If the interface speed is set to **Auto-Negotiate**, the streaming Ethernet port will allow link to be established in 100Mb/s Half-Duplex mode. However, this will be flagged as a warning in the **Network** status tab and in the **Admin Event Log** tab.

DNS Tab

The **DNS** tab is used to optionally configure DNS servers.

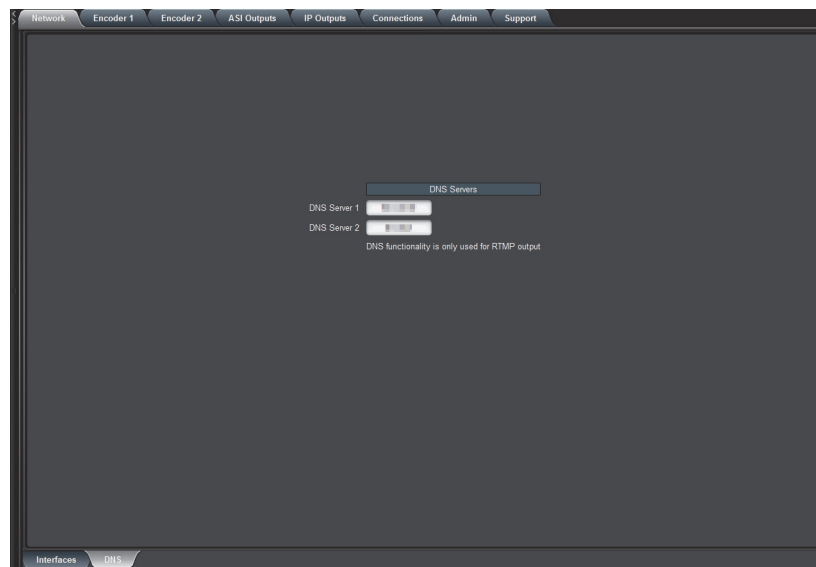


Figure 9.2 Network — DNS Tab

The **DNS** tab allows manual configuration of up to two DNS servers. They do not need to be in the same subnetwork as the streaming ports, as long as at least one default gateway is configured. DNS is only used in conjunction with the RTMP output functionality. If you are not using RTMP, there is no need to configure DNS servers.

DNS server configuration takes effect immediately, as soon as the information is entered.

For More Information on...

- the network status tabs, refer to the section “**Network Status Tabs**” on page 108.

Encoder Setup

Each **Encoder** tab is divided into the following sub-tabs: Basic, Advanced, and Connection. This chapter discusses the function and options of each tab.

Configuration Overview

The MSE-8671 can be configured with one encoder channel while the MDE-8672 includes two channels (at the time the unit is ordered, factory installed). If an encoder channel is not installed, both its configuration and status windows will be empty.

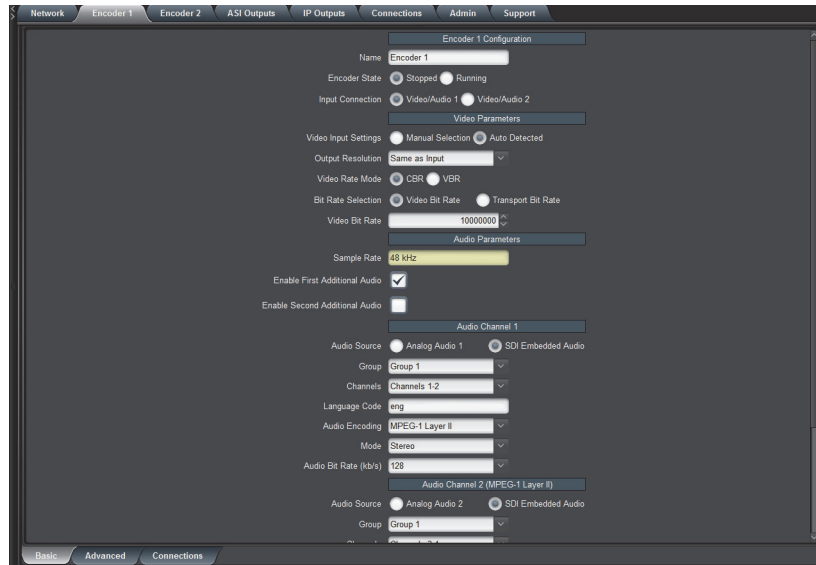


Figure 10.1 Encoder 1 Tab — MSE-8671

Each **Encoder** tab is divided into the following sub-tabs:

- **Basic** tab — contains the more important configuration parameters, which all users are likely to change.
- **Advanced** tab — contains the advanced configuration parameters, which do not necessarily need to be changed.
- **Connections** tab — allows the creation of connections between this encoder and the ASI and IP output ports.

In general, the encoder user interface will change as a function of the parameter selections made, to remove illegal parameter combinations.

Selections made in any of the encoder configuration tabs do not take effect until the **Apply** button is pressed. If you wish to discard the changes made to the user interface, press the **Cancel** button. The **Apply/Cancel** buttons are present in all the tabs and will be grayed out until changes are made. At any given point in time, the currently running encoder configuration can be inspected in the **Encoder** status tab, described in the section “**Encoder Status Tabs**” on page 109.

Using the Apply/Cancel Buttons

The **Apply/Cancel** buttons are available at the bottom of the Basic, Advanced, and Connection tabs. These are not separate buttons - they are multiple instances of the same buttons, repeated on each tab for convenience. Thus changes made on the **Basic** tab can be applied, or canceled, on the Connection tab. This allows all tabs to be updated to a new configuration, then send all three tabs of changes with one button press. If no changes have been made to the settings, the **Apply/Cancel** buttons are grayed out; once any changes are made, they become available. Changes do not take effect until the **Apply** button is pressed. If you make changes but decide not to apply them, click the **Cancel** button and the user interface reverts to where it was before. Once you click the **Apply** button, the changes are implemented.

In general, most changes will cause the encoder channel to stop and start again, causing a brief (2-second) interruption to the stream. Changes to the following parameters are implemented on-the-fly, without stopping the encoder:

Table 10.1 Applying Changes

Tab	Menu Item	Parameter
Basic	Audio Configuration	Audio Source
		Language Code
Advanced Tab	VBI/Ancillary Data Insertion	Any CC/AFD configurations
	Analog Audio Parameters	Audio Gain L/R
		Audio Mute L/R
	PMT Information	Audio Type and Dolby PMT Type
	Mux Parameters	Transport Stream ID
		Enable SDT and all the SDT parameters
	ASI/IP Streaming	Any connections made
	Secondary Audio PID changes in Encoder 1 when Secondary Audio is enabled	

Video Input Auto-Detection

The encoder can be set to auto-detect the video input signal, and self-configure for the incoming resolution and frame rate. This feature allows the encoder to operate in situations where the video signal can change over time (for example, at the output of a video router). The MSE-8671 and MDE-8672 is also capable of automatically recognizing whether a signal is SDI or composite, and the video standard for composite signals.

The following points should be considered when using video input auto-detection:

- The available output scaling options are limited, since some options are specific to some input resolutions.
- If the encoder is not licensed for a given configuration, it will stop encoding if the input video signal switches to a value that requires this configuration. For example, an SD encoder configured to output the same resolution as the input will stop if the input signal switches to HD.
- If the encoder is configured with auto-detection and SDI embedded audio, it will fall back to analog audio if it detects a composite video signal. If your input can switch between SDI and composite, either use analog audio for all signals, or make sure that the corresponding analog audio signal is present at the encoder unbalanced audio inputs when the video is a composite signal.

Multiple Audio Support

The MSE-8671 and MDE-8672 can be licensed to offer up to two additional MPEG-1 Layer II audio channels, regardless of the number of installed encoders. These additional audio channels can be associated with the first or second encoder. Moreover, a dual-channel encoder can be configured as a single-channel encoder with combined audio. The following combinations are supported:

MSE-8671 Encoders

Support for 1, 2 or 3 audio stereo pairs, as follows:

- First stereo pair:
 - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
 - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)

- Second stereo pair:
 - › MPEG-1 Layer II support only
 - › Valid inputs: second analog unbalanced audio, SDI embedded (SDI signals only)
- Third stereo pair (only available for SDI inputs):
 - › MPEG-1 Layer II support only
 - › Valid input: SDI embedded

MDE-8672 Encoders

Support for 1 or 2 audio stereo pairs per encoder channel, as follows:

- First stereo pair:
 - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
 - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Second stereo pair (only available for SDI inputs):
 - › MPEG-1 Layer II support only
 - › Valid input: SDI embedded

Dual channel encoders can be configured to have one encoder channel with 3 audio stereo pairs, and another encoder channel with 1 audio stereo pair, as follows:

- Encoder with 1 stereo pair:
 - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
 - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Encoder with 3 stereo pairs:
 - › First stereo pair: MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support. Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
 - › Second stereo pair (only available for SDI inputs): MPEG-1 Layer II support only. Valid input: SDI embedded.
 - › Third stereo pair (only available for SDI inputs): MPEG-1 Layer II support only. Valid input: SDI embedded.

Dual channel encoders with combined audio: support for up to 4 audio stereo pairs per board, as follows:

- First stereo pair:
 - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
 - › Valid inputs: analog unbalanced audio, SDI embedded (SDI signals only)
- Second stereo pair:
 - › MPEG-1 Layer II, AAC-LC or Dolby® Pass-through support
 - › Valid inputs: second analog unbalanced audio, SDI embedded (SDI signals only)
- Third stereo pair (only available for SDI inputs):
 - › MPEG-1 Layer II support only
 - › Valid input: SDI embedded
- Fourth stereo pair (only available for SDI inputs):
 - › MPEG-1 Layer II support only
 - › Valid input: SDI embedded

Selecting an Output Resolution

You can set the Video Input Settings to either Manual Selection or Auto Detected. This section outlines both options.

- ★ Resolutions in H.264 must be a multiple of 16. A resolution of 1080 is not a multiple of 16, and the next multiple is 1088. When the encoder takes in 1920x1080, it adds 8 black lines to the bottom of the screen to create a 1920x1088 image.

Manual Selection

If **Video Input Settings** is set to **Manual Selection**, the following resolutions are displayed in the **Output Resolution** menu:

- Same as the input (no scaling)
- $\frac{3}{4}$ scaling from the input
- Low resolutions: 480x270, 320x240, and 320x180, progressive, at half and quarter frame rates
- HD inputs can be scaled (and re-interlaced if necessary) to SD resolution, anamorphic
- 720p inputs can be reduced to half frame rate (typically for Internet applications), as follows:
 - › 1280x720p50 is converted to 1280x720p25
 - › 1280x720p59.94 is converted to 1280x720p29.97
 - › 1280x720p60 is converted to 1280x720p30
- 1080i, 720p and SD inputs can be converted to SD resolution, with progressive frame rates (ideal for computer displays), as follows:
 - › 1080i59.94, 720p59.94, and 480i59.94 are converted to 720x480p29.97
 - › 1080i60 and 720p60 are converted to 720x480p30
 - › 1080i50 and 720p50 are converted to 720x576p25

The conversions from HD resolutions are done using anamorphic scaling.

- 1080i, 720p and SD¹ inputs can be scaled to 640x360, with progressive frame rates, as follows:
 - › 1080i59.94 and 480i59.94 are converted to 640x360p29.97
 - › 720p59.94 is converted to 640x360p59.94
 - › 1080i50 and 576i50 are converted to 640x360p25
 - › 720p50 is converted to 640x360p50
- HD 1080i inputs can be scaled to 1280x720p at the same incoming frame rate (e.g. 1080i 59.94 will be scaled to 720p 29.94; 1080i 50 will be scaled to 720p 25).
- HD 1080i inputs can be scaled to $\frac{1}{4}$ resolution (960x540), with the same incoming frame rate
- SD inputs can be horizontally cropped to 704 pixels or horizontally scaled to 640 pixels
- SD inputs can be horizontally scaled to 640 or 528 pixels, and converted to progressive frame rates (29.97p for NTSC inputs, 25p for PAL inputs)

Auto Detected

If **Video Input Settings** is set to **Auto Detected**, the following options are displayed in the **Output Resolution** menu:

- Same as Input: the encoder will produce a signal that has the same resolution and frame rate as the input (no scaling).

1. By default, SD signals have a 4:3 aspect ratio, unless they are derived from an HD source with anamorphic scaling. The 640x360 resolution is intended for 16:9 content. Scaling SD to 640x360 should only be done if the SD signal is anamorphic to start with, otherwise the resulting encoded signal will have an incorrect aspect ratio.

- **Scale 3/4 Horizontal:** the encoder will scale down the image horizontally by 3/4. The frame rate will not be changed.
- **Scale to 640x360p:** the encoder will scale the input video to 640x360. The frame rate will be the same as the input, but interlaced inputs will be de-interlaced (for example, 1920x1080i60 will yield 640x360p30).
- **Scale to 480x270p, Scale to 320x240p, Scale to 320x180p:** the encoder will scale the input video to the selected resolutions. Interlaced inputs will be de-interlaced as described above. Progressive inputs will be encoded at half frame rate.

Using the Basic Tab

The **Encoder 1** and **Encoder 2** tabs are used to configure/monitor the individual encoder channels. The parameters in these two tabs are exactly the same.

For More Information on...

- the supported input video signals, refer to the section “**Supported Input Video Signals**” on page 14.

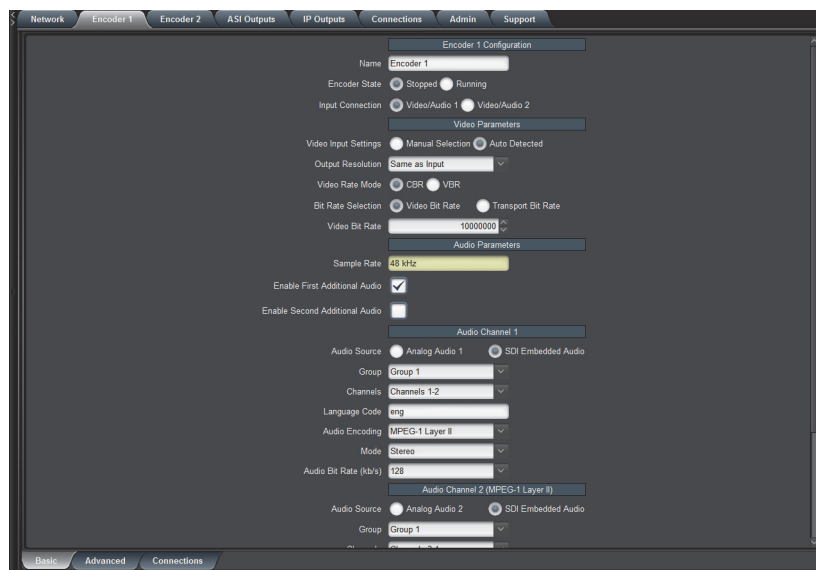


Figure 10.2 Encoder 1 — Basic Tab

The **Basic** sub-tab is divided into three general areas:

- **Encoder Configuration** — generic configuration parameters.
- **Video Parameters** — parameters related to video encoding. The MSE-8671 and MDE-8672 is capable of automatically identifying the video signal present in the selected input connection. The detected signal is reported in the **Encoder** status tab. Additionally, the encoder can also be set to auto-configure its input based on the detected signal
- **Audio Parameters** — parameters related to audio encoding.

The **Basic** sub-tab parameters change (or appear/disappear in the GUI) based on the device’s configuration and the parameter choices made.

Encoder Configuration

This area of the Basic tab provides generic configuration options.

Name

All MSE-8671 and MDE-8672 encoders and outputs can be assigned a user-defined name. This name is used to identify the encoder later when making connections. Use any descriptive name suitable for your application, or accept the default.

Encoder State

Allows you to start/stop an encoder. This control needs to be set to Running for normal operation.

Input Connection

Selects which of the two rear module inputs is to be connected to this encoder. The MSE-8671 and MDE-8672 can run both encoders from the same input.

The default is to run Encoder 1 from Video/Audio 1 and Encoder 2 from Video/Audio 2, but all combinations are allowed.

The options presented in the Video Parameters area section may change if this selection changes (e.g. if you switch the encoder from a Composite input to an SDI input).

Video Parameters

The Video Parameters area provides options for setting up the video encoder features.

Video Input Settings

Choose one of the following:

- **Manual Selection** — The input signal must be correctly selected using the Input Resolution, Input Source, and Field/Frame Rate controls for the encoder to run. If the input signal does not match the settings, the encoder will not run.
- **Auto Detected** — The encoder will auto-detect the input signal, and automatically configure for it if it is a supported signal. The Input Resolution, Input Source, and Field/Frame Rate controls are not displayed.

Input Resolution

Select the resolution of the input video signal. The following options are available: SD: 720x480i¹, HD: 1280x720p, and HD: 1920x1080i.

Input Source

Select the input source type. This control is available only if the Input Resolution is set to SD. In this case, the options will be Composite or SD-SDI.

If the Input Resolution is set to any of the HD values, this control will not be selectable, and will show the appropriate type of input: HD-SDI for 1280x720p and 1920x1080i.

Field/Frame Rate

Select to match your source. For all input resolutions, the supported options always include 59.94 (for NTSC-based systems) and 50 (for PAL-based systems). Some resolutions have support for additional frame rates, as follows:

- If you select the 1920x1080i or 1280x720p resolutions, this field will also include an option for a field rate of 60, used by some cameras.
- If you select the 1920x1080p resolution, this field will also include an option for a frame rate of 23.98 (Film).

Output Resolution

Select the desired output resolution. The values in this drop-down list are a function of the Video Input Settings, the Input Resolution and the Frame/Field Rate. Note that some resolutions require additional licensing for the encoder.

Refer to the section “**Selecting an Output Resolution**” on page 50 for details.

1. This will be displayed as 720x576i if the Field/Frame Rate is set to 50Hz.

Video Rate Mode

Controls whether the video elementary stream is Constant Bit Rate (CBR) or Variable Bit Rate (VBR). The video bit rate setting varies according to this selection.

Bit Rate Selection

This field is shown only if the encoder is set to CBR mode, and allows the user to specify either the video bit rate, or the transport bit rate. The transport bit rate includes audio, video, tables, NULL packets, and various overheads. In some situations, such as for example, RF links of fixed capacity, it is more convenient to specify the transport rate (i.e., the final bit rate “in the wire”), and let the encoder compute the corresponding video bit rate to yield the desired transport rate. In other situations, such as IPTV deployments, it is more convenient to simply specify the video bit rate and let the encoder compute the final transport rate. Note that this control is not available in the OTT protocol modes.

Transport Bit Rate, Video Bit Rate

This field is displayed only if the encoder is set to CBR mode and the Bit Rate Selection control is set to Video Bit Rate. It determines the video elementary stream bit rate, expressed in bits/second. Note that the bit rate resolution is 1000bits/second.

Transport Bit Rate

This field is shown only if the encoder is set to CBR mode and the Bit Rate Selection control is set to Transport Bit Rate. It determines the overall transport stream bit rate, with a resolution of 1000 bits/sec; the encoder will calculate the appropriate video bit rate to yield the desired transport rate. Note that not all transport rates are achievable; in particular, the encoder may not be able to achieve very low transport rates if the audio bit rates are high. In these cases, the actual transport rate output by the encoder will be higher than the configured value. The actual transport rate is displayed in the Encoder status tab, after the **Apply** button was clicked. At that point, the actual encoder video bit rate can be found in the Encoder status tab, under the Basic bottom tab.

Peak Video Bit Rate, Average Video Bit Rate

These two fields are shown only if the encoder is set to VBR mode, and determine the desired average and acceptable peak bit rates for the video elementary stream. The peak video bit rate must be between 1.5 and 2 times the average bit rate; the user interface will enforce these limits automatically (i.e., it will update either the average or peak to be consistent with the value being entered). For both of these parameters, the resolution is 1000bits/sec.

Audio Parameters

The Audio Parameters area provides options for configuring the audio encoding features.

Sample Rate (read-only)

This field is for information purposes only. The MSE-8671 and MDE-8672 only supports 48kHz audio sample rate.

Enable First Additional Audio

Adds a second audio channel and updates the Encoder tab options accordingly.

Audio Source

This parameter selects the audio source. The options are Analog Audio, directing the encoder will to use the analog right/left audio channels connected to the selected rear I/O panel, and SDI Embedded Audio, directing the encoder to extract embedded audio from the SDI input. If the video Input Source (refer to the section “**Using the Basic Tab**” on page 51) is set to Composite, this parameter is grayed out and forced to Analog Audio. It will be selectable only if the video input source is one of the SDI variations, or if Video Input Settings is set to Auto Detected. Please note that if the encoder is set to auto-detect the video input, and it detects a composite signal, the audio selection will fall

back to analog audio regardless of the Audio Source settings. When SDI Embedded Audio is selected, additional configuration options become available.

Group and Channels

SDI embedded audio is typically divided into four groups (denoted by Group 1 to Group 4); each group has four mono channels (2 stereo pairs), denoted by Channels 1-2 and 3-4. These controls allow the selection of the desired group and channel pair. In the large majority of the cases, the first stereo pair is in Group 1, Channels 1-2, the second stereo pair is in Group 1, Channels 3-4, and so on. Selection has one additional choice, labeled Custom DID. This allows the encoder to use a non-standard embedded audio DID (this quite uncommon). If Custom DID is selected, a new configuration option becomes available, where the DID value can be entered.

Group DID

Enter the desired Group DID, in hexadecimal. Note that the entry will be immediately validated and rejected if invalid. As a reference, **Table 10.2** contains the standard DIDs built into the system for Groups 1 to 4.

Table 10.2 Standard DIDs for Groups 1-4

Group	SD-SDI DID	HD-SDI DID
1	0x2FF	0x2E7
2	0x1FD	0x1E6
3	0x1FB	0x1E5
4	0x2F9	0x2E4

Language Code

This parameter represents the 3-letter ISO 639-2 language code for the audio, to be placed in the audio language descriptor in the PMT. If the Output Protocol in the Encoder Connections tab is set to RTMP, this field will not be displayed as RTMP does not use the transport stream container.

Audio Encoding

This parameter selects the audio encoding algorithm. The available choices depend on the Audio Source selection. For Analog Audio, the choices are MPEG-1 Layer II and AAC-LC. For SDI Embedded Audio, the Dolby® Pass-through option is offered in addition to the previous choices. Note that AAC-LC requires additional licensing.

If the Output Protocol in the Encoder Connections tab is set to RTMP, this field is forced to AAC-LC and becomes not editable. The reason is that the RTMP protocol has no support for MPEG-1 Layer II audio at 48kHz sampling. It also has no support for Dolby®.

Mode

The available choices for this parameter depend on the Audio Encoding selection, as follows:

- **MPEG-1 Layer II** — the available modes are Stereo or Single Channel. If you select Single Channel (Mono), only the audio connected to the Left input will be encoded.
- **AAC-LC** — the available modes are Stereo, Mono, or Dual Mono. If you select Mono, only the audio connected to the Left input will be encoded.
- **Dolby® Pass-through** — this parameter is not displayed.

Audio Bit Rate

The format of this parameter is a function of the Audio Encoding setting. For MPEG-1 Layer II, this parameter is a drop-down list of valid discrete bit rates; the values in the list are also a function of the Mode Setting. For AAC-LC, the range is 112 to 512kbps for Stereo and Dual Mono, and 56 to 256kbps for Mono. This parameter is not displayed for Dolby® Pass-through as the MSE-8671 and MDE-8672 will automatically detect the incoming audio bit rate.

Peak Audio Bit Rate

This parameter is only displayed for AAC-LC. It must be set at least 1kbps higher than the Audio Bit Rate. The maximum value is 288kbps for Mono, and 576kbps for Stereo and Dual Mono.

Sample Rate

This field is for information purposes only. The MSE-8671 and MDE-8672 only supports 48kHz audio sample rate.

Additional Audio Support

If the encoder is in a configuration where additional audio channels can be offered, a check box to enable them will be presented in the GUI.

If the box is checked, additional fields will become available for configuring the additional audio channel. These fields are the same as with the first audio channel. Note that, depending on the configuration, the Audio Source selection may be grayed out.

After the first additional audio is enabled, the encoder may offer a second additional audio channel. (**Figure 10.3**)

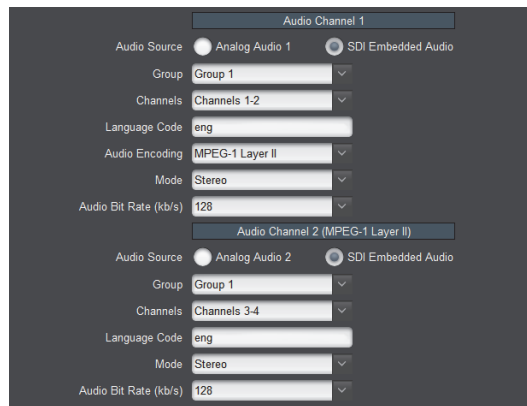


Figure 10.3 Audio Parameters — Additional Audio Channel

The second additional audio option will be offered in the following conditions:

- In a single-channel encoder, if the input signal type is SDI.
- In a dual-channel encoder, if the first additional audio is not being used by the other encoder channel.
- In a dual-channel encoder, if secondary audio is enabled.

Additional audio channels are only available if the **Output Protocol** in the **Encoder Connections** tab is set to **ASI/IP Streaming**.

Secondary Audio Support

A dual-channel MSE-8671 and MDE-8672 can be configured to offer secondary audio support (i.e., a second audio PID in the same program). If this function is available, it will be available in the audio section of Encoder 1.

Secondary audio support is only available if the **Output Protocol** in the **Encoder Connections** tab is set to **ASI/IP Streaming**.

When **Secondary Audio** is set to **Enabled**, the Encoder 1 Audio Configuration section will update.

The individual controls work in the same manner as discussed before. Each audio channel can be independently configured. As before, the SDI Embedded Audio option will only be available if the Encoder 1 input selection is one of the SDI variants. The only input restriction is that, when using Analog Audio, the signal connected to Video/Audio 1 will be the first audio channel, and the signal connected to Video/Audio 2 will be the second audio channel.

Secondary audio support can be combined with the two additional audio channels to create one program with up to 4 audio services (i.e., up to 4 audio PIDs).

Support for secondary audio requires that both encoder channels in the board be tied together. Then the Secondary Audio control depicted above is set to Enabled, Encoder 2 will be slaved to Encoder 1.

The operation is as follows:

- The Encoder State, Input Selection, Video Input Settings, Output Resolution and Coding Delay (in the Advanced tab) controls are slaved to the corresponding controls in Encoder 1. They will reflect the state of their Encoder 1 counterparts.
- If Video Input Settings in Encoder 1 is set to Manual Selection, the Input Resolution, Input Source and Field/Frame Rate controls are shared with Encoder 1, and apply to whatever input port is selected. Changes here will be mirrored in the corresponding parameters for Encoder 1. If Video Input Settings in Encoder 1 is set to Auto Detected, these controls are not displayed.
- Encoder 2 can optionally share one or both audio channels from Encoder 1. This is accomplished by checking Include Audio Ch1/2 boxes in the Audio Insertion Controls displayed above.

Using the Advanced Configuration Tab

The appearance of the Encoder Advanced Configuration tab is a function of the choices made in the Encoder Basic Configuration tab.

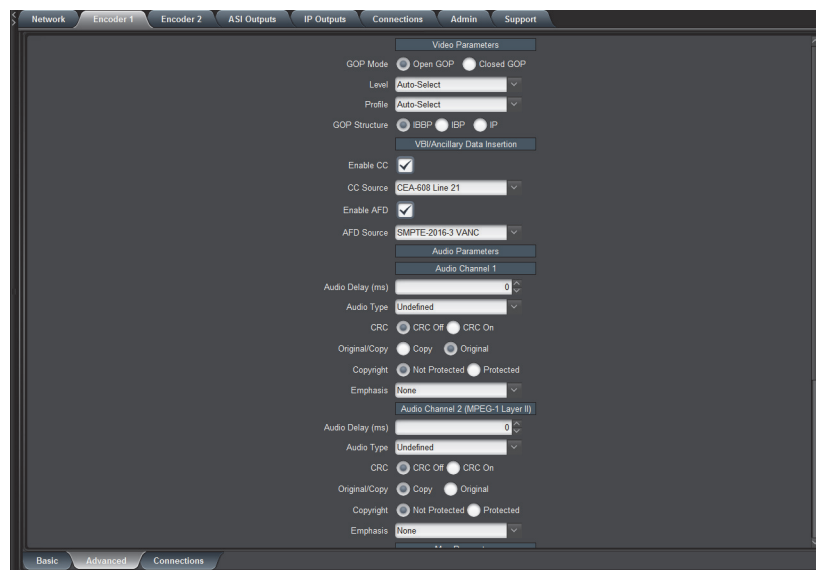


Figure 10.4 Advanced Configuration tab

The options in the Advanced sub-tab are organized into four areas:

- **Video Parameters** — these are advanced controls related to the encoding of the video.
- **VBI/Ancillary Data Insertion** — controls related to Closed-Captioning insertion and Active Format Description (AFD) insertion.
- **Audio Parameters** — these are advanced controls related to the audio subsystem.
- **MUX Parameters** — these are advanced controls related to audio/video multiplexing and (P)SI tables.

Video Parameters

The Video Parameters area provide advanced video encoding options.

GOP Mode

The GOP Mode determines how B-Frames are encoded with respect to the Group of Pictures (GOP) boundary. Choose from the following:

- **Open GOP** — the B-Frames may reference beyond the GOP boundary for the data. As a result, they can be smaller than they might be for closed GOP encoding. This is the default setting.
- **Closed GOP** — the B-Frame(s) at the end of a GOP can only use data from the previous I or P-Frame within the GOP, and as a result, they will be larger than they might be for open GOP encoding. This setting is used for some storage applications, and is also required by some content distribution networks (CDN) such as the YouTube™ video community; there is a very small negative impact in video quality if Closed GOP is selected. For some output protocols (HLS and RTMP), this control becomes read-only and is forced to Closed GOP.

Level

Selects the H.264 level signaled in the bit stream. The default setting is Auto-Select, whereby the encoder will signal the minimum required level based on the current settings. If, for some reason, a different (higher) level is desired, it can be selected here. Note that the encoder will not honor a level selection that is lower than the legal minimum for the current settings. It is typically not necessary to change the level from Auto-Select.

Table 10.3 Levels Overview

Level	Maximum Bit Rate (kb/s)			Video Format
	Baseline Profile	Main Profile	High Profile	
1.2	384	384	480	320x240/20
				352x288/15
1.3	768	768	960	320x240/36
				352x288/30
2	2,000	2,000	2,500	320x240/36
				352x288/30
2.1	4,000	4,000	5,000	352x480/30
				352x576/25
2.2	4,000	4,000	5,000	352x480/30
				352x576/25
				720x480/15
				720x576/12
3	10,000	10,000	12,500	352x480/60
				352x576/50
				720x480/30
				720x576/25
3.1	14,000	14,000	17,500	720x480/80
				720x576/66
				1,280x720/30

Table 10.3 Levels Overview

Level	Maximum Bit Rate (kb/s)			Video Format
	Baseline Profile	Main Profile	High Profile	
3.2	20,000	20,000	25,000	1,280x720/60
				1,280x1,024/42
4	20,000	20,000	25,000	1,280x720/68
				1,920x1,080/30
				2,048x1,024/30
4.1	50,000	50,000	62,500	1,280x720/68
				1,920x1,080/30
				2,048x1,024/30
4.2	50,000	50,000	62,500	1,280x720/145
				1,920x1,080/64
				2,048x1,080/60

Profile

The profile of the encoder determines the complexity of the encoding, and trades off encoding/decoding effort against quality at a given Bitrate. The MSE-8671/MDE-8672 supports Baseline, Main and High Profiles. It is important to verify the capabilities of the decoder to ensure that it supports the selected profile. All three supported profiles offer 8bit depth and 4:2:0 sampling.

- ★ As the profile is lowered, there will be video quality degradation. In other words, for a given resolution and bit rate, the video quality for High Profile will be better than Main Profile and Main Profile will be better than Baseline Profile. Whether the quality difference is noticeable will depend on the resolution, and specific video content.

Choose one of the following:

- **Baseline Profile** — This is primarily for applications that target low-cost or older decoders (for example older set-top boxes or smart-phones). This profile utilizes simpler encoding techniques which are supported by most decoders. Note that Baseline Profile does not support interlaced video. If the output is interlaced, the encoder will approximate Baseline Profile by producing Main Profile with CAVLC coding.
- **Main Profile** — This is the standard profile for Standard-Definition content and is used for SD DVB broadcast. This profile provides higher quality encoding than Baseline Profile.
- **High Profile** — This is the standard profile for High-Definition content and is used for HD Digital Video Broadcast (DVB) and Blu-ray Discs™. This profile provides higher quality encoding than Main and Baseline Profiles.
- **Auto-Select** — With this setting, the encoder will use High Profile for HD and Main Profile for SD.

Aspect Ratio

The H.264 bit stream includes aspect ratio information in the VUI Parameters as part of the Sequence Parameter Set. Normally, the encoder will automatically set the correct aspect ratio code. However, in some situations, it may be necessary to override this (for example when scaling HD to SD). Use this control to override the default aspect ratio set by the encoder. In particular, if the video input is 1920×1080i, and the content is being scaled to SD, use either 16:11 (PAL Widescreen) or 40:33 (NTSC Widescreen) to get the correct aspect ratio.

GOP Structure

Select between IBBP, IBP and IP. Selecting IBBP gives the best video quality, but some low-end decoders require IP. If Profile is set to Baseline Profile, this control will not be selectable and will be forced to IP.

Coding Delay

This parameter controls the size of the H.264 Coded Picture Buffer (CPB) expressed in milliseconds. This is one component of the end-to-end encoder/decoder delay. The MSE-8671 and MDE-8672 latency is 150ms plus the value of this control. For example, if the Coding Delay is set as its default value of 500ms, the MSE-8671 and MDE-8672 latency will be 650ms. Note that the overall encoder/decoder latency is also a function of the latencies in the decoder.

★ Reducing the coding delay will reduce latency at the expense of video quality.

Use VBR if at all possible when reducing the latency, and set the peak rate as high as you can afford. For example, if the MSE-8671 and MDE-8672 output is 1920x1080i, a bit rate on the order of 10 to 12Mb/s (either CBR average or VBR peak) is required to product a stream without artifacts with a Coding Delay of 100ms.

Notes on Resolution Settings

Keep the following in mind when configuring resolution settings:

- If the Output Resolution setting in the Basic tab - Video Configuration is set to one of the low resolutions (480x270, 320x240, or 320x180), the Profile and GOP Structure controls will not be selectable.
- If the Input Resolution setting in the Basic tab - Video Configuration is set to 1920x1080p, the Profile and GOP Structure controls will not be selectable.

VBI/Ancillary Data Insertion

The MSE-8671 and MDE-8672 can extract the following data types from the video input and insert them in the compressed video output: Closed Captioning or Active Format Description (AFD).

Closed Captioning

The MSE-8671 and MDE-8672 automatically re-formats the closed captions to suit any combination of input/output frame rates and interlaces modes.

★ If the **Video Input Settings** is set to **Auto Detected**, the encoder will comply with the CC Source if possible, but may fall back to another setting depending on the input signal. For example, if CC Source is set to CEA-608 Line 21 and the encoder detects an HD signal, it will fall back to SMPTE-334 VANC. Conversely, if it is set to SMPTE-334 VANC and it detects a composite signal, it will fall back to CEA-608 Line 21 if that composite signal is NTSC, or turn off CC if that composite signal is PAL.

The Closed Captioning controls are only displayed in the following situations:

- In the Video Configuration section of the Basic tab, the **Video Input Settings** is set to **Manual Selection**, and the **Frame/Field Rate** is set to **59.94 (NTSC)**.
- In the Video Configuration section of the Basic tab, the **Video Input Settings** is set to **Auto Detected**.

The appearance of this control is also a function of the Video Input Settings, Input Resolution and Input Source parameters.

The Closed Captioning controls are as follows:

- **Enable CC** — Select this box to enable Closed-Captioning insertion. Closed Captions are inserted in the video elementary stream, as per ATSC A/72. Both CEA-608 and CEA-708 captions are supported.
- **CC Source** — This controls where the encoder extracts closed captions from. This field may or may not be editable, depending on the video input settings, input resolution, and input source. The options are:
 - › CEA-608 Line 21 — This option can only be used for SD inputs. The encoder will extract all the CEA-608 information from both fields of Line 21, if present.
 - › SMPTE-334 VANC — This option can only be used for SDI inputs. The encoder will expect closed-captioning information in the VANC. Both CEA-608 and CEA-708 modes are supported (and automatically detected).

- **Allowed CC Types** — this parameter is only displayed if CC Source is set to SMPTE-334 VANC. The SMPTE-334M specifies two types of Closed Captioning information in the VANC:
 - › EIA-708 captions on DID 0x161, SDID 0x101
 - › EIA-608 captions on DID 0x161, SDID 0x102

This control has the following settings:

- › Both SMPTE-334 608 and 708 — the encoder will accept and process either format. However, if both formats are present, the captions will be inserted twice.
- › SMPTE-334 708 only — the encoder will accept only EIA-708 captions on DID 0x161, SDID 0x101, and will discard any EIA-608 captions received on DID 0x161, SDID 0x102.
- › SMPTE-334 608 only — the encoder will accept only EIA-608 captions on DID 0x161, SDID 0x102, and will discard any EIA-708 captions received on DID 0x161, SDID 0x101.

Active Format Description

The MSE-8671 and MDE-8672 can extract Active Format Description (AFD) information from the incoming video signal and insert it in the compressed bit stream. AFD information can be extracted from the following sources:

- For SDI signals, AFD information can be present in the VANC as per *SMPTE-2016-3*. This is the primary way of conveying AFD information on a professional video feed.
- For SD signals (either from Composite or SD-SDI sources), AFD information can be synthesized from Wide Screen Signaling (WSS) data present in the VBI (line 20 for NTSC signals, line 23 for PAL signals).
- The MSE-8671 and MDE-8672 also has the option of inserting a user-defined AFD code (instead of receiving it from the video input).

The AFD controls are as follows:

- **Enable AFD** — Check this box to enable AFD extraction and insertion. This control is always available. AFD is inserted in the video elementary stream as per *ATSC A/72* and *ETSI TS 101 154*.
- **AFD Source** — This controls where the AFD information is coming from. Choose one of the following:
 - › Line 20/Line 23 WSS — This option causes the encoder to synthesize AFD information from WSS. It is available only if the input resolution is SD or if the video input settings are auto-detected. It will be displayed as Line 20 for NTSC and Line 23 for PAL. For PAL inputs, the conversion follows *ETSI TS 101 154 Appendix B.4*.
 - › SMPTE-2016-3 VANC — This option causes the encoder to extract AFD from the VANC. It is only available for SDI inputs or if the video input settings are auto-detected.
 - › Manual AFD Selection — This option allows the user to specify a fixed AFD code to be inserted. Any AFD information received from the input is ignored. This can be used to override the original AFD information, or when the video is being scaled (e.g., when the input is HD and is being converted to SD).
- **AFD Code** — This control is displayed only when AFD Source is set to Manual AFD Selection. It corresponds to the codes listed in *SMPTE-2016*.
- ★ If the **Video Input Settings** is set to **Auto Detected**, the encoder will comply with the CC Source if possible, but may fall back to another setting depending on the input signal. For example, if AFD Source is set to Line 20/23 WSS and the encoder detects an HD signal, it will fall back to SMPTE-2016-3 VANC. Conversely, if it is set to SMPTE-2016-E VANC and it detects a composite signal, it will fall back to Line 20/233 WSS (and automatically use the correct line number based on the input signal). However, **Manual AFD Selection** is always honored.

Figure 10.5 provides an illustrative example of how an image in a 4:3 coded frame is defined by the applicable AFD Codes.

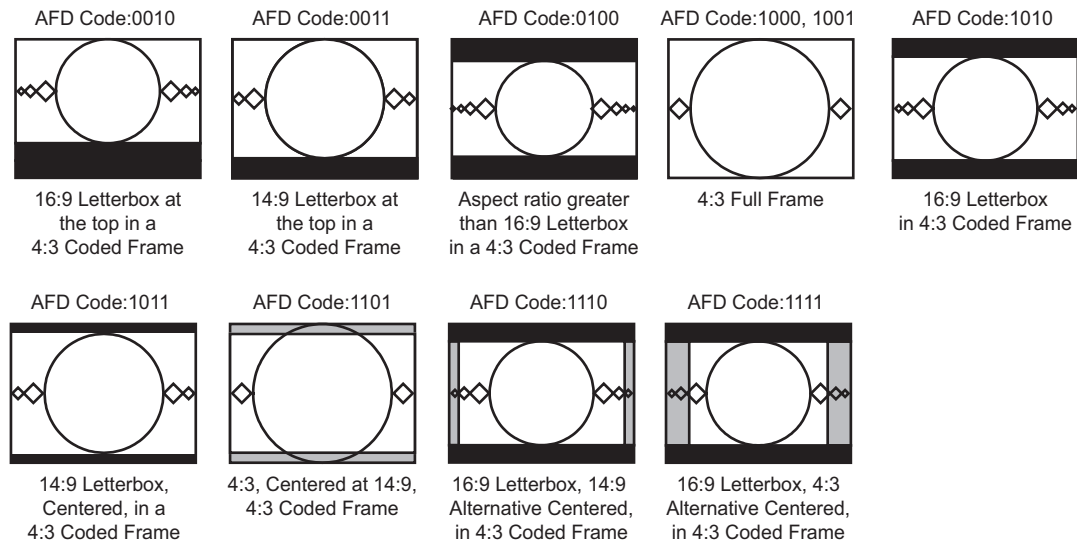


Figure 10.5 Graphical Example of 4:3 Coded Frame Images

Figure 10.6 provides an illustrative example of how an image in a 16:9 coded frame is defined by the applicable AFD Codes.

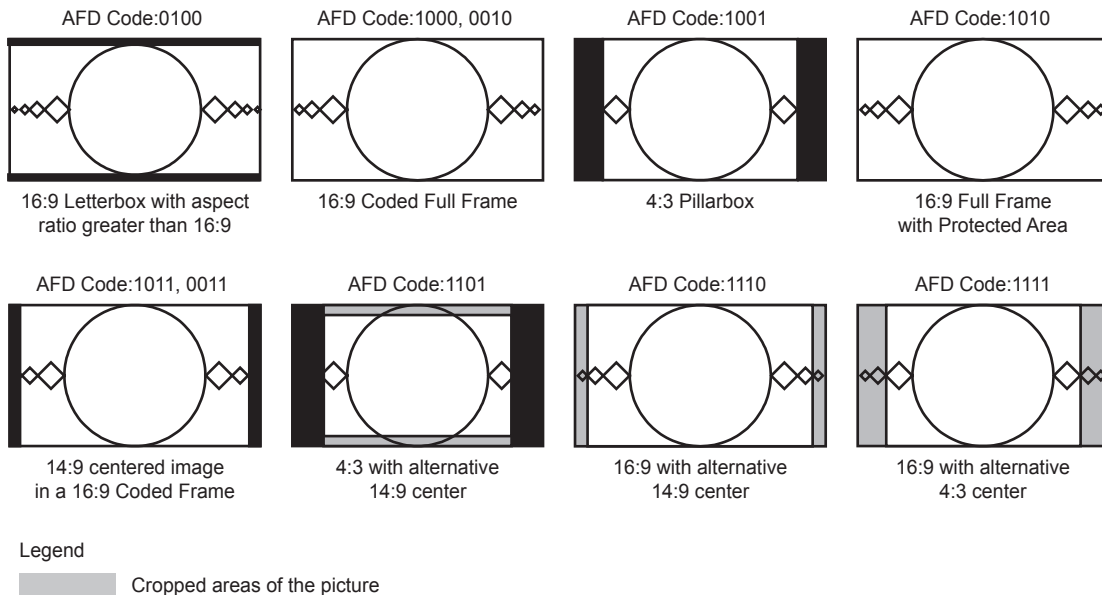


Figure 10.6 Graphical Example of 16:9 Coded Frame Images

SCTE 104 Ad Insertion Triggers

If the input signal is SDI, the Encoder is capable of extracting SCTE 104 triggers from the VANC (inserted as per **SMPTE 2010**) and converting them to SCTE 35 triggers in the output transport stream.

Select the **Enable SCTE 104/35** box to enable SCTE 104 extraction. Note that this control is only displayed if the input signal is SDI or if the Encoder is in auto-detect video mode.

SMPTE-2038 Generic ANC Transport

If the input signal is SDI, the Encoder is capable of extracting any generic (non-specific) ANC data (both from the VANC and the HANC) and inserting them into the output transport stream.

Select the **Enable SMPTE-2038** box to enable generic ANC extraction and insertion using SMPTE-2038. Note that this control is only displayed if the input signal is SDI or if the Encoder is in auto-detect video mode. Once selected, the following additional controls are displayed:

- **Maximum Bit Rate (b/s)** — Some types of ANC data, such as VITC or LTC, may use a non-trivial amount of bandwidth in the output. This parameter controls how much bandwidth to reserve in the transport stream output for ANC data, for NULL-padded CBR outputs. If the ANC data bit rate exceeds this value, packets may be dropped. For ANC data that appears only occasionally, a bit rate of zero may be specified. Note that the encoder measures the actual ANC rate in the transport stream and reports it in the Status tab (please refer to the Encoder Statistics section of this manual).
- **Offset (frames)** — The encoder will include information in the transport stream that enables the decoder to restore the ANC data to the exact same frame it came from. This control allows the encoder to offset this information to a range of -5 to +5 frames (i.e., the decoder will restore the ANC data to an earlier or later frame based on this setting). The default setting of 0 offset is recommended and will properly reinsert timecode into its corresponding SDI source frame.
- **Enable/DID/SDID** — The encoder can support transport of up to 4 DID/SDID pairs per video input. They are specified here. Check the Enable box to enable a particular DID/SDID. Note that GUI shows the full 10bit DID/SDID, but it accepts 8bit entries as well. For example, the DID/SDID for VITC is 0x60/0x60 (8-bits). Simply enter “60”, and the encoder will compute the final 10bit value (0x260) and display it. DID/SDID values are always entered in hexadecimal. The leading “0x” does not need to be entered, but will be automatically added by the encoder.

Notes:

- Only 4 DID/SDID pairs can be specified per video input. In a dual-channel encoder, both encoders can be configured to use the same input. In this case, the DID/SDID list will be common (i.e., changes made in one encoder tab will be immediately reflected in the other). The Enable controls, however, are specific to each encoder.
- The SMPTE-2038 feature is not available for SMPTE-334M Closed-Captioning, SMPTE-2016 AFD and SCTE-104 triggers, as there are well-defined standards for carriage of this information. Therefore, the following DID/SDID pairs will always be ignored if specified for SMPTE-2038 (even if the corresponding feature is disabled):

Table 10.4 SMPTE-2038 — Ignored DID/SDID Pairs

DID	SDID	Data Type
0x161	0x101	EIA 708 CC
0x161	0x102	EIA 608 CC
0x241	0x205	AFD
0x241	0x107	SCTE-104/SMPTE-2010

Audio Parameters

The Audio Parameters are divided into three subgroups, some of which vary (and may not be present) according to the selections made in the Encoder Basic Configuration tab. A sample of the Audio Parameters section is depicted in **Figure 10.7**.

Figure 10.7 Encoder 1 Tab — Advanced Tab, Audio Parameters

Analog Audio Parameters

These parameters are only displayed if the Audio Source in the Basic tab - Audio Configuration is set to Analog Audio.

Choose one of the following:

- **Balanced Audio Level** — This control is only displayed if the encoder is equipped with a balanced audio rear module. It selects the nominal signal level as follows:
 - › **SMPTE** — Nominal level according to SMPTE RP155, typically used in North America.
 - › **EBU** — Nominal level according to EBU R68, typically used in Europe. The EBU level is 6dB higher than the SMPTE level.
- **Audio Gain L (dB), Audio Gain R (dB)** — These controls allow an independent gain adjustment for the left/right audio channels, from -18.0 dB to +18.0 dB, in steps of 0.5 dB.
- **Audio Mute L, Audio Mute R** — These controls allow muting of the left/right audio channels.

A/V Sync Adjustment

This parameter can be used to provide a small amount of A/V sync adjustment, for cases where the A/V sync in the input signal to the encoder is not correct. If, in the input signal, audio is behind the video, you can use this parameter to compensate for up to 100 milliseconds. Note that it is only available for MPEG-1 Layer II and AAC-LC encoding; it will not be displayed for Dolby® Pass-through.

Use the **Audio Delay (ms)** field to compensate for up to 100 milliseconds of audio delay in the input signal. This setting will advance the audio in relation to the video by the amount configured.

PMT Information

The Program Map Table (PMT) Information section has the following parameters:

The **Audio Type** parameter determines the audio type in the PMT audio descriptor. This setting has no actual impact on how the audio is encoded; it only affects its description in the PMT. Choose one of the following:

- **Undefined** — no further information. This is the most common setting.
- **Clean Effects** — indicates that the audio has no language.
- **Hearing Impaired** — indicates that the audio is prepared for the hearing impaired.
- **Visual Impaired Commentary** — indicates that the audio is prepared for the visually impaired viewer.

If the Audio Encoding setting in the Basic tab - Audio Configuration is set to Dolby® Pass-through, another parameter becomes available in the PMT Information section. The **Dolby® PMT Type** parameter controls how Dolby® AC-3 audio is signaled in the PMT. Choose one of the following:

- **DVB** — Dolby® Audio is signaled as per *ETSI TS 101 154 Appendix C* (stream_type 0x06 with the AC-3 Descriptor from *EN 300 468 annex D*).

- **ATSC** — Dolby® Audio is signaled as per *ATSC A/53 Part 3* (stream_type 0x81). This option is not implemented.

If the Output Protocol in the Encoder Connections tab is set to RTMP, the PMT Information fields will not be displayed as RTMP does not use the Transport Stream container.

Audio Encoder Specific Configuration

The appearance of this control depends on the Audio Encoding setting in the Basic tab - Audio Configuration. Choose one of the following:

- **CRC** — Enables/Disables CRC insertion in the audio elementary stream. This is normally left disabled (CRC off).
- **Original/Copy** — Controls the state of the Original/Copy flag in the audio elementary stream. This setting does not affect the actual audio encoding.
- **Copyright** — Controls the state of the Copyright flag in the audio elementary stream. This setting does not affect the actual audio encoding.
- **Emphasis** — Controls the state of the Emphasis flags in the audio elementary stream. This setting does not affect the actual audio encoding. The available values are None, 50/15 us, and ITU-T J.17.

Additional Audio Channels

When Secondary Audio is set to Enabled, or Additional Audio Channels are enabled, the following changes take place:

- Additional sets of controls are displayed in the Encoder Advanced tab, corresponding to each of the enabled audio channels. Each set operates independently as described in the previous section.
- If Secondary Audio is set to Enabled, no Advanced Audio controls are displayed in the Advanced tab for Encoder 2.

Multiplexer Parameters

These parameters control the details of the audio/video multiplexing within the MPEG Transport Stream, and the PSI tables. If the Output Protocol in the Encoder Connections tab is set to RTMP, these parameters will not be shown as RTMP does not use the Transport Stream container.

The following MUX Parameters are always available if the Output Protocol is not set to RTMP.

Mux Parameters	
PMT PID	0x20
PCR PID	0x101
Video PID	0x100
Audio 1 PID	0x110
Audio 2 PID	0x111
Program Number	1
Transport Stream ID	0x1
Generate SDT	<input type="checkbox"/>

Figure 10.8 Encoder 1 — Advanced Tab, MUX Parameters

PMT PID, PCR PID, Video PID, Audio PID, SCTE 35 PID

These parameters control the Packet Identifier (PID) values for the PMT, PCR, Video and Audio. The values can be entered in hexadecimal (prefixed by 0x) or in decimal. Valid values are from 0x20 (32) to 0x1FFE (8190). PMT PID, Video PID and Audio PID must be distinct values. PCR PID can either be the same as the video PID or distinct from the other values as well. The user interface will not accept an invalid entry at any time - it will immediately revert to the previous value. If additional audio channels are enabled, there will be additional entries for their corresponding PIDs. The SCTE 35 PID entry is shown only if SCTE 104 Ad Insertion Triggers are enabled.

Program Number

Enter the desired program number for this encoder channel. Valid program numbers go from 1 to 65535 and are always entered in decimal.

Transport Stream ID

Enter the desired Transport Stream ID for this encoder channel. Values in this field can be entered both in hexadecimal (prefixed by 0x) or in decimal.

Generate SDT

The Service Description Table (SDT) provides additional metadata within the MPEG Transport Stream about the services. If this box is selected, an SDT will be generated for this encoder channel. Additional parameters become available once this box is selected. This option is not available for the HTTP Live Stream and RTMP protocols.

Service Name

Enter the desired SDT service name for this encoder channel. The default name is Slot **x** Encoder **y**, where **x** is the openGear® slot number where the MSE-8671 and MDE-8672 is installed, and **y** is 1 or 2 (for Encoder 1 or Encoder 2).

Provider Name

Enter the desired SDT service provider name. The default is Ross Video.

Advanced SDT Config

By default, the other SDT values are automatically set by the system. If you need to configure them, check this box, and a new set of parameters appears.

Running Status

Indicates the status of the service. The options are undefined, not running, starting, pausing, running, and service off-air. The value used for this parameter when Advanced SDT Config is not enabled is running.

Service Type

Indicates the type of service. The value used for this parameter when Advanced SDT Config is not enabled is advanced Codec SD digital television service if the encoder is in SD mode, or advanced Codec HD digital television service if the encoder is in HD mode. The drop-down list offers a few of the most common choices. If you need to code something other than these choices, select custom setting in the drop-down list and a new parameter will become available.

Custom Service Type

Enter the service type. This field accepts both hexadecimal (prefixed by 0x) and decimal values. The valid range is from 0 (0x00) to 255 (0xFF).

Original Network ID

This field contains the Network ID code from which this program originated. This field accepts both hexadecimal (prefixed by 0x) and decimal values. Valid values are from 0 (0x0000) to 65535 (0xFFFF). The default value for this field is 0xFF01, which is in the range of values allocated for video over IP.

EIT Schedule Flag

Select this box to set the flag. This flag indicates that Event Information Table (EIT) schedule information is present for this service. Since the MSE-8671 and MDE-8672 does not generate EITs, the correct setting of this flag is not set. Only set it if you intend to mux an EIT downstream of the MSE-8671 and MDE-8672.

EIT P/F Flag

Select this box to set the EIT present/following flag for this service. Since the MSE-8671 and MDE-8672 does not generate EITs, the correct setting of this flag is not set. Only set it if you intend to multiplex an EIT downstream of the MSE-8671 and MDE-8672.

Free CA Mode

Select this box to set the Free CA Mode flag. If this flag is set, it indicates that one or more components of the service are scrambled. Since the MSE-8671 and MDE-8672 does not offer scrambling, the correct setting of this flag is not set. Only set it if you intend to scramble the program downstream from the MSE-8671 and MDE-8672.

Using the Encoder Connections Tab

The **Connections** tab is used to create output connections for the encoder.

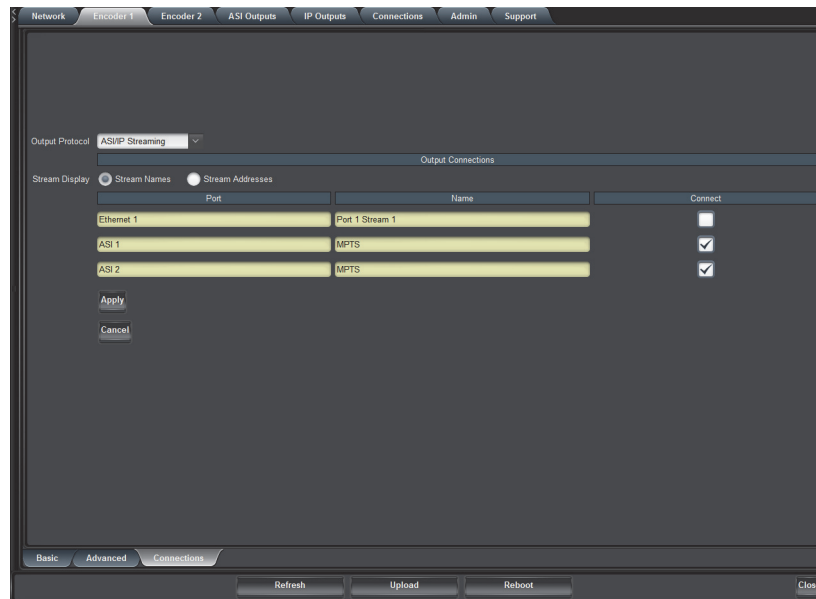


Figure 10.9 Encoder 1 — Connections Tab

The set of output options offered is a function of whether or not Secondary Audio and/or Additional Audio are enabled. Once an option is selected, the appropriate configuration parameters are displayed. Choose one of the following:

- **ASI/IP Streaming** — the output of the encoder is available for connection to ASI Outputs and IP Outputs from the rear module.
- **HTTP Live Streaming** — the output of the encoder is directed to a web server (which can be the internal server in the encoder or an external server), which in turn serves it to web clients using HTTP Live Streaming. If this option is selected, the encoder output is not available to ASI and IP Output ports, and the video bit rate is limited to 15Mbps. Moreover, the GOP Mode parameter in the Advanced tab - Video Parameters will be forced to Closed GOP. This output option is not available if Secondary Audio is enabled.
- **Direct HTTP Streaming** — the output of the encoder is available to clients over a standard HTTP connection. Clients will open an HTTP connection to the encoder, send a standard HTTP GET request, and receive the bit stream (for as long as they keep the connection open). This output option is not available if Secondary Audio is enabled.
- **RTMP** — the encoder will operate as an RTMP client, connect to a specified RTMP server and publish the stream, similar to the Adobe® Flash® Live Media Encoder (FMLE). This output option is not available if Secondary Audio is enabled. If this is selected, the GOP Mode parameter in the Advanced tab > Video Parameters will be forced to Closed GOP.

ASI/IP Streaming

If this option is selected, the standard Output Selection Connection Parameters are presented. These connection parameters are common to all data sources, and are described in the section “**Destination Selection**” on page 85.

HTTP Live Streaming

HTTP Live Streaming (HLS) is a protocol designed to deliver live streaming content to clients on the Internet using a standard unmodified Web Server, and the standard HTTP protocol. (Figure 10.10)

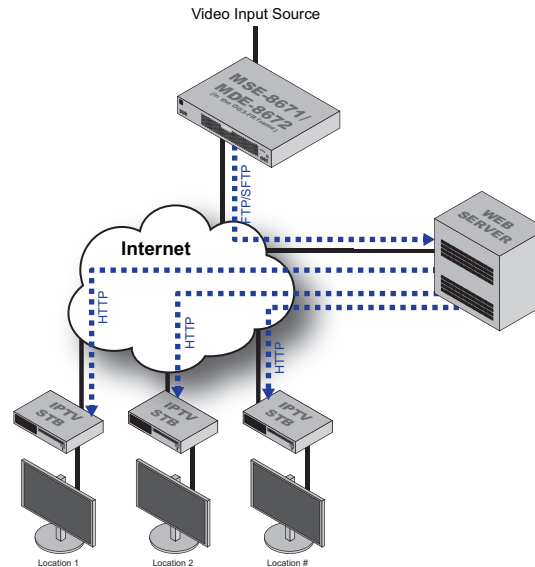


Figure 10.10 Example of a Possible HTTP Live Streaming Setup

The highlights of the protocol are:

- The encoder segments the bit stream into small files of similar duration, at some suitable points.
- The encoder continuously uploads the files as they are created to a standard web server.
- Every time the encoder uploads a new file, it also updates a special play-list file in the server, which informs the clients of which segments are available.
- The encoder also takes care of deleting old files from the server.
- The clients can connect to the web server at will; they download the play-list file, and start playing the segments as they come.
- A standard unmodified web server can be used.

HTTP Live Streaming is supported in the MSE-8671 and MDE-8672¹. The content can be uploaded to an external server, or served directly from the unit.

Uploading to an External Server

When uploading to an external server, the configurable parameters are as follows.

Server Location

Choose from the following:

- **Remote** — the segments are uploaded to a remote web server, using FTP or SFTP.
- **Local** — uses the local server in the device itself.

1. A license is required for this feature. Contact Ross Video for details.

Transfer Protocol

This configures the protocol to be used between the encoder and the web server for uploading the files. The two options are FTP and SFTP (Secure FTP). FTP exchanges data and password in the clear, while SFTP encrypts both flows.

Server Address

Enter the IP address of the web server here. It needs to be reachable from either one of the encoder's Ethernet ports.

Username

Enter the username to be used when uploading the files to the server.

Password

Enter the password corresponding to the user name, to be used when uploading the files.

Server Path

Enter the absolute server path for the directory where the files should be placed. It is recommended that a separate directory be created for each encoder.

Base File Name

Enter the base file name for the files created in the server. The encoder will create the following files:

- **basename.m3u8** — This is the top play-list file. For the example above, where the base file name is `live`, the play-list file will be `live.m3u8`. This file will contain a single bit rate profile. It is created when the encoder starts, and not changed during operation. For backward compatibility with previous versions, a top play-list with an `".m3u"` extension and identical contents will also be created.
- **basename_p.m3u8** — This is the current play-list file for the encoder profile. It is updated every time a new segment is created.
- **basename_XXXX.ts** — These will be the bit stream encoded files where **XXXX** is an increasing count. For example, the encoder will create files named `live_1.ts`, `live_2.ts`, `live_3.ts`, `live_4.ts`, and so on. At any given point in time, there will be five or six consecutive files in the configured directory if the encoder is configured to remove older files.

Segment (sec)

Number of seconds per segment. This defines the approximate size (in seconds) for the above bit stream encoded files. The valid range is from 1 to 20 seconds. Note that the clients will experience latency approximately equal to the segment size times the number of segments. The recommended value is 10 seconds. Setting the segment size to less than 3 seconds may cause performance issues with the FTP/SFTP server (especially Microsoft® Windows® servers running FileZilla); the result will be a non-zero count of dropped segments.

Number of Segments

This defines the number of bit stream segments advertised in the play-list. The minimum number, as per the HLS specification, is 3. Some set-top boxes require 4 segments. Apple® devices work well with three segments.

The maximum number of segments is dependent on the segment size and bit rate. The total capacity of the local server is 20Mbytes.

Extra Server Compatibility

Check this box if the encoder has problems renaming files in the server. This is typically required for Microsoft® Windows® FTP servers. Linux® based servers do not need this. Ross Video recommends checking this box only if your server requires it.

Keep Segments on Server

Normally, when a segment falls out of the play-list file, it is automatically deleted by the encoder. If you check this box, the bit stream is left in the server. Clients will still start playing from the first segment in the play-list.

Program Name

This program name is placed in the play-list file. Whether or not it is shown depends on the client. This is an optional parameter.

For example,

If the directory `/var/www/TV` is published on server `www.example.com` as `http://www.example.com/TV`, the URL for the video will be: `http://www.example.com/TV/live.m3u8`

Using the Built-in Server in the Encoder

When using the built-in server of the MSE-8671 and MDE-8672, the options are:

Server Location

Select Local to use the local server in the device itself.

Segment (sec)

Number of seconds per segment. This defines the approximate size (in seconds) for the above bit stream encoded files. The valid range is from 1 to 20 seconds. Note that the clients will experience latency approximately equal to the segment size times the number of segments. Given the limited amount of memory storage in the local encoder server, at higher bit rates the segment size will be limited. The MSE-8671 and MDE-8672 has 20Mbytes of storage per encoder.

Number of Segments

This defines the number of bit stream segments advertised in the play-list. The minimum number, as per the HLS specification, is 3. Some set-top boxes require 4 segments. Apple® devices work well with 3 segments.

Program Name

This program name is placed in the play-list file. Whether or not it is shown depends on the client. This is an optional parameter. If entered, it will be shown as part of the encoder link in the web page generated by the MSE-8671 and MDE-8672.

In local server mode, the access URLs for the content are:

`http://xxx.xxx.xxx.xxx/HLS/encoder1.m3u8`

`http://xxx.xxx.xxx.xxx/HLS/encoder2.m3u8`

where `xxx.xxx.xxx.xxx` is the IP Address of the MSE-8671 and MDE-8672 Ethernet port. In the MSE-8671 and MDE-8672 openGear® version, HLS streams are available through both streaming Ethernet ports. Note that if you use a browser to go to the encoder IP address (i.e., just go to `http://xxx.xxx.xxx.xxx`), there will be a link for the HLS page.

HLS Implementation Notes

Keep the following in mind when implementing HLS:

- When HTTP Live Streaming is selected, the GOP Mode control is set to Closed GOP and is not selectable. This is done to ensure that each segment is self-contained.
- The maximum video bit rate allowed in HLS mode is 15Mbps.
- The maximum aggregate performance of the built-in HLS server in the encoder is between 20 and 30Mbps (total bit rate to all clients), and is somewhat dependent on network conditions. The built-in server is intended to serve

only a small handful of clients and performance is not guaranteed at the capacity limits; if you need to scale, please use a remote server.

- If you are streaming to Apple® devices such as an iPhone®, iPad® or iPod®, you must also select the following:
 - › **Audio Encoding** — Select AAC-LC.
 - › **Output Resolution** — If you are streaming to older Apple® devices, select one of the resolutions ending in /15p (e.g., 320x240/15p). If your input is 50Hz, these resolutions will be shown ending in /12.5p. Newer devices may be able to support higher resolutions.

Direct HTTP Streaming

Direct HTTP Streaming is an output mode whereby clients open a standard HTTP connection to the MSE-8671 and MDE-8672 and issue a standard HTTP GET request. The MSE-8671 and MDE-8672 will send the appropriate HTTP response followed by the encoder bit stream; the bit stream will be transmitted for as long as the client maintains the connection. Since HTTP runs on top of the TCP protocol, it is possible for the MSE-8671 and MDE-8672 to deliver content over the Internet using this mode. However, it has the following limitations:

- The MSE-8671 and MDE-8672 has to send one independent copy of the bit stream to each client. There is a limit of 5 clients or 20Mbps per Ethernet port in this mode.
- The TCP protocol is capable of flow control; if the client is not fast enough, or if the network between the MSE-8671 and MDE-8672 and the client is not fast enough, the protocol will attempt to throttle the encoder, which is not possible. The MSE-8671 and MDE-8672 will buffer a small amount of bit stream in this case, but if the overall performance of the client/network link combination is insufficient to support the configured encoder data rate, the MSE-8671 and MDE-8672 will drop transport packets.

Direct HTTP Streaming has one parameter: Listening Port.

Listening Port

Use this to select the TCP port to be used by the MSE-8671 and MDE-8672 to listen to HTTP connections. Note that the MSE-8671 and MDE-8672 will not accept the values 22, 23, 80, 1935 and 5253 for this parameter as these ports may be internally used by the MSE-8671 and MDE-8672. The listening ports for Encoders 1 and 2 can be set independently (and can be set to the same value if desired).

The URL for accessing the bit stream will be:

```
http://encoder_ip:port/encoder1 (access to encoder1)
```

or

```
http://encoder_ip:port/encoder2 (access to encoder2)
```

Where `encoder_ip` is the IP address of either one of the MSE-8671 and MDE-8672 Ethernet ports (configured in the Network tab) and `port` is the Listening Port configured above. For example, if one of the IP addresses of the MSE-8671 and MDE-8672 is set to 10.10.9.80, and the Listening Port is set to 8000, the URL for Encoder 1 will be:
`http://10.10.9.80:8000/encoder1`

Please note that none of the common web browsers (Windows® Explorer®, Mozilla® Firefox®, etc.) are capable of directly playing this URL; what these browsers will do is download the bit stream to a file. If you wish to see video playback on a web page, refer to the chapter “**Playing Video on a Web Page**” on page 103.

Real Time Messaging Protocol

The MSE-8671 and MDE-8672 can operate as an Real Time Messaging Protocol (RTMP) client, and publish a real-time, live bit stream to an RTMP server. RTMP clients (such as the Adobe® Flash® Player) can connect to the server and play the live stream. The MSE-8671 and MDE-8672 can generally connect to the same servers as the Adobe® Flash® Media Live Encoder (FMLE).

An RTMP server publishing point is defined by the following:

- An RTMP URL, of the form: `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
- **rtmps** — encrypted RTMP over SSL, tunneled over HTTP

The **server-name** 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 configurable parameters are outlined below.

RTMP Protocol

Select the protocol variant, as discussed above.

Primary Server

Enter the host name or IP address of the primary (or single) 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 may be configured in the DNS sub-tab of the Network Configuration tab as outlined in the section “**DNS Tab**” on page 44.

Primary Network Interface

Select the network interface to be used when contacting the primary server. Choose from the following:

- **Any** — Use the optimal network interface to connect to the server.
- **Ethernet 1** — Specifies to use Ethernet 1 to connect to the server. If the server is not in the same subnet as Ethernet 1, and no default gateway is set for Ethernet 1, this setting will be ignored.
- **Ethernet 2** — Specifies to use Ethernet 2 to connect to the server. If the server is not in the same subnet as Ethernet 2, and no default gateway is set for Ethernet 2, this setting will be ignored.

Primary App

Enter the application name in the primary server, as discussed above. Consult your CDN or server documentation for details on what should be entered in this field.

Primary Server URL

This read-only field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the primary server.

Primary Stream

Enter the stream name for the primary server. Consult your server documentation or CDN for details on what should be entered here. Some servers allow arbitrary stream names, while others use this field for authentication and thus require specific names.

Backup Server

If you have a backup RTMP server, configure it here; otherwise, this field can be left empty. The encoder will only attempt to contact the backup RTMP server if it cannot establish a connection with the primary server.

Backup Network Interface

Select the network interface to be used when contacting the backup server. The meaning of the choices is the same as the outlined in the section “**Primary Network Interface**” on page 71.

Backup App

Enter the application name in the backup server. If this field is left blank, the value entered for Primary App is used.

Backup Server URL

This read-only field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the backup server.

Backup Stream

Enter the stream name for the backup server. If this field is left blank, the value entered for Primary Stream is used.

Redundancy Switch Time (sec)

This field is only displayed if a Backup Server is specified (i.e. it will not be present if the Backup Server field is left blank). It sets the timeout for encoder to switch servers after the RTMP connection is established, if the server stops accepting data, such as when the IP Output Rate goes to 0 (zero).

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 Port Selection is set to Specific Port. Configure a non-standard TCP port here.

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 displayed:

- **Username** — Enter the username to be used for authentication.
- **Password** — Enter the password to be used for authentication.
- **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.
- **Server URL** — This field is automatically updated as you configure the RTMP parameters. It displays the full RTMP URL for the primary server. The backup server URL is similar.
- **Stream** — Enter the stream name. 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.
- **Connect** — This parameter controls whether or not the encoder should actually establish a connection with the server. If you set this parameter to No, the encoder will run but no data will be transmitted. This is useful to pre-configure a session, and turn it on later when it comes the time to broadcast.

Notes

Keeping the following in mind when using RTMP:

- The maximum aggregate RTMP performance for the MSE-8671 and MDE-8672 is 12Mbps. If the unit has two encoder channels, this limit applies to the sum of their video bit rates. For example, if one encoder channel is

configured for RTMP at 8Mbps, the other can only be configured for RTMP at 4Mbps or less. The limit does not apply to encoder channels configured for UDP/ASI streaming.

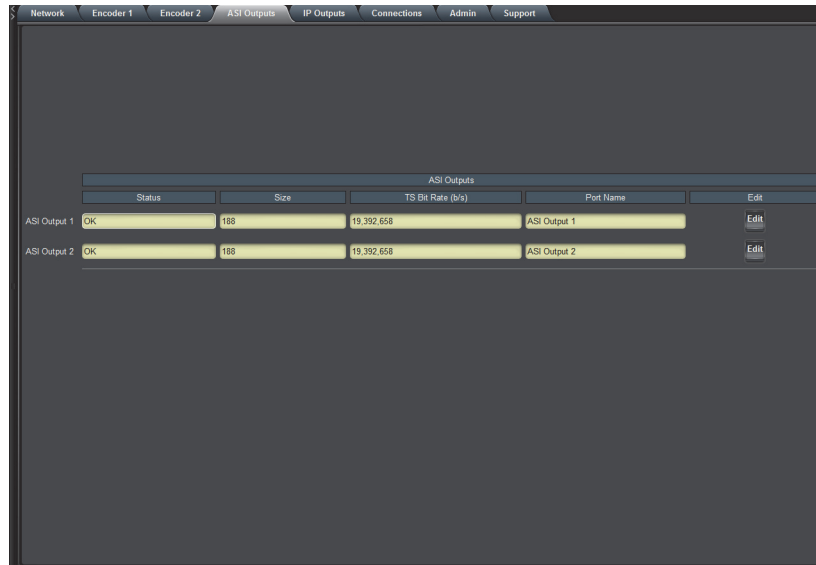
- Using one of the encrypted variants of the protocol (rtmpe, rtmps, rtmpte, or rtmpts) will also have a performance impact and will reduce the maximum usable rate.
- Performing a firmware update while the encoder is running RTMP at high bit rates may cause service interruptions to the RTMP stream. If you need to update the firmware, we recommend that you do so during a maintenance window.
- Some CDNs only accept frame rates up to 30fps and required Closed GOP operation. Refer to the section “**Using the Advanced Configuration Tab**” on page 56 for details.
- In RTMP Mode, the MSE-8671 and MDE-8672 will force Closed GOP operation as required by some CDNs. Refer to the section “**Using the Advanced Configuration Tab**” on page 56 for details.

ASI Outputs Tab

The MSE-8671 and MDE-8672 has two ASI output ports that can be independently configured using the ASI Outputs tab in DashBoard. This chapter discusses the functions and options in the ASI Outputs tab.

ASI Outputs Configuration Tab

This section provides a general overview of the ASI Outputs tab.



ASI Outputs				
	Status	Size	TS Bit Rate (b/s)	Port Name
ASI Output 1	OK	188	19,392,658	ASI Output 1
ASI Output 2	OK	188	19,392,658	ASI Output 2

Figure 11.1 ASI Outputs Tab

Status

This field displays one of the following messages:

- **OK** — Port is operating correctly.
- **Unlocked** — Port is unlocked and is operating in Automatic Bit Rate mode. There is no input.
- **Overflow** — Transmit overflow. The ASI Output is in Manual mode, and the configured bit rate is insufficient to carry the bit streams connected to it. This situation will raise an alarm as packets are being dropped.

Size

This field indicates the configured transport packet size, in bytes.

TS Bit Rate

This field reports the actual transport stream bit rate, in bits/second.

Port Name

This field reports the user-configured name assigned to the port.

Edit Button

Clicking this button enables configuration of the port. The ASI Output Configuration tab displays, with the settings for the selected port.

ASI Outputs Configuration

To configure an individual port, click the **Edit** button for that port in the ASI Outputs area. The Configuration tab can be divided into two parts: ASI Output Parameters, and Input Selection Connection Parameters.

The Connection Parameters are common to all outputs, and are further described in the chapter “**Connections Tab**” on page 85.

Port Name

All MSE-8671 and MDE-8672 encoders 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 and 204bytes.

ASI Rate

The following two modes are available:

- **Manual** — In this mode, the ASI output bit rate is set to the value entered in the Bit Rate field. The ASI output will maintain this rate at all times, as follows:
 - › If there is no connection to the ASI port, or if the input connected to the ASI port is not active, the ASI port will transmit NULL packets.
 - › If the connected input bit rate is lower than the rate entered in the Bit Rate field, the ASI port will add NULL packets as required to pad it to the desired value. PCR packets will be re-stamped as required.
 - › If the connected input bit rate is higher than the rate entered in the Bit Rate field, the ASI port will attempt to remove NULL packets from the connected bit stream in order to achieve the desired value. PCR packets will be re stamped as required. If there are not enough NULL packets to be deleted, packets will be dropped, and an alarm will be raised. This alarm will be indicated in the DashBoard Card State field, in the front Status LED, and in the ASI status tab.
- **Automatic** — If this mode is selected, the Bit Rate field disappears. The ASI output will exactly match the rate of the connected bit streams. However, if the connected ports have no data, or if there is no connection to the ASI port, there will be no output, and any connected downstream ASI device will indicate loss of sync. The ASI status tab will indicate this state, as well as the rear I/O panel indicator LED. Note that an alarm will only be raised if there is at least one connection to the ASI output.

Bit Rate

This field is only available if the **ASI Rate** mode is set to **Manual**.

Enter the desired ASI output bit rate here, in bits/second. The minimum value is 64,000 and the maximum value is 213,000,000.

Apply

Once the port is configured, click the **Apply** button, and the configuration takes effect.

IP Outputs Tab

IP Outputs receive data from connected encoders or the test packet generators, format this data for transmission over UDP/IP, and send it with very precise timing over the Ethernet ports. Each card supports up to four transport stream outputs per Ethernet port.

Getting Started

The IP Outputs have the following specifications:

Table 12.1 Specifications — IP Outputs

Item	Specifications
Supported Formats	MPEG-2 Transport Packets over UDP/IP
MPEG-2 Packets	The number of MPEG-2 Transport Packets per UDP datagram is fixed at 7
Addressing Support	Unicast
	Multicast
	Broadcast
Control over IP Header Fields	Advanced control over the IP header fields available
SMPTE 2022 FEC Support	Each card supports one FEC ¹ session per Ethernet port

1. Previously known as Pro-MPEG FEC COP3.

Configuration Overview

An IP output stream can be created, configured, and removed using this configuration area. Before any streams are created, the IP Outputs tab displays as seen in **Figure 12.1**.

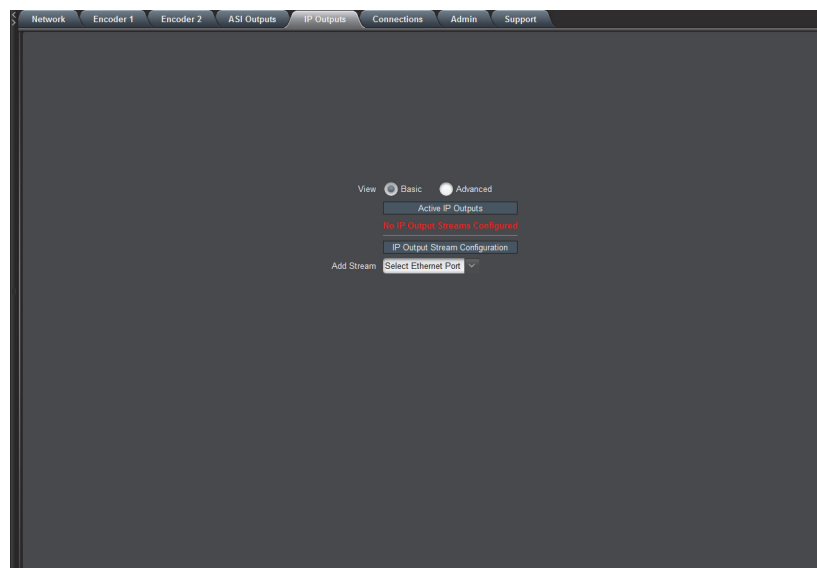


Figure 12.1 IP Outputs Tab — No IP Output Stream Configured

To create an IP Output stream, first select the desired Ethernet port in the Add Stream drop-down box. Once that selection is made, the IP Output Stream Configuration is displayed. (**Figure 12.2**)

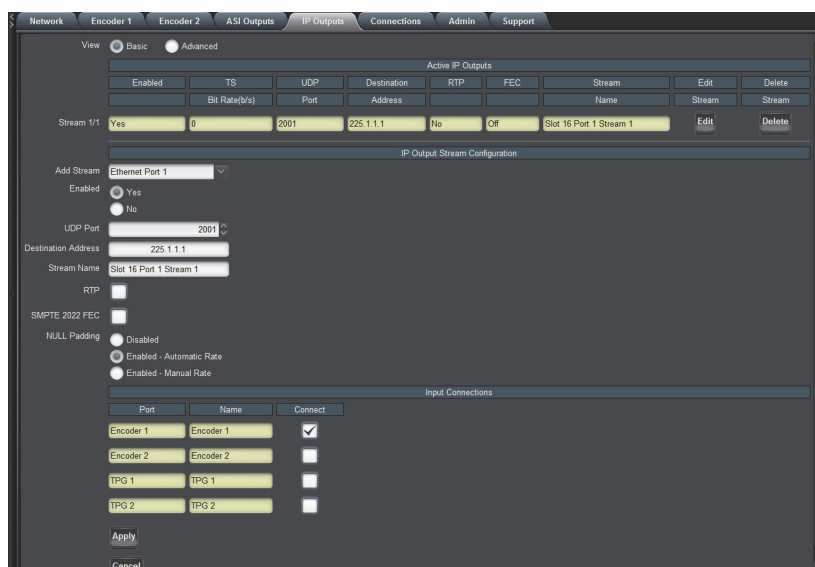


Figure 12.2 IP Outputs Tab — IP Output Stream Options

The tab has two areas: IP Output Stream Configuration, and Input Connection parameters.

- **IP Output Parameters** — These are the parameters specific to the IP Output configuration. The set of parameters available for configuration depends on the View selection. When **View** is set to **Basic**, the suitable default values are entered for the advanced parameters.
- **Input Selection Connection Parameters** — These allow a connection to be made to the output stream. The Connection Parameters are common to all outputs, and will be described in the chapter “**Connections Tab**” on page 85.

IP Output Parameters — Basic View

When View is set to Basic, the Active IP Output parameters are available in addition to the IP Output Stream Configuration and Input Connection settings.

Active IP Outputs

The Active IP Outputs area of the tab is located near the top of the tab.

Enabled

This allows the output stream to be enabled or disabled. If it is disabled, no packet transmission takes place. This feature is provided for testing purposes (i.e., temporarily disable an output for fault-finding). Most users will leave the stream enabled.

UDP Port

Selects the UDP port to transmit to. Valid values are between 1 and 65535. Note that, in traditional IP networks, UDP ports between 1 and 1023 are reserved for administrative uses. Ross Video recommends the use of UDP ports 1024 and higher. The MSE-8671 and MDE-8672, however, will accept any legal value.

Destination Address

Selects the IP address to transmit to. Any unicast or multicast address can be entered here, with the exception of the loop back range (127.0.0.0 to 127.255.255.255). The MSE-8671 and MDE-8672 will also accept the broadcast IP address of 255.255.255.255, and will transmit the packets as Ethernet broadcasts. Use of broadcasts, however, is strongly discouraged.

Stream Name

All MSE-8671 and MDE-8672 input and output ports can be assigned a user-defined name. This name is used to identify the stream later when making connections. Use any descriptive name suitable for your application, or accept the default.

NULL Padding

This setting controls whether or not NULL packets are transmitted, making the stream completely CBR. IP networks are inherently VBR, and do not require NULL packets (which carry no information). However, the decoders may need them.

The following is a good set of rules for deciding whether or not to send NULL packets:

- If all your decoders are consumer IP set-top boxes or PCs running software decoders, NULL packets can be disabled.
- If your decoders include professional IRDs, NULL packets must be enabled. The great majority of professional IRDs will not work without them.
- If you are generating an MPTS (routing both encoders to the stream), enable NULL packets. An MPTS without NULL packets is technically illegal as per ISO/IEC 13818-1, but some systems support it.
- If you are not sure about what kind of decoder will be receiving the stream, enable NULL packets.

This control offers the following options:

- **Disabled** — NULL packets are disabled and will not be transmitted. This will cause the stream to be somewhat VBR, even if the encoder is set to CBR mode.
- **Enabled - Automatic Rate** — This setting enables NULL packets, but the bit rate is automatically set by the encoder to the minimum suitable value. This is the recommended setting. If you later reconfigure an encoder connected to this stream, the rate will be automatically adjusted.
- **Enabled - Manual Rate** — This setting allows you to specify the overall stream bit rate. If you specify the bit rate, it must be high enough to support the connected encoders (i.e., it must be at least equal to the sum of the encoder Transport Rate, found in each encoder Status tab). Specifying a rate that is not high enough will cause the IP Output to drop packets. Note that if this option is selected, the IP Output will be transmitting continuously at the selected bit rate, regardless of connections or the state of the encoders. If there is no connection to the IP Output, it will transmit only NULL packets; if there are connections and the encoders are stopped, it will transmit NULL packets plus (P)SI tables.

IP Output Parameters — Advanced View

If the Advanced View is selected, four more parameters are available for configuration.

TOS

This parameter allows the configuration of the Type-Of-Service (TOS) byte in the IP header (also known as the Differentiated Services - DS - field). Valid values are between 0 and 255. Configuring this is only useful if the downstream router is configured to honor the field.

TTL

This parameter allows the configuration of the Time-To-Live (TTL) byte in the IP header. Valid values are between 0 and 255. If not explicitly configured, it defaults to 128. This field controls how many hops the packet can traverse before it is dropped by a router. The default value of 128 is suitable for virtually all applications.

DF Bit

This parameter allows the configuration of the Do-not-Fragment (DF) bit in the IP header. The MSE-8671 and MDE-8672 will never produce fragmented packets, and with the UDP payload set to 7 transport packets, the IP packets are guaranteed to fit inside the Ethernet MTU. This control is provided for compatibility with legacy

switches/routers. Some legacy equipment may exhibit performance problems if this bit is not set. This is not an issue with current network equipment.

SMPTE 2022 FEC

Each card supports SMPTE 2022 FEC in one stream per Ethernet interface. If no streams are currently configured for SMPTE 2022 FEC, the **SMPTE 2022 FEC** check box is displayed. If it is not displayed, the another stream is already using the feature.

Select this box to enable transmission of SMPTE 2022 FEC packets for this stream. Refer to the section “**SMPTE 2022 FEC Support**” on page 80 for details on configuring support for FEC.

NULL Padding

This setting controls whether or not NULL packets are transmitted, making the stream completely CBR. IP networks are inherently VBR, and do not require NULL packets (which carry no information). However, the decoders may need them. The following is a good set of rules for deciding whether or not to send NULL packets:

- If all your decoders are consumer IP set-top boxes or PCs running software decoders, NULL packets can be disabled.
- If your decoders include professional IRDs, NULL packets must be enabled. The great majority of professional IRDs will not work without them.
- If you are generating an MPTS (routing both encoders to the stream), enable NULL packets. An MPTS without NULL packets is technically illegal as per *ISO/IEC 13818-1*, but some systems support it.
- If you are not sure about what kind of decoder will be receiving the stream, enable NULL packets.

This control offers the following options:

- **Disabled** — NULL packets are disabled and will not be transmitted. This will cause the stream to be somewhat VBR, even if the encoder is set to CBR mode.
- **Enabled - Automatic Rate** — This setting enables NULL packets, but the bit rate is automatically set by the MSE-8671 and MDE-8672 to the minimum suitable value. This is the recommended setting. If you later reconfigure an encoder connected to this stream, the rate will be automatically adjusted.
- **Enabled - Manual Rate** — This setting allows you to specify the overall stream bit rate. If you specify the bit rate, it must be high enough to support the connected encoders (i.e., it must be at least equal to the sum of the encoder Transport Rate, found in each encoder Status tab). Specifying a rate that is not high enough will cause the IP Output to drop packets. Note that if this option is selected, the IP Output will be transmitting continuously at the selected bit rate, regardless of connections or the state of the encoders. If there is no connection to the IP Output, it will transmit only NULL packets; if there are connections and the encoders are stopped, it will transmit NULL packets plus (P)SI tables.

SMPTE 2022 FEC Support

The card supports one FEC session per Ethernet port. A check box for SMPTE 2022 FEC is displayed if the feature is available. Once this feature is enabled for one of the streams in a given Ethernet port, the check box will no longer be displayed.

Once the SMPTE 2022 FEC box is checked, additional parameters become available for configuration.

FEC Mode

If you select Column Only, the MSE-8671 and MDE-8672 will send a single FEC flow, corresponding to the column protection data, using a UDP port number corresponding to the media UDP port number plus 2.

If you select Row and Column, the MSE-8671 and MDE-8672 will send two FEC flows, the first corresponding to the column protection data, and the second corresponding to the row protection data.

The row protection data will be sent using a UDP port number corresponding to the media UDP port number plus 4. Note that not all receivers support Row and Column mode; such receivers will only use the FEC Column data and discard the FEC Row data.

Columns

Number of columns in the FEC matrix. This variable must be between 1 and 20 if FEC Mode is set to Column Only, and between 4 and 20 if it is set to Row and Column.

Rows

Number of rows in the FEC matrix. This variable must be between 4 and 20.

FEC Overhead

This field is updated as configuration is entered, and contains the overhead for the selected FEC configuration. Note that not all parameter changes cause the overhead to change. The FEC overhead is the sum of a Column overhead and a Row overhead (which is zero if FEC Mode is Column Only). The overhead is a function of the settings, as follows:

- Increasing the number of columns decreases the Row overhead (if enabled) and does not change the Column overhead.
- Increasing the number of rows does not change the Row overhead and decreases the Column overhead.
- Decreasing the number of rows and columns has the opposite effect as the previous items.

Constraints

The following constraints apply to the FEC function:

- The number of rows must be between 4 and 20.
- The number of columns must be between 1 and 20 for Column Only mode, or between 4 and 20 in Row and Column mode.
- The size of the FEC matrix (product of the number of rows and the number of columns) must not exceed 100.

The user interface will not allow invalid configurations to be entered, and will automatically make parameter adjustments as required. For example,

- If you select Row and Column, and the number of columns is less than 4, it will be automatically adjusted to 4.
- If your number of rows is 10, and you set the number of columns to 20, the number of rows will be automatically reduced to 5.

The number of rows and columns should be selected based on some understanding of the packet loss characteristics of the network between the MSE-8671 and MDE-8672 and the receivers. If you have no statistics on packet loss, the recommended setting is 20 columns and 5 rows to maximize the correction capabilities. Most receivers that support SMPTE 2022 FEC provide packet loss/recovery statistics. After running for a while, if the network is found to be clean, consider reducing the matrix to 10 rows and 10 columns, which will reduce the overhead.

Completing the Configuration

Once the configuration information is filled in, click on the **Apply** button to make it active. If there are no errors, the stream will be created, and the configuration area disappears. If any errors are detected, they will be displayed at the top of the **Apply** button.

The following configuration-related errors are flagged.

UDP Port/Address conflict with Port X/Y

You have configured two IP Output streams with the same destination IP Address and UDP port, on the same Ethernet interface. Please review your settings. Note that ports with FEC enabled will use either two or three UDP ports (depending on the FEC settings) - these are checked as well.

Maximum number of streams exceeded on this port

You will receive this message if you attempt to create more than 4 IP outputs on a given Ethernet port.

No SMPTE 2022 FEC License Available

The SMPTE 2022 function requires licensing. Please contact Ross Video to obtain a license.

Active IP Outputs Table

Once the output is created, it is added to the Active IP Outputs table, which has Basic and Advanced views. This table provides a summary of the configuration and status of the output stream. An example of this table, in the Basic view, is depicted in **Figure 12.3**.

View ☒ Basic ☐ Advanced

Active IP Outputs								
Enabled	TS	UDP	Destination	RTP	FEC	Stream	Edit	Delete
	Bit Rate(b/s)	Port	Address			Name	Stream	Stream
Stream 1/1	Yes	0	2001	225.1.1.1	No	Off	Slot 16 Port 1 Stream 1	EditDelete

Figure 12.3 Example of an Active IP Outputs Table

Basic View

The Basic view includes the following fields:

Enabled

The configured value of this parameter.

TS Bit Rate

This column provides the current bit rate of the output transport stream. This does not include UDP and IP overhead, nor FEC overhead.

UDP Port

The configured value of this parameter.

Destination Address

The configured value of this parameter.

FEC

This provides a summary of the FEC configuration. If FEC is disabled, this field will indicate it as Off. If FEC is enabled, this field will indicate the FEC matrix size as Columns × Rows, and the protection mode as C for Column Only or R-C for Row and Column. In the example above, Stream 1/1 has Column Only FEC with 1 Column and 4 Rows, and Stream 2/1 has Row and Column FEC with 4 Columns and 10 Rows.

Stream Name

The configured stream name.

Edit Stream

If you click the **Edit** button, you can modify all the parameters for this output. The configuration area will re-open with the current output settings.

Delete Stream

If you click the **Delete** button, the stream is deleted and removed from the table.

Advanced View

When **View** is set to **Advanced**, additional fields appear in the table. The Advanced view includes all items in the Basic view plus the following.

Line Rate

This column replaces the TS Rate column in the Advanced view. It indicates the actual Ethernet line rate for the stream, including the MAC, IP, UDP, and FEC overheads.

Null Padding

The configured value of this parameter (shown as No, Auto, or Manual).

TOS

This parameter allows the configuration of the Type-Of-Service (TOS) byte in the IP header (also known as the Differentiated Services – DS – field). Valid values are between 0 and 255. Configuring this is only useful if the downstream router is configured to honor the field.

TTL

This parameter allows the configuration of the Time-To-Live (TTL) byte in the IP header. Valid values are between 0 and 255. If not explicitly configured, it defaults to 128. This field controls how many hops the packet can traverse before it is dropped by a router. The default value of 128 is suitable for virtually all applications.

DF

This parameter allows the configuration of the Do-not-Fragment (DF) bit in the IP header. The MSE-8671 and MDE-8672 will never produce fragmented packets, and with the UDP payload set to 7 transport packets, the IP packets are guaranteed to fit inside the Ethernet MTU. This control is provided for compatibility with legacy switches/routers. Some legacy equipment may exhibit performance problems if this bit is not set. This is not an issue with current network equipment.

Destination MAC

The destination MAC address for this IP Output. For multicast destination addresses, this is derived from the destination IP address using the rules from RFC 1112. For unicast destination addresses, this is obtained using the ARP protocol. If this entry is the word Unknown, the encoder has failed to obtain a destination MAC address. The IP Output is not streaming. A more detailed description of the unicast MAC address algorithms used in the encoder is presented in the section “**Managing Unicast MAC Addresses**” on page 83.

Managing Unicast MAC Addresses

When the MSE-8671 and MDE-8672 is configured with a unicast destination address, it needs to obtain a corresponding MAC address (corresponding to either the final destination, if it is in the same subnet, or to the default gateway). These MAC addresses are obtained using the ARP protocol. The MSE-8671 and MDE-8672 uses a custom MAC address management algorithm, designed specifically for MPEG operation.

When an IP Output stream with a unicast destination address is created, the MSE-8671 and MDE-8672 immediately starts attempting to obtain a MAC address for it, using standard ARP requests. These requests are issued every two seconds until answered. No packets will be transmitted on that IP Output until a MAC address can be obtained. Note that this process will happen even if the stream is configured to be in the disabled state.

Once a MAC address is obtained, the MSE-8671 and MDE-8672 will cache it for about 5 minutes, as it is usual for IP devices. Unlike other IP devices, the MSE-8671 and MDE-8672 will keep on using the MAC address until a response is received, to avoid stream interruptions. If no response is received at that time, the MSE-8671 and MDE-8672 will raise a yellow alarm. This alarm can be seen in the IP Output status tab, described in the section “**IP Outputs Status Tab**” on page 114.

The current state of the MSE-8671 and MDE-8672 current streaming ARP cache is available in the Advanced View of the Active IP Outputs table, described in the section “**Active IP Outputs Table**” on page 82.

Connections Tab

The Connections tab allows the creation, deletion, and management of input-output connections.

Connections Configuration Tab

The Connections configuration tab is depicted below. The message “No Connections” displays if there are no configured input/output connections in the MSE-8671 and MDE-8672. If the MSE-8671 and MDE-8672 has two encoder channels installed, there are two sub-tabs, to switch between the Connections configuration interface and the MPTS configuration/status interface.

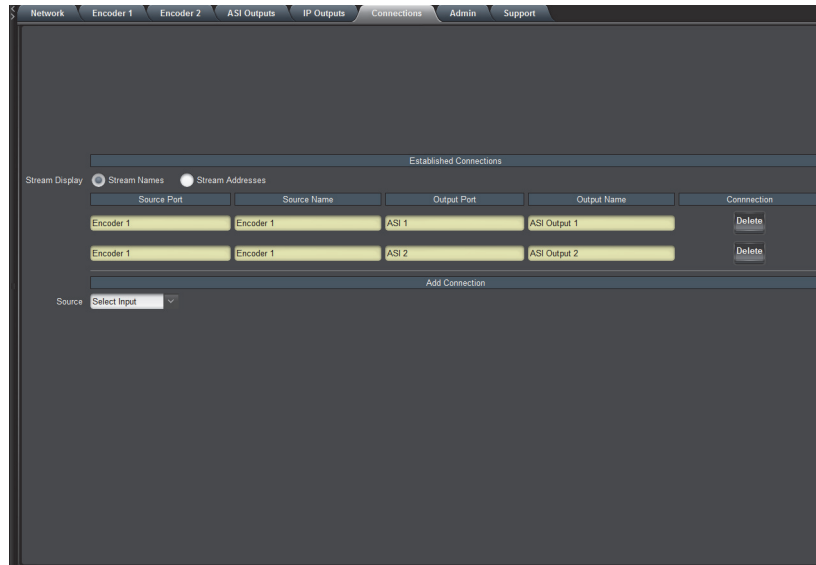


Figure 13.1 Connections Tab — Single Channel

To establish a connection

1. Select a source and a destination.
2. Click **Apply**.

Source Selection

There are four sources in the MSE-8671 and MDE-8672:

- Up to two Encoder channels as described in the chapter “**Encoder Setup**” on page 47.
- Two Test Packet Generators as described in the section “**Test Packet Generator Tab**” on page 97.

The connection process starts by selecting one of these data sources, using the Source drop-down menu. Once a source is selected, a list of available destinations is displayed.

Destination Selection

The list of available destinations always includes all the defined IP Output ports, as well as the two ASI ports. This interface is also available if you select ASI/IP Streaming in the Encoder Connections tab, and in the Admin Test Packet Generator tab. If **Stream Display** is set to **Stream Names**, the user-defined names are presented. This is displayed below.

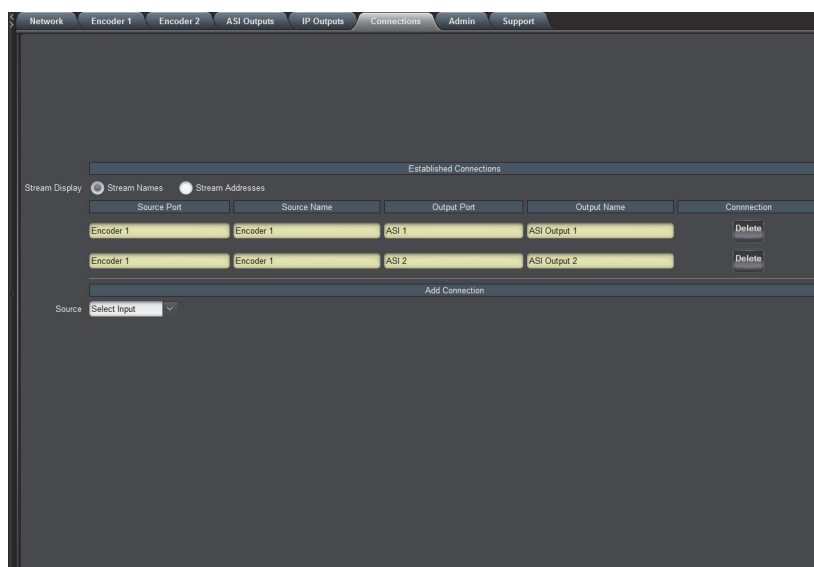


Figure 13.2 Stream Display — Set to Stream Names

If you would prefer to make the output selection by Destination Address and UDP Port, set **Stream Display** to **Stream Addresses**.

To make the connections, simply check the Connect box in front of the input you wish to use. You can connect any source to as many outputs as you wish. Conversely, clearing the box disconnects that particular source-destination pair.

Source Selection in the Output Ports

When configuring an output (ASI or IP), connections can be immediately made as well, in that output's configuration interface. The user-defined names for the Encoders (and Test Packet Generators) are displayed in the user interface to facilitate identification. To make the connection, just click on the corresponding box under Connect. Note that if an encoder channel is not available (either because it is not installed, or because it has been configured for HTTP Live Streaming), it will not show in the list.

Established Connections Table

As connections are established (either in the Connections tab, or as part of the source or output configuration), they are added to the Current Connections table. Regardless of how they are added, the connections can be managed using the functions in this table. An example is depicted below.

Source Port	Source Name	Source Status	Output Port	Output Name	Output Status
Encoder 1	Encoder 1	Warn	ASI 1	ASI Output 1	OK
Encoder 1	Encoder 1	Warn	ASI 2	ASI Output 2	OK

Figure 13.3 Connection Tab — List of Established Connections

The following columns are available in this table.

Source Port

This column indicates the physical port of the connection. The possible values are Encoder 1, Encoder 2, TPG 1 and TPG 2.

Source Name

This column contains the user-defined name for the source.

Output Port

This column indicates the physical output port for the connection. The possible values are Ethernet 1, Ethernet 2, ASI 1 and ASI 2.

Output Name

If the Stream Display control at the top of the table is set to Stream Names, this column will have the user-defined name for the output. If it is set to Stream Addresses, it will have the destination IP address and UDP port for IP Outputs, and the values ASI Output 1 and ASI Output 2 for the ASI ports.

Delete

If you click the **Delete** button, the corresponding connection will be deleted.

MPTS Configuration Tab

If two encoder channels are installed in the MSE-8671 and MDE-8672, the MPTS Configuration tab is available. This tab contains information specific to multiplexing the two encoders into one Multi-Program Transport Stream (MPTS).

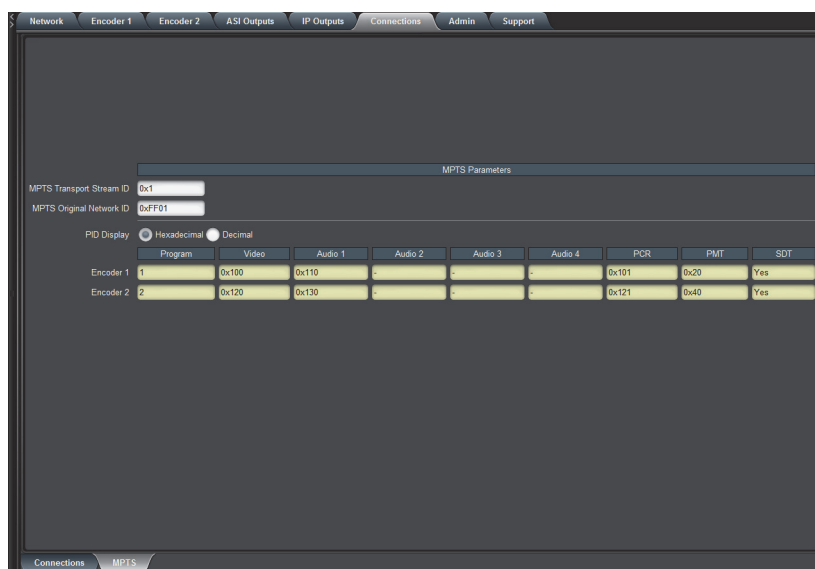


Figure 13.4 Connections Tab — MPTS Tab

As indicated above, the MPTS Configuration tab is divided into two distinct areas:

- **MPTS Parameters** — allows the setting of two MPTS-specific parameters.
- **MPTS PID/Program Allocation** — reports on the actual PIDs and Program numbers used in the MPTS.

MPTS Configuration Parameters

Whenever possible, the MPTS uses the same parameters as configured in the individual encoders. However, there are two parameters that need to be independently set, as follows:

MPTS Transport Stream ID

This field sets the Transport Stream ID for the MPTS formed by multiplexing the two encoders. This field accepts both hexadecimal (starting with 0x) and decimal entries. Valid values are from 0 (0x0) to 65535 (0xFFFF).

MPTS Original Network ID

This field set the Original Network ID to be reported in the MPTS SDT (if enabled). For a discussion of how to set the Original Network ID, refer to the section “**Multiplexer Parameters**” on page 64.

Note that this area does not have an **Apply** button; changes take effect immediately and on-the-fly.

MPTS PID/Program Allocation

Since the PIDs and Program Numbers can be set arbitrarily in each encoder, it is possible to select the same values for one or more of these parameters between Encoder 1 and Encoder 2. However, when the bit stream from the encoders is multiplexed into one MPTS, these values have to be distinct.

When building the MPTS, the MSE-8671 and MDE-8672 will use the configured values for each encoder if at all possible. However, if there are any conflicts, the following rules are employed:

1. The PID/Program allocations made for Encoder 1 are used unchanged in the MPTS.
2. If any PIDs configured for Encoder 2 conflict with those from Encoder 1, the Encoder 2 PIDs are remapped to the closest free value. Note that this remapping only happens for the MPTS; ports carrying the bit stream for Encoder 2 only will use the configured values.
3. If the program number is the same for Encoder 1 and Encoder 2, the program number for Encoder 2 in the MPTS will be that of Encoder 1 plus 1. For example, if both encoders are configured to be program 4, Encoder

1 will be program 4 in the MPTS, and Encoder 2 will be program 5 in the MPTS. Both encoders will still be program 4 in their individual SPTS.

4. The MPTS will have an SDT if either Encoder 1 and/or Encoder 2 have the SDT enabled. If only one encoder has the SDT enabled, the MPTS SDT will have only one entry, for that encoder.

The MPTS PID/Program Allocation area reports the actual PIDs and Program Numbers being used in the MPTS. It also reports whether or not the individual SDTs are enabled per encoder.

The **PID Display** control determines whether PIDs are displayed in Hexadecimal or Decimal.

If more audio channels are enabled, their respective PIDs will be displayed.

If SMPTE-2038 and/or SCTE-35 are enabled, their respective PIDs will be displayed.

Admin Tab

The **Admin** tab contains a number of general administrative functions, each on its own tab. The Admin status tabs are simplified read-only versions of the corresponding Admin Configuration tabs. They will not be explicitly described here.

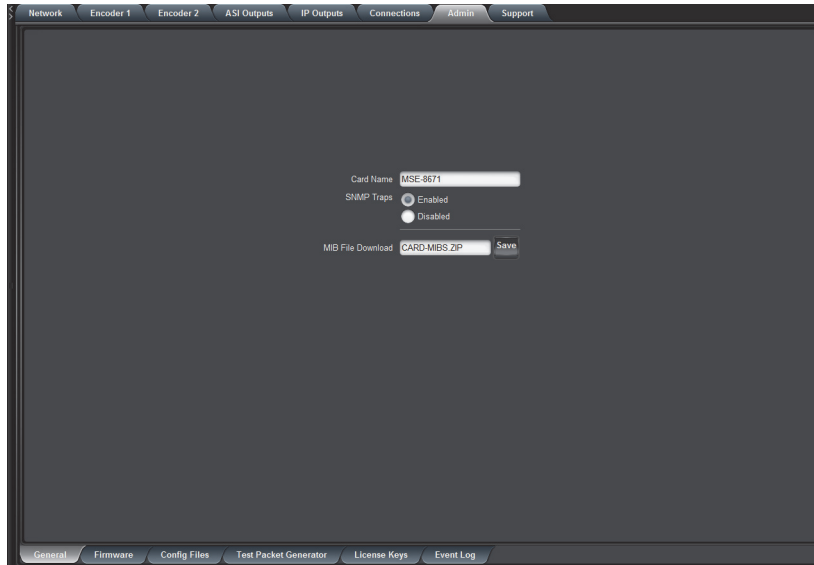


Figure 14.1 Admin Tab

The following tabs are displayed

- **General** — Manages a number of general card parameters; provides an SNMP MIB download.
- **Firmware** — Manages firmware images.
- **Config Files** — The MSE-8671 and MDE-8672 has the ability to store multiple configurations, and it has a number of pre-set configurations as well. These are managed in this tab.
- **Test Packet Generator** — Manages the Test Packet Generators.
- **License Keys** — Contains the current licensing state of the MSE-8671 and MDE-8672, and allows for new license keys to be entered.
- **Event Log** — The MSE-8671 and MDE-8672 contains a non-volatile event log. It can be inspected and downloaded from this tab.

General Tab

The General sub-tab includes the following parameters:

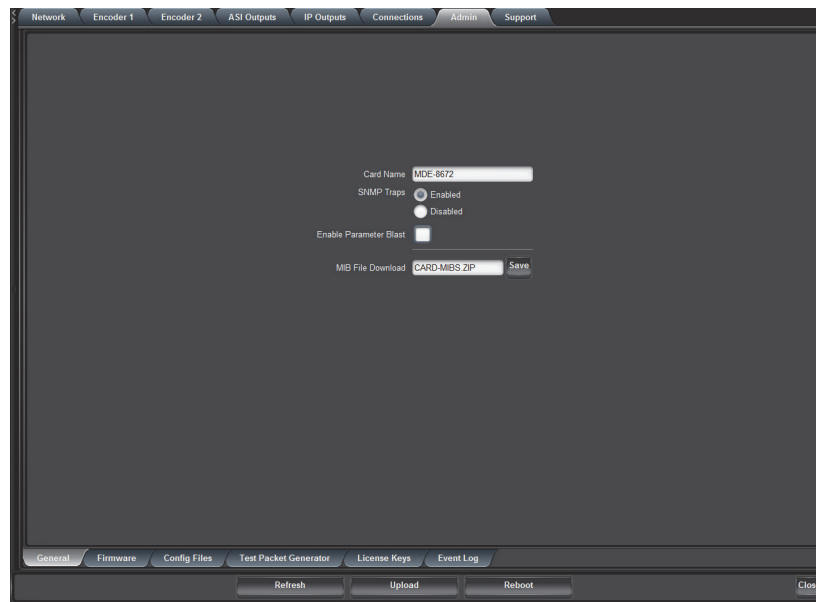


Figure 14.2 Admin — General Tab

Card Name

This field defaults to “MSE-8671” or “MDE-8672” 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 disabled¹. Note that this setting does not take effect immediately - it will become active the next time the card is rebooted.

Enable Parameter Blast

Select this box to speed up DashBoard startup times over high-latency links (i.e. when the computer running DashBoard has a WAN connection to the encoder or the frame housing the encoder). This feature requires DashBoard version 8.2 or higher.

MIB File Download

The MSE-8671 and MDE-8672 provides an up-to-date copy of its MIBs. If you click 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.

Firmware Tab

The card 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 chapter “**Hardware Overview**” on page 21.

1. SNMP is an optional feature in the Network Controller card that is installed in the openGear frame. The MSE-8671 and MDE-8672 SNMP functions are only available if SNMP is licensed in the Network Controller card.

The MSE-8671 and MDE-8672 firmware is updated in the same fashion as with any standard openGear card. Once you obtained the upgrade image from Ross Video, place it anywhere in your computer and click the **Upload** button. A dialog box allows you to select the upgrade file. Note that you can simultaneously upgrade all of your MSE-8671 and MDE-8672 cards over multiple frames if you wish.

For More Information on...

- installing and using DashBoard, refer to the *DashBoard User Manual*.
- ★ Uploading firmware to the MSE-8671 and MDE-8672 does not affect its operation in any way and does not introduce any glitches in the inputs/outputs, except when running RTMP at high bit rate. If you are running RTMP at high bit rate, uploading firmware to the MSE-8671 and MDE-8672 may cause momentary stream interruptions.

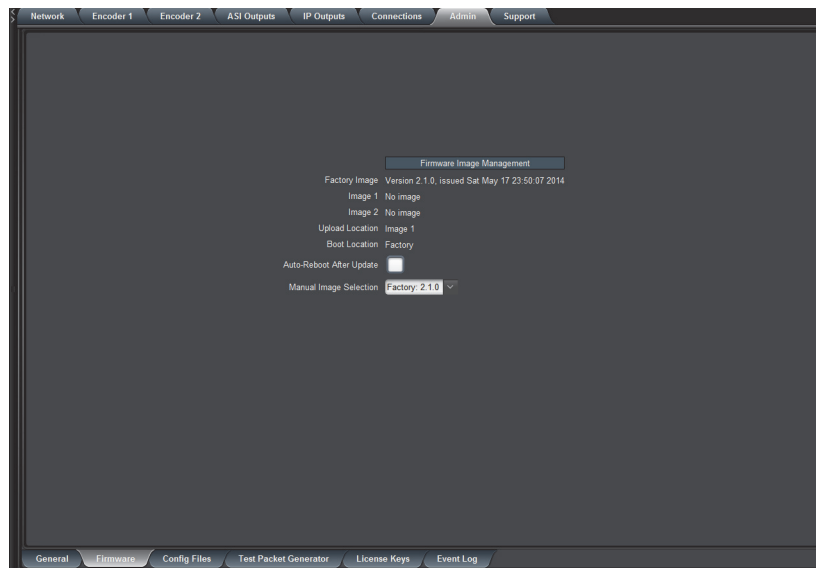


Figure 14.3 Admin — Firmware Tab

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.

Upload Location

This field contains the location where the image upload will go. The MSE-8671 and MDE-8672 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 MSE-8671 and MDE-8672 will automatically reboot after a successful firmware upload through DashBoard. By default, the MSE-8671 and MDE-8672 will not reboot after an update. You can upload the firmware at any time, and reboot later during a maintenance window.

Manual Image Selection

Enables you to specify which firmware version to apply after the next reboot of the card.

- Factory Image file — applies the factory default settings to the card. This will apply the firmware version that was shipped on your card.
- Image 1: x.x.x file — applies the settings as determined by the software version currently saved to the Image 1 file. For example, selecting Image 1: 2.5.0 upgrades the card to firmware version 2.5.0.
- Image 2: x.x.x file — applies the settings as determined by the software version currently saved to the Image 1 file. For example, selecting Image 1: 2.4.0 updates the card to firmware version 2.4.0.

Config Files Tab

As you make configuration changes to the MSE-8671 and MDE-8672, 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 persistence, the MSE-8671 and MDE-8672 also offers the ability to save up to five 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 MSE-8671 and MDE-8672 also offers five pre-saved configuration templates for some common scenarios.

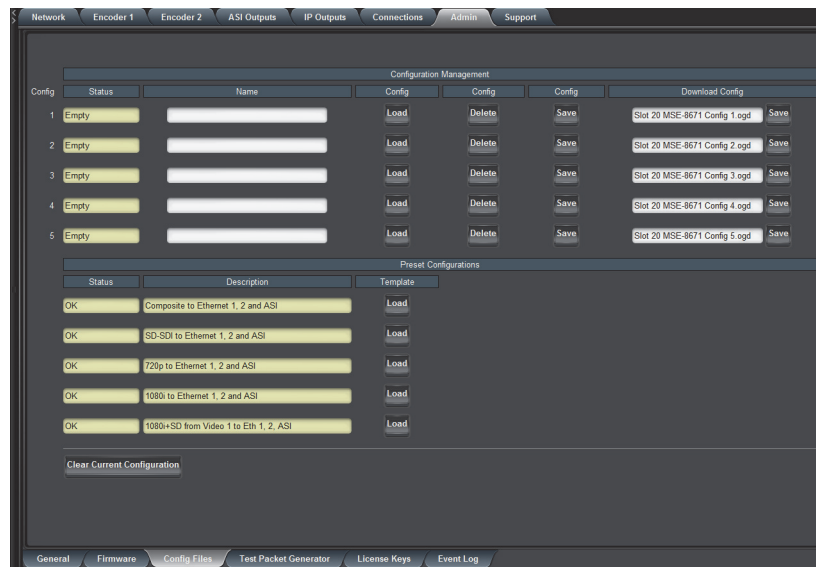


Figure 14.4 Admin Tab — Config Files Tab

Configuration Management Area

The **Configuration Management** area of the tab includes the following fields and buttons used for managing your card configurations.

Status

This indicates whether there is a locally-saved configuration on that particular slot. It will report the words Saved or Empty.

Name

This is the name for the currently selected configuration file.

Load Button

If you click this button, the configuration reported in the **Name** field is loaded in the MSE-8671 and MDE-8672 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 MSE-8671 and MDE-8672 is virtually instantaneous. The **Status** column of the tab will indicate the result of the operation.

Delete Button

If you click this button, the corresponding configuration and its description are deleted.

Save Button

If you click this button, the current card configuration is saved on the corresponding slot, overwriting the current contents if it is not empty.

Download Config

When you click the **Save** button, the file reported in the **Name** field is downloaded to your computer. This feature is provided to allow configuration backups. You must still apply the file to your card as outlined in the section “**To restore a local configuration**” on page 95.

Managing the Local Configurations

You can save a copy of the current configuration to the non-volatile (local) memory of the card. This enables you to restore a configuration using the **Load** button in the Admin > Config Files tab.

To save a local configuration to a file

1. In the Tree View, expand the node for the frame that the MSE-8671 and MDE-8672 is installed in.
2. Double-click the node for the encoder installed in the frame.
3. Select the **Admin** tab.
4. Select the **Config Files** sub-tab.
5. Locate the **Config** row in the **Configuration Management** area on the **Config Files** sub-tab.
6. Edit the **Name** field to assign a unique identifier to the new configuration file.
7. Click **Save** (the button in the **Config** column for the row).

To restore a local configuration

1. In the Tree View, expand the node for the frame that the MSE-8671 and MDE-8672 is installed in.
2. Double-click the node for the encoder installed in the frame.
3. Select the **Admin** tab.
4. Select the **Config Files** sub-tab.
5. Locate the **Config** row that represents the local configuration in the **Configuration Management** area on the **Config Files** sub-tab.
6. Click **Load** (the button in the **Config** column for the row).

Managing the Configuration Files

You can also save the current configuration as an *.ogd file to a folder on your computer or network. Once a configuration is saved to a file, you can choose to restore it to the encoder. It is recommended to ensure the encoders are running the same software version before restoring a saved configuration file.

- ★ Restoring configurations from saved files will NOT update the fields in the Configuration Management rows of the Config Files tag. These fields are local to the card only, and are fully protected from being overwritten by external files. However, the restoring a configuration via a saved file will update the settings in the Encoder 1, Encoder 2, ASI Outputs, IP Outputs and Connections tabs only.

To save the configuration to a file

1. In the Tree View, expand the node for the frame that the MSE-8671 and MDE-8672 is installed in.
2. Double-click the node for the Network Controller card installed in the frame (the card in slot 0).
3. Select the **Admin** tab.
4. Select the **Config Files** sub-tab.
5. Locate the **Config** row that represents the local configuration in the **Configuration Management** area on the **Config Files** sub-tab.
6. Click **Save** (the button in the **Download Config** column for the row).

To restore a configuration from a file

1. In the Tree View, expand the node for the frame that the MSE-8671 and MDE-8672 is installed in.
2. Double-click the node for the Network Controller card installed in the frame (the card in slot 0).
3. Select the **Data Safe** tab.
4. Clear the **Disable** box corresponding to the encoder you wish to recall the configuration to.
5. In the Tree View, right-click the encoder node.
6. Select **Restore Configuration**.
7. Follow the prompts and navigate to the file you wish to apply

The file loads and updates the Encoder 1, Encoder 2, ASI Outputs, IP Outputs, and Connections tabs.

★ The fields in the Admin tab are unaffected. The Configuration Management slots are not altered or updated.

Preset Configurations Area

The MSE-8671 and MDE-8672 offers five pre-defined configuration templates, as indicated below.

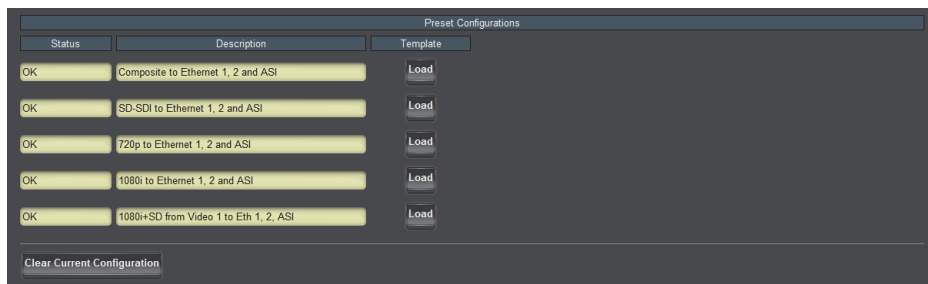


Figure 14.5 Preset Configurations Area — List of Pre-Defined Templates

To load a specific template, click the associated **Load** button.

The following templates are available:

Table 14.1 Preset Templates

Template Name	Description
Composite to Ethernet 1, 2 and ASI	This template configures both encoders to run from composite inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.
SD-SDI to Ethernet 1, 2 and ASI	This template configures both encoders to run from SD-SDI inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

Table 14.1 Preset Templates

Template Name	Description
720p to Ethernet 1, 2 and ASI	This template configures both encoders to run from HD-SDI 720p inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.
1080i to Ethernet 1, 2 and ASI	This template configures both encoders to run from HD-SDI 1080i inputs (Encoder 1 from Video 1, Encoder 2 from Video 2). Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.
1080i + SD from Video 1 to Eth 1, 2, ASI	This template configures both encoders to run from an HD-SDI 1080i input connected to Video 1. Encoder 1 runs at full resolution, Encoder 2 downscales the content to SD. Encoders are routed to individual multi-casts on both Ethernet ports, and as an MPTS to both ASI Ports.

Using the Clear Current Configuration Button

The **Clear Current Configuration** button clears all the configured ports and streams as follows:

- All ASI Ports are set to manual configuration, 20Mbps, 188byte packets.
- All Encoders are stopped and configured with a default set of parameters.
- All IP Outputs are deleted.
- All Connections are removed.
- The Test Packet Generators are disabled.

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 MSE-8671 and MDE-8672 is virtually instantaneous. The **Status** column in the tab indicates the result of the operation.

Test Packet Generator Tab

The MSE-8671 and MDE-8672 includes two Test Packet Generators (TPG) that are capable of generating a configurable constant bit rate sequence of MPEG-2 Transport Packets with very strict timing. The TPGs are considered a source (input), and are available to be connected to any output. The user interface for the TPGs includes a current status table, which reports the current configuration of the generators.

To configure one of the TPGs, click the **Edit** button on its row. The following configuration parameters are displayed:

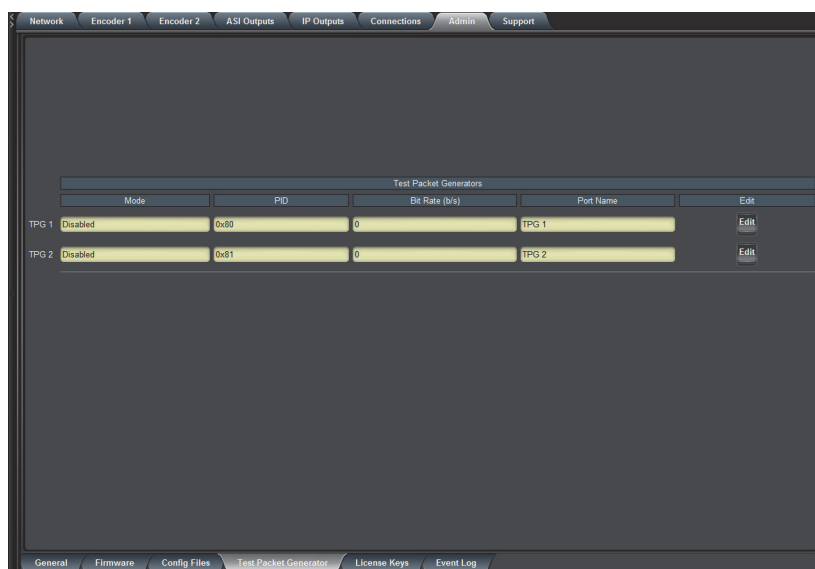


Figure 14.6 Admin Tab — Test Packet Generator Tab

The configuration interface is divided into two areas:

- **TPG Configuration Parameters** — described in this section.
- **Output Selection Connection Parameters** — described in the section “**Destination Selection**” on page 85.

TPG Configuration Parameters

This section outlines the configuration settings available in the Test Packet Generator tab.

Port Name

All MSE-8671 and MDE-8672 ports have a user-defined name, to facilitate routing. Enter any suitable name.

Mode

This field controls the type of MPEG-2 transport packets generated. The options are:

- **Disabled** — TPG is disabled. No packets are being generated.
- **NULL Packets** — TPG is generating NULL packets. If you select this option, the PID parameter becomes read-only with the value 1FFF.
- **Ramp48 Packets** — TPG is generating packets with a “Ramp48 Payload”. A “Ramp48 Payload” is composed of the bytes 0x48, 0x49, 0x4A, ..., 0xFF. Generated packets have the Payload bit set, no Adaptation Field, and a valid Continuity Counter field.
- **PCR Packets** — TPG is generating packets with a valid PCR field (stamped corresponding to the packet's departure time at the configured bit rate). The packets have a small payload with random data, so the Continuity Counter field is valid and counting.

PID

Controls the PID of the generated packets. This field accepts both decimal and hexadecimal values (prefixed with 0x).

Bit Rate

Controls the bit rate of the generated packets. The minimum value is 64,000bps and the maximum value is 213,000,000bps.

License Keys Tab

The MSE-8671 and MDE-8672 has a number of optional licensable features. The License Keys tab is used to manage these features. Using this tab, you can verify how many licenses you have for each optional feature, and how many you are currently using.

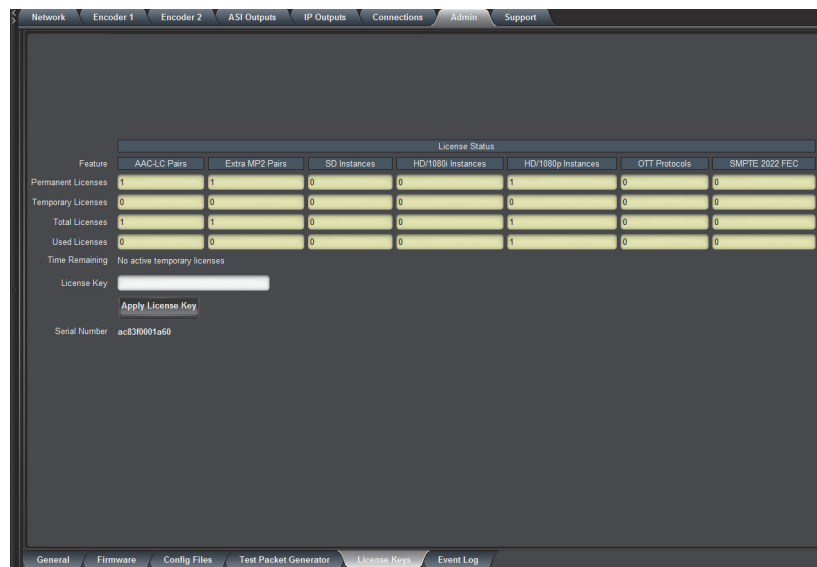


Figure 14.7 Admin — License Keys Tab

The MSE-8671 and MDE-8672 has the concept of a temporary license. If you want to try out a certain feature, contact Ross Video. You will receive, free of charge, a license key that enables that feature for a specific period of running time (license time does not “count” when the card is off).

The License Keys tab includes a License Status table, and a Configuration area, as shown above. 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. It is simply the sum of the permanent and temporary licenses.
- **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”.

License Status

The table columns correspond to the licensable features as outlined in this section.

AAC-LC Pairs (AAC-8671)

The MSE-8671 and MDE-8672 requires one AAC-8671 license per instance of AAC-LC stereo encoding. Note that AAC-LC is required for the operation of some OTT protocols.

Extra MP2 Pairs (MPA-8671)

One MPEG-1 Layer II license (MPA-8671) is included with each encoder channel. This field counts the additional licenses.

SD Instances, HD/1080i Instances

These standard licenses define the maximum output resolution for the MSE-8671 and MDE-8672. By default, one license is activated for the MSE-8671 and two licenses for the MDE-8672.

OTT Protocols

Over-The-Top (OTT) Protocols are HTTP Live Streaming and RTMP. Licenses in this column are applicable to both protocols. Each instance of either protocol requires a license. By default, this feature is licensed for each encoder.

- ★ RTMP only supports AAC-LC audio; the encoder must have AAC-LC licenses to run RTMP. The HLS protocol does not require AAC-LC, but may mobile devices that support HLS only work with AAC-LC.

FEC (SMPTE 2022) License

The FEC-8671 license feature enables Forward Error Correction (FEC) for the encoder. This is not a counted feature; if FEC is enabled, the corresponding number is 1; if it is disabled, the corresponding number is 0. The Used Licenses field will be set to 1 if there is at least one FEC instance in use.

1080p Processing License (HDP-8671, HDP-8672)

The HDP-8671/HDP-8672 license feature enables 1080p 59.94Hz and 1080p 50Hz processing for the MSE-8671 and MDE-8672 respectively.

Requesting a License Key

If you want to request a license key from Ross Video, you will need to provide the card serial number. It can be found in the **Product** status tab and in the **License Key** sub-tab of the **Admin** tab as well.

Once you receive the key from Ross Video, enter it in the **License Key** field, and click the **Apply License Key** button. If the key is accepted, the message `License Key Installed OK` is displayed.

If there are any problems, 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. Ensure to press **Enter** after entering the key.
- **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 xxxxxxxxxxxx: MSE-8671 and MDE-8672 license keys are specific to a card. You entered a valid license key, but it is intended for a different card, whose serial number is displayed in the message. You must use this key on the correct card.
- **This key has already been applied** — License keys can only be applied once. This is a valid key for this card, but you have already applied it, and its features are already available.

Event Log Tab

The MSE-8671 and MDE-8672 includes an Event Log in non-volatile storage. This event log can be used for fault-finding, and to check for error conditions.

Date	Time	Severity	Subsystem	Event
09/08/14	19:01:07	Info	System	System time set by NTP
09/08/14	14:41:25	Info	ENC1	Encoder configuration change
09/05/14	04:59:23	Info	System	System time set by NTP
09/05/14	04:46:03	Info	System	System time set by NTP
09/05/14	20:46:23	Info	ENC1	Embedded Audio 2 Locked
09/05/14	20:46:23	Info	ENC1	Embedded Audio 1 Locked
09/05/14	20:46:22	Info	ENC1	Video input locked
09/05/14	20:46:21	Info	ENC1	Input auto-detected - SDI: 1920x1080i59.94
09/05/14	20:46:18	Error	ENC1	Video input unlocked
09/05/14	20:46:18	Error	ENC1	Video signal not detected

Figure 14.8 Event Log Tab

The following information is included in each MSE-8671 and MDE-8672 event in the log.

Date

The calendar date in which the event occurred.

Time

The time at which the event occurred. Refer to the section “**Timestamps**” on page 101 for details.

Severity

The severity of the event. The MSE-8671 and MDE-8672 defines three severity levels:

- **Error** — These are events that affect the operation of the device. For example, an ASI Input losing lock or an IP Input no longer receiving packets. An error will impact service until addressed.
- **Warning** — These are events that may produce visible glitches, but they do not have a continuous service impact. Examples of warnings are automatic redundancy switches and ARP renewal failures.
- **Info** — These are informational events. All configuration actions are logged with this severity. When an error is cleared (for example, a video 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. The MSE-8671 and MDE-8672 will store up to about 400kbytes 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.

Timestamps

The MSE-8671 and MDE-8672 does not have a battery-backed real-time clock. It 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. By default, the MSE-8671 and MDE-8672 will initialize its internal time-of-day clock to January 1, 2010, GMT. If the frame controller is NTP-synchronized, the MSE-8671 and MDE-8672 will then accept time from it and set its time-of-day clock accordingly.

In order to configure the frame controller for NTP, open its configuration tab on DashBoard, select the Network tab, and enter the IP address of an available NTP server. Refer to the *MFC-OG3 Series User Manual* for details.

If your frame controller has access to the Internet, you can point it to one of the public NTP servers for your region.

Other Fields in the Event Log Tab

The full Event Log tab includes the following fields and menus.

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 **Save**. 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®, so it is presented in tabular form. 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

This setting does not affect the log download, it only affects what is displayed.

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 to your time zone using this drop-down menu. The MSE-8671 and MDE-8672 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 MSE-8671 and MDE-8672 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

Clicking this button clears all log views. This is useful to quickly identify any new events after the MSE-8671 and MDE-8672 is set up. Note that this action does not clear the logs stored in non-volatile memory.

- ★ The MSE-8671 and MDE-8672 will store up to approximately 400kbytes 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.

Playing Video on a Web Page

In general, there are two ways of playing video on a web page:

- Using the HTML5 <VIDEO> tag, for browsers that support it, or
- Using a web-browser plug-in

Using HTML 5

Unfortunately, the HTML5 standard did not actually specify what type of audio/video encoding and container was to be supported. Therefore, even though the current versions of all major browsers support the <VIDEO> tag, there is no single format that will work on all browsers. Moreover, since the MSE-8671 and MDE-8672 is an encoder designed primarily for the broadcast market, it uses the transport stream container, which is not supported natively by any browser¹. Therefore, it is not possible to use the HTML5 <VIDEO> tag with content generated by the MSE-8671 and MDE-8672.

Using a Web-browser Plug-in

In order to play the bit stream coming from the MSE-8671 and MDE-8672 in a web page, a plug-in with the appropriate audio, video and container support must be installed in the web browser. The open-source VideoLAN™ player includes appropriate plug-ins that will work with the bit stream coming from the encoder card.

There are two types of plug-ins:

- Windows® ActiveX® controls, used by Windows® Internet Explorer®
- Mozilla® (Netscape) style plug-ins, used by most other browsers (Mozilla® Firefox®, Google® Chrome™, Apple® Safari®)

When installing the VideoLAN player, make sure to select the appropriate plug-ins for the browsers you intend to use. If multiple browser support is required, both types of plug-ins can be selected (but at least one “Mozilla-style” browser must be already installed).

We recommend VideoLAN version 2.0.1 or later. Earlier versions did not support HTTP Live Streaming.

Web Browser Support

The web pages generated by the encoder are known to work with the VideoLAN plug-in versions 2.0.1 to 2.0.5 and the following web browsers:

- Windows® Internet Explorer® versions 9.0.2 - 9.0.13
- Mozilla® Firefox® versions 7.0 - 19.0
- Google® Chrome™ versions 14.0.835.186 - 24.0.1312.57
- Apple® Safari® 5.1 - 5.1.7

Other browsers and operating systems may work, as long as the VideoLAN plug-in is installed.

Web Pages Served by the Encoder

The MSE-8671 and MDE-8672 automatically generates web pages that will display the video being encoded, depending on the output mode of the encoder channels (refer to the Encoder Connections Tab section). The pages will be available for the following output protocols:

- ASI/IP Streaming, as long as IP Outputs with multicast destination IP addresses have been defined.

1. A number of browsers support the MP4 container format, but this container does not support real-time encoded video.

- Direct HTTP Streaming.
- HTTP Live Streaming, when configured to use the local server.

The web pages generated by the MSE-8671 and MDE-8672 assume that the VideoLAN plug-in has been installed to provide playback services.

Getting Started

To get started, point a web browser to the IP address of the desired MSE-8671 and MDE-8672 Ethernet port:

`http://encoder_ip`

The MSE-8671 and MDE-8672 will respond with a web page with the appropriate links to access the streams, depending on the current configuration. Note that the pages served by each Ethernet port may be different; for example, if the encoders are set to ASI/IP streaming, and no IP Outputs are defined for a given Ethernet port, the web page served from it will indicate that there are no streams available.

The following are examples of how these web pages look like, depending on the encoder settings.

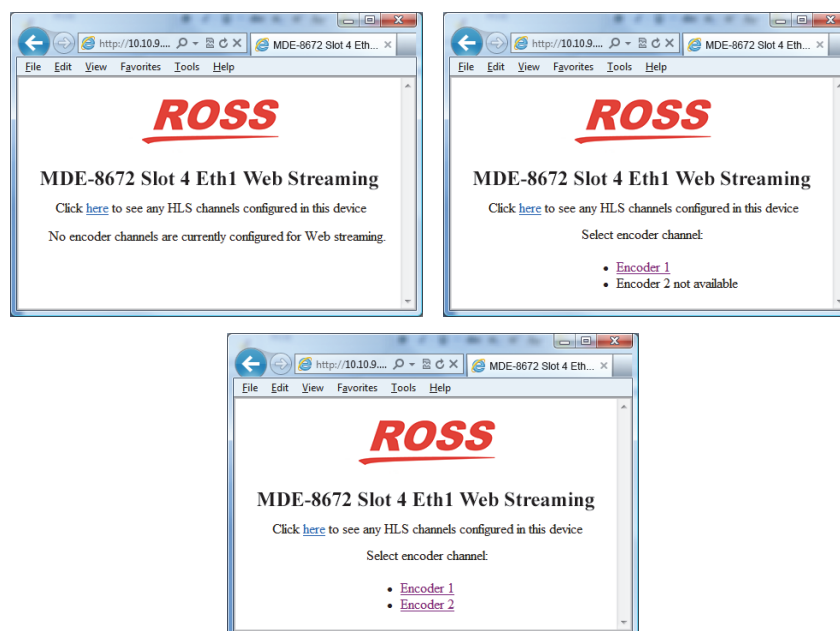


Figure 15.1 Example Web Pages

Multicast Streaming

If an encoder is connected to IP Output ports configured for multicast streaming (i.e., with a destination IP address in the range of 224.0.0.0 to 239.255.255.255), the MSE-8671 and MDE-8672 will generate a web page for that output in the relevant Ethernet port. Note that the video will only actually play if the network between the client and the encoder supports multicast. This will typically be the case if the encoder and the client are in the same subnetwork, but may not work across routers unless they have multicast support enabled, and will definitely not work across the Internet.

Figure 15.2 illustrates the relevant pages. UDP is supported.

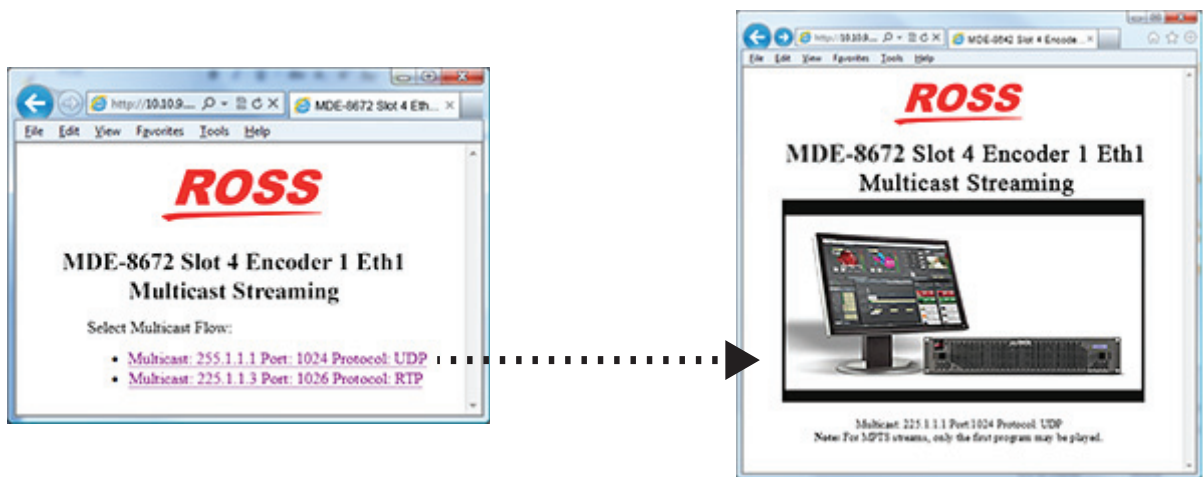


Figure 15.2 Example Web Pages

If you configure an MPTS stream (i.e., both encoders routed to the same IP Output), the page will be available for both encoders, but the plug-in will only play the first channel (Encoder 1). Also, the plug-in will only play the first audio PID, even if secondary audio is configured.

HTTP Live Streaming

All the web pages accessible from the Ethernet ports of the encoder include a link for the built-in HTTP Live Streaming server page. (Figure 15.3)

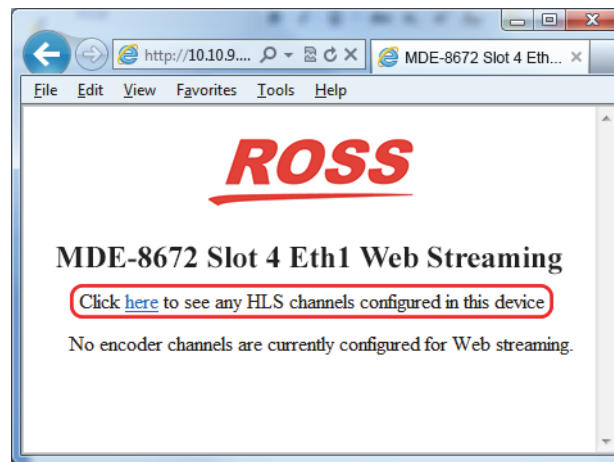


Figure 15.3 Example of a HTTP Live Streaming Server Page

If the IP address of the port being accessed is xxx.xxx.xxx.xxx, the available local HLS channels can also be accessed through this direct link:

`http://xxx.xxx.xxx.xxx/HLS/`

The page accessed through this link will display a list of available local HLS channels, with the value configured for Program Name as the label.

★ HLS channels configured for remote servers will not be listed in this page, as the encoder has no way of knowing the actual link to these channels.

Clicking on the link will cause the content to play. For Apple® devices, this will launch the built-in media player; for PCs running Windows® (and possibly Linux®), if the VLC plug-in is installed, the video will play in the web page.

Direct HTTP Streaming

If an encoder channel is configured for Direct HTTP Streaming, the selection happens as depicted in **Figure 15.4**. Unlike multicast, Direct HTTP Streaming will work over the Internet as long as the path from the encoder to the client has sufficient bandwidth. Direct HTTP Streaming is always available on both Ethernet ports.

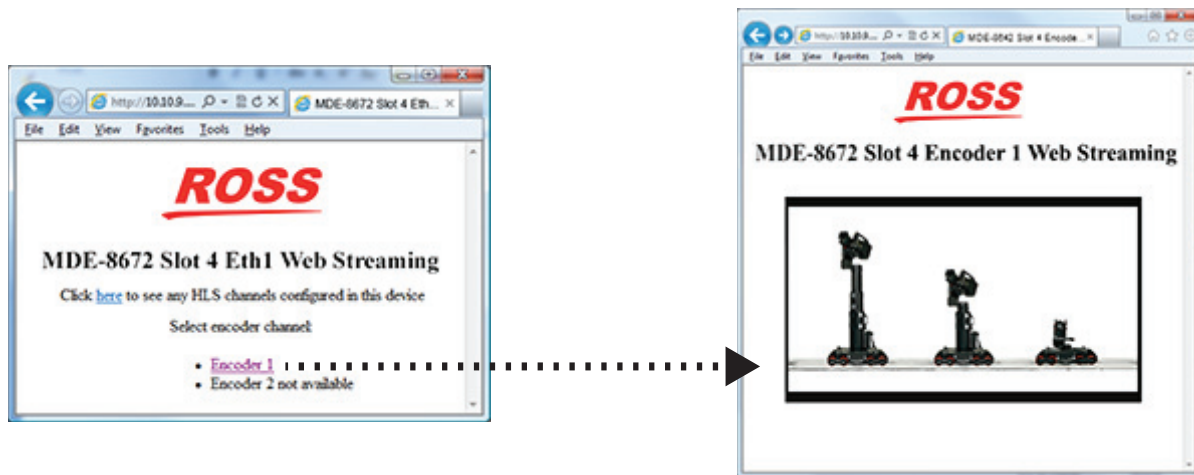


Figure 15.4 Example of Direct HTTP Streaming Pages

If the card is required to support clients on remote networks, make sure that a Default Gateway is entered in the corresponding Ethernet port configuration (refer to the chapter “**Network Tab**” on page 43 for details). When replying to a request, the card will always use the Ethernet port where it received the request from.

Using a Firewall

Since both Direct HTTP Streaming and HTTP Live Streaming work over the Internet, in some situations it may be desirable to do so (for example, to allow for remote monitoring). Ross Video believes it is safe to connect the MSE-8671 and MDE-8672 Ethernet ports directly to the Internet with a public IP address; however, this may not be desirable. It is possible to place a port-forwarding firewall between the MSE-8671 and MDE-8672 and the Internet; the web pages and the streaming will still work as long as the firewall is configured not to remap the Direct HTTP Streaming Listening Port (refer to the section “**Direct HTTP Streaming**” on page 106). For example, if the Listening Port is configured to be 8000, the firewall must be configured to remap external port 8000 to internal port 8000. The reason for this requirement is that the plug-in needs to know the listening port, and that value is passed to it by the automatically-generated pages from the MSE-8671 and MDE-8672.

Status Menus

This chapter summarizes the read-only information displayed in the **Status** tabs. The fields in the **Status** tabs can vary in severity from green (valid), yellow (caution), to red (alarm). DashBoard reports the most severe alarm for a single field. Alarm colors are noted within the tables as text set in brackets next to the menu parameter name.

Product Tab

The **Product** tab contains basic information about the MSE-8671 and MDE-8672.

Table 16.1 Product Tab Items

Item	Parameters	Description
Build Date	#	The date the firmware image was built.
Supplier	Ross Video Ltd.	
Product	MSE-8671 or MDE-8672	
Software Rev	xx yy zz	Indicates the firmware revision currently running where: <ul style="list-style-type: none">• xx represents the Major Version• yy represents the Minor Version• zz represents the Build Number
Serial Number	#	Displays the serial number of this MSE-8671 and MDE-8672.
Hardware Version	#	Indicates the board version number.
Rear Module	OK (Green)	The MSE-8671 and MDE-8672 supports the rear module it is currently installed with.
	Not Installed (Yellow)	The card 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.
	Wrong Module (Red)	The MSE-8671 and MDE-8672 is connected to a rear module that is not supported. Depending on the signals present on that module, there may be a small chance of damage to the MSE-8671 and MDE-8672; Ross Video recommends that this situation be rectified immediately. This alarm will cause the front status LED to turn red. Refer to the section “ Supported Rear Modules ” on page 25 for details on which rear module is supported by your encoder.
Analog Audio Input	#	Indicates the type of analog audio input
	Unknown	The rear module is not supported.
Card Uptime	#	Indicates how long the card has been running since it was last rebooted.
Ambient Temp	#	Temperature, in degrees centigrade, of the air intake of the card (measured at the front edge of the card).
Internal Temp		Temperature, in degrees centigrade, at the back of the card.
MDP Core Temp ¹		Temperature, in degrees centigrade, of the core processing element.

1. 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 MSE-8671 and MDE-8672. If that measurement is at 45°C or higher, action must be taken to cool down the ambient temperature.

Network Status Tabs

The **Network** status tab is subdivided into the same tabs as the **Network** tab, namely Interfaces and DNS.

The **Interfaces** tab reports the current IP configuration of each Ethernet port, as well as their link state and running status. **Table 16.2** summarizes the read-only information displayed in the **Interfaces** status tab.

Table 16.2 Interfaces Status — Ethernet # Configuration

Item	Parameters	Description
Alarm on Link Loss	#	Reports the current setting of this parameter on the Network tab
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
Interface Speed	#	Reports the current setting for this parameter on the Network tab
Port # Link	Link OK (Green)	The port has established link with the network connection
	Half-Duplex Link (Yellow)	The port is set to Auto-Negotiate, and it has achieved 100Mbps Half-Duplex link with the network connection. Half-Duplex links are not suitable for video communication. The port will operate, but we recommend that this be addressed. If Alarm on Link Loss is set to Yes, the Card State status is yellow if there are no higher-priority alarms present.
	No Link (Red)	The port does not currently have link. If Alarm on Link Loss is set to Yes, the 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.
Port # Status	OK (Green)	The port is operating correctly.
	TX Overflow (Red)	In the current configuration, the IP outputs are attempting to transmit more than the port capacity (i.e., the overall output data for this port exceeds the interface speed of 100Mbps or 1Gbps). The Card State will be red and the Status LED in the front of the board will also be red. In this case, reduce the output bit rate (either by reducing the encoder bit rates or by removing output ports). If this indicator is red, data is being dropped.
Link Speed (Mb/s)	#	Reports the actual speed negotiated with the switch for the port. If the port has no link, the value reported here is zero (0).
MAC Address	#	Reports the MAC address of the Ethernet port.

Encoder Status Tabs

Each Encoder Status tab provides a summary of the current status of the specified encoder. The variables displayed in this tab vary according to the encoder configuration.

The Basic, Advanced and Connections tabs are direct equivalents of their configuration counterparts. They present the current value of each of the configuration parameters. When the Apply/Cancel buttons are grayed out, the contents of these tabs exactly match their configuration counterparts. When the Apply/Cancel buttons are active, configuration parameters may have been changed. The current (running) encoder configuration can still be inspected in the status tabs, prior to clicking on the Apply button.

Table 16.3 Encoder Status Tab Items

Item	Parameters	Description
Encoder # Status	OK (Green)	The encoder is running normally.
	Stopped (Yellow)	The encoder has been manually stopped (refer to the section “Using the Basic Tab” on page 51).
	Error (Red)	The encoder should be running but it is not. This status will be briefly shown when the encoder is starting. The possible causes for this are: <ul style="list-style-type: none"> • The encoder has no input (check the corresponding Encoder Video Status field) • There is a mismatch between the video input signal and the encoder configuration. For example, the input is 1080i and the encoder is configured for 720p.
Encoder # Video Status	Locked (Green)	This indicates whether or not the selected video input front-end is locked. This status is also reflected in the rear module LED next to the video input.
	Unlocked (Red)	
Video Detected	Composite #	An analog composite video signal is detected. Refer to the section “Notes on the Video Detected Field” on page 111 for details.
	SDI #	A digital video SDI signal is detected.
	No signal	No recognizable video signal is detected.
Encoder # Embedded Audio ¹	Present (Green)	Embedded audio is present in the selected Group /Combination.
	Not Present (Yellow)	The SDI input has no lock, it is not possible to determine whether embedded audio is present or not.
	Not Present (Red)	Embedded audio is not present in the selected Group/Channel combination. Check the source settings, or select a different Group/Channel combination.
Encoder # Audio Status ²	OK (Green)	No errors detected.
	Not Present (Yellow)	Embedded audio is not present - errors cannot be detected. This status will be issued when there is no SDI lock, or when there is no embedded audio.

Table 16.3 Encoder Status Tab Items

Item	Parameters	Description
Encoder # Audio Status ^b	Error (Red)	<p>Embedded audio errors are being detected. If this indicator is red, audio is corrupted or has glitches. The possible causes for this are:</p> <ul style="list-style-type: none"> • Corrupted embedded audio in the input - checksum errors • Audio sampling rate mismatch • The channel is configured for Dolby® Pass-through, and the data present in the selected Group/Channel is not Dolby® AC-3®.
SDI Standard	Unlocked	Reports the detected SDI signal. This is useful to resolve SDI signal mismatch issues (for example, when the input signal is SD SDI and the encoder is configured for HD).
	SD SDI	
	HD SDI	
Closed Captions	Present	<p>This field reports Closed Caption insertion. If Closed Captions are enabled, the encoder reports whether or not it is receiving them.</p> <p>Note that it is possible for the encoder to be receiving closed caption data that is empty (without actual captions). These will be reported as Present.</p>
	Not Present	<p>The possible reasons are:</p> <ul style="list-style-type: none"> • If the caption source is EIA-608 Line 21, it means that the encoder cannot find a valid closed caption waveform on that line. • If the caption source is SMPTE-334 VANC, it means that the encoder is either not receiving closed caption messages, or it is receiving EIA-708 messages without a caption field.
Encoder Passthrough ³	Dolby AC-3, #kb/s	The data in the selected group/pair has been correctly identified as Dolby® AC-3®; its bit rate is reported here.
	Unknown Format	Data is present in the selected group/pair, but it is not Dolby® AC-3®.
	Not Present	There is no data in the selected group/pair
AFD	Code #	<p>If AFD insertion is enabled, the encoder reports it is receiving them, and what AFD code is being inserted where # is the current AFD code being inserted.</p> <ul style="list-style-type: none"> • If AFD Source is set to Manual AFD Selection, this field will report the selected manual code. • If the input is SDI, the encoder reports the detected type of SDI signal
	Not Present	No AFD is received.
Transport Rate	#	<p>This indicates the overall transport rate, including NULL packets, coming out of the encoder subsystem.</p> <ul style="list-style-type: none"> • If you are connecting this encoder to an IP Output or ASI port in manual rate mode, the configured bit rate must be at least this value. • If you are connecting this encoder to an IP Output with padding disabled, the actual rate will be lower than this value as the NULL packets will be stripped from it.

Table 16.3 Encoder Status Tab Items

Item	Parameters	Description
SCTE35 Packets Injected ⁴	#	Shows a count of how many SCTE 35 packets have been successfully injected in the transport stream for this encoder. Successful SCTE 35 injections are also logged, refer to the section “ Event Log Tab ” on page 100.
SCTE 35 Packets Dropped ^d	#	If there are too many SCTE 104 messages, it may not be possible to insert all the SCTE 35 packets due to internal limitations on the encoder. The encoder can insert up to 10 SCTE 35 packets per second, which is sufficient for all usual ad insertion applications. If this indicator is non-zero, contact Ross Technical Support.
SCTE 104 Errors ^d	#	Shows a count of SCTE 104 errors in the incoming signal. A non-zero count indicates that the device upstream of the MSE-8671 and MDE-8672 is non-compliant. Contact the vendor of the upstream device.
SMPTE-2038 Injection Rate ⁵	#	Shows the current average injection rate for ANC packets carried using SMPTE-2038, over the last 2sec interval. This can be used to set the maximum injection rate.
SMPTE-2038 Packets Injected ^e	#	Shows a running count of how many SMPTE-2038 transport packets have been injected since the encoder was restarted

1. This indicator flags whether or not embedded audio is actually present on the selected Group/Channel combination. The actual indicators displayed depends on the individual settings of each audio channel. The actual indicators displayed depends on the individual settings of each audio channel.
2. The status of each audio channel is displayed.
3. This field is only displayed if Dolby® Pass-through is configured. This indicator contains the status of the Dolby® AC-3® Pass-through function
4. This field is only displayed if SCTE 35 injection is enabled in the Advanced > VBI/Ancillary Data Insertion tab.
5. This field is only displayed if SMPTE-2038 injection is enabled in the Advanced > VBI/Ancillary Data Insertion tab.

Notes on the Video Detected Field

If there is any recognizable video signal at the encoder video input, this field will indicate what type of signal the encoder is detecting. This detection is independent of the video input settings and is intended to aid the operator in making the correct selection.

For the detected video signals, the encoder will provide further information on the type of signal, as follows:

For Composite signals, the encoder will further report the encoding system, as follows:

- Systems with 59.94 fields/sec: NTSC
- Systems with 50 fields/sec: PAL B/G

For SDI signals, the encoder will indicate additional information, as follows:

- For Standard Definition and High Definition signals, this field will report resolution, frame/field rate, and whether the signal is progressive or interlaced. Examples: SDI: 1920x1080i59.94, and SDI: 1280x720p50.
- For High Definition signals whose resolution is not 1920x1080 or 1280x720, the encoder will report the input as SDI: unknown. Encoding of such signals is not supported by the MSE-8671 or MDE-8672.

HTTP Live Streaming Status

If HTTP Live Streaming is selected in the Encoder Connections tab, four more indicators are added to the Encoder Status tab.

Table 16.4 HTTP Live Streaming Status Items

Item	Parameters	Description
IP Output Rate	# bits/second	Reports the average transfer rate into the server, averaged over the last segment.
Segments Transferred	#	Reports the number of bit stream segments successfully transferred so far
HTTP Dropped Segments	#	Reports the number of segments dropped
HTTP Transfer Errors	#	Reports the number of errors encountered while transferring segments

HTTP Dropped Segments

A segment will be dropped if the previous segment has not been completely transferred when it becomes ready. A non-zero count here indicates that there is a performance problem between the encoder and the server - either in the network (not enough bandwidth) or in the server (not enough CPU power/disk bandwidth). If the segment size is small (3 seconds or less), increasing the segment size may improve the situation.

HTTP Transfer Errors

These may be network errors, or may be configuration errors. The exact error description will be shown in the configuration area, in the area on top of the Apply button. One example is where the server is not responding due to an incorrect IP address.

Direct HTTP Streaming Status

If Direct HTTP Streaming is selected in the Encoder Connections tab, three indicators are added to the status area.

Table 16.5 Direct HTTP Streaming Status Items

Item	Parameters	Description
IP Output Rate	#	Reports the aggregate average bit rate to all connected clients (so it can be higher than the transport rate)
Connections	#	Reports the number of clients currently connected to this encoder
Dropped Packets	#	Reports the number of transport packets dropped over the current connections. Once a connection terminates, the dropped packet count for that connection is reset

RTMP Status

If RTMP is selected in the Encoder Connections tab, five indicators are added to the status tab.

Table 16.6 RTMP Status Items

Item	Parameters	Description
IP Output Rate ¹	#	Reports the average bit rate transferred to the server. It will be lower than the transport rate due to the lower container overhead used by RTMP. It is possible for the IP Output Rate to be less than the intrinsic bit rate of the encoder for short periods of time, depending on server and network conditions. The encoder will buffer the bitstream and attempt to “catch up” in these cases. If it cannot, audio/video bitstream data may be dropped.
Encoder RTMP Status	Connected (Green)	The encoder has established a connection with the RTMP server and is transferring data
	Waiting for Encoder (Yellow)	The encoder is not attempting to connect to the RTMP server. The reasons are: <ul style="list-style-type: none"> • The encoding core is not running (i.e., the encoder is not generating bit stream). This can be because the encoder is explicitly stopped (Encoder State set to Stopped in Basic Tab - General Configuration) or it has no valid input. • The RTMP output is configured not to connect to the server (Connect set to No in the RTMP configuration section).
	Not Connected (Red)	The encoder is running, but it is unable to connect to the RTMP server because: <ul style="list-style-type: none"> • the encoder cannot contact the server, or • the RTMP parameters are incorrect • the server was specified as a host name, and the encoder cannot convert that to an IP address (e.g. no DNS, or the server name is misspelled) Check the Admin Event Log tab settings.
Server Connection	#	Indicates which server (Primary or Backup) the encoder is currently connected or attempting to connect. RTMP can be optionally configured with a primary and a backup server. If the primary server cannot be contacted, the encoder will attempt to connect to the backup server.
Video Buffer%	#	These buffers are used to temporarily store the bit stream if there is no enough network and/or server bandwidth. However, if this situation persists, the buffers start to fill up. These indicators report the current state of the buffers. If they overflow, data is dropped. Ideally, these buffers should be almost 0.
Audio Buffer%	#	
Dropped Packets		If the buffers overflow, data is dropped. The encoder will drop entire access units (an audio block or a video frame). This indicator has a count of the number of access units dropped for the current connection. This count resets when a new connection is established.

1. It will be lower than the transport rate due to the lower container overhead used by RTMP. It is possible for the IP Output Rate to be less than the intrinsic bit rate of the encoder for short periods of time, depending on server and network conditions. The encoder will buffer the bit stream and attempt to “catch up” in these cases. If it cannot, audio/video bit stream data may be dropped.

ASI Outputs Status Tab

The ASI Outputs status tab for the ASI Ports provides a quick visual summary status for the ports.

Table 16.7 ASI Ports Status Items

Item	Parameters	Description
ASI Output #	TX OK (Green)	The port is operating normally in transmit mode (ASI Output).
	TX Overflow (Red)	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 reduce the connected 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 (Red)	The port is in automatic bit rate, and there is no data rate coming to it. Any downstream ASI receivers will lose lock. DashBoard Card State and the Status LED will be red if there is a connection to this port.

IP Outputs Status Tab

The status tab for the IP output ports contains a summary of each stream status. There are two sub-tabs: one for Ethernet 1, and another for Ethernet 2.

Table 16.8 IP Outputs Status Items

Item	Parameters	Description
IP Output #	OK (Green)	The IP Output is operating normally (either streaming or ready to stream).
	No Response (Red)	The IP Output is configured for unicast operation, but it does not have a destination MAC address. If there is a connection to this output, DashBoard Card State and the Status LED will be red.
	Overflow (Red)	The IP Output is configured for NULL Padding with a manual rate, and the connected bit stream(s) exceed that configured manual rate. If this alarm is asserted, packets are being dropped. The DashBoard Card State and the Status LED will be red.
	No Response (Yellow)	The IP Output is configured for unicast operation, and the destination stopped responding to ARP. The IP Output is using an old cached MAC address. If there is a connection to this output, the DashBoard Card State will be yellow (but packets are being transmitted).
	Disabled (Grey)	The IP Output has been disabled (by setting Enable to No).

Connections Status Tab

The Connections status tab includes all connected input/output status indicators and an overall summary status indicator, which allows the operator to immediately pinpoint errors. This information is divided into two sub-tabs: Connections and MPTS.

Connections Tab

The Connection status tab presents the combined status of all the established connections, in one location. It includes the Source Port, Source Name, Output Port and Output Name fields to identify the connections, and the rows are in the same order as the table in the Configuration tab. The status tab contains two additional fields, the Source Status and the Output Status. Since these are color-coded, it is simple to quickly identify any problems. If any of the Source Status or Output Status indicators are red, the DashBoard Card State will be red as well, and the Status LED in the front of the card will also be red.

Table 16.9 Connections Status — Established Connections

Item	Parameters	Description
Source Status	OK (Green)	The stream is operating normally. If it is an encoder, it means that it is operating normally If it is an output, it means that it is either transmitting or ready to transmit.
	Warn (Yellow)	The stream is configured but disabled. Simply enabling the stream may clear this situation.
	Error (Red)	The stream is configured but has detected a problem. If it is an encoder, it is not running. If this is an output, it normally means that the output is either unable to send (e.g., an IP output configured for unicast but unable to find the destination MAC address) or dropping packets (e.g., an oversubscribed ASI or IP output in manual rate mode). ASI Outputs with Automatic Rate will be in this state if they do not have data to transmit.

MPTS Tab

The MPTS status tab has the exact same information as the MPTS sub-tab of the Configuration tab. PIDs are displayed in Decimal or Hexadecimal depending on the setting in the Configuration tab.

For More Information on...

- the configuration options and read-only information displayed in the MPTS sub-tab, refer to the section “**MPTS Configuration Tab**” on page 87.

Software Upgrades

The encoder can be upgraded in the field via the Network Controller card in your openGear frame. Note that DashBoard version 6.2.0 or higher is required for this procedure.

To upgrade the software on an encoder

1. Contact Ross Technical Support for the latest software version file.
2. Display the **Device View** of the card by double-clicking its status indicator in the **Basic Tree View**.
3. From the **Device View**, click **Upload** to display the **Select file for upload** dialog.
4. Navigate to the *.bin upload file you wish to upload.
5. Click **Open**.
6. If you are upgrading a single card, click **Finish** to display the **Uploading to Selected Devices** dialog. Proceed to step 9.
7. If you are upgrading multiple cards:
 - Click **Next >** to display the **Select Destination** menu. This menu provides a list of the compatible cards based on the card selected in step 2.
 - Specify the card(s) to upload the file to by selecting the check box(es) for the cards you wish to upload the file to.
 - Verify that the card(s) you wish to upload the file to. The **Error/Warning** fields indicate any errors, such as incompatible software or card type mismatch.
 - Click **Finish** to display the **Uploading to Selected Devices** dialog.
8. If the **Automatically Reboot After Upgrade** box is not selected in the **Admin** tab, reboot the card by clicking **Reboot** at the bottom of the **Device View**.
 - ★ The card(s) are temporarily taken off-line during the re-boot process. The process is complete once the status indicators for the Card State and Connection fields return to their previous status.
9. If the **Automatically Reboot After Upgrade** box is selected in the **Admin** tab, monitor the upgrade as follows:
 - The **Uploading to Selected Devices** dialog enables you to monitor the upgrade process.
 - Click **OK** to complete the upgrade.

Specifications

This chapter provides technical information on the MSE-8671 and MDE-8672. Note that specifications are subject to change without notice.

SDI Inputs Specifications

Table 18.1 Technical Specifications — SDI Inputs

Item	Specifications
Number of Inputs	2
Data Rates and SMPTE Standards Accommodated	480i 59.94Hz (SMPTE 259M)
	576i 50Hz (SMPTE 259M)
	1080i 59.94Hz (SMPTE 292M)
	1080i 50Hz (SMPTE 292M)
	720p 59.94Hz (SMPTE 292M)
	720p 50Hz (SMPTE 292M)
	1080p 59.94Hz (SMPTE 424M)
	1080p 50Hz (SMPTE 424M)
	Composite video (PAL/NTSC)
Impedance	75ohm

Audio Inputs Specifications

Table 18.2 Technical Specifications — Audio Inputs

Item	Specifications
Number of Inputs/Outputs	Embedded SDI (up to 4 pairs)
	1 pair unbalanced analog pair ¹
	1 balanced analog pair ²

1. Requires the R2-8671 or R2-8672 rear module.
2. Requires the R2C-8671 or R2C-8672 rear module.

ASI Outputs Specifications

Table 18.3 Technical Specifications — ASI Outputs

Item	Specifications
Supported Protocols	MPEG-TS multi-program stream
Maximum Data Rate	213Mb/s
Null-packet insertion	Supported

Network Specifications

Table 18.4 Technical Specifications — Network

Item	Specifications
Number of Connections	2
Supported Protocols	UDP/IP (unicast and multicast)
	RTMP (Adobe® Flash®)
	HTTP Live Streaming (HLS) ¹
	HLS ²
Communication Type	Auto-negotiate or fixed speed
Connector Type	100/1000 Base-T RJ-45

1. Populates an external web server through FTP or SFTP.
2. Automatically generates web pages with a video window for HLS (VLC plug-in required)

Video Encoding Specifications

Table 18.5 Technical Specifications — Video Encoding

Item	Specifications
Dual Channel HD Video	MPEG-4 AVC High profile at level 4.2 (HP@L4.2)
	MPEG-4 AVC High profile at level 4.0 (HP@L4.0)
	CBR and VBR
	2Mbps to 12Mbps (typical - depending on profile)
Dual Channel SD Video	MPEG-4 AVC Main profile at level 3.0 (MP@L3.0)
	CBR and VBR
	500kbps to 10Mbps (typical - depending on profile)
Latency	150ms plus the value of the Coding Delay parameter

Output Video Resolution Specifications

Table 18.6 Technical Specifications — Output Video Resolution

Item	Specifications
HD	1080x1920p 60Hz
	1080x1920p 50Hz
	1080x1920i 25/29.97/30Hz
	1080x1440i 25/29.97/30Hz
	720x1280p/960 50/59.94Hz
	960x540 29.97Hz
	960x540 25Hz

Table 18.6 Technical Specifications — Output Video Resolution

Item	Specifications
SD	480 x 720/704/640/528 29.97Hz
	360 x 640p 29.97Hz
	576 x 720/704/640/528 25Hz
Other	480x270
	320x240
	320x180

Audio Encoding Specifications

Table 18.7 Technical Specifications — Audio Encoding

Item	Specifications
Protocol	MPEG-I Layer II
	Dolby® Digital AC-3 pass-through
	AAC-LC
Lip sync adjustment	0-100ms

Video Preprocessing Specifications

Table 18.8 Technical Specifications — Video Preprocessing

Item	Specifications
Types	Closed captions CEA 608B and CEA-708C
	WSS/AFD

Management and Control Specifications

Table 18.9 Technical Specifications — Management and Control

Item	Specifications
Features	10/100 Base-T Ethernet
	Configuration import/export
	In-band and out-of-band control
	SNMP v1, v2 supported
	DataSafe automated card configuration
	Accurate bit rate control
	Startup to streaming in seconds

Environmental Specifications

Table 18.10 Technical Specifications — Environmental

Item	Specifications
Operating Temperature	0°C to 40°C (32°F to 104°F)
Operating Humidity	5% to 95% (non-condensing)

Power Specifications

Table 18.11 Technical Specifications — Power

Item	Specifications
Maximum Power Consumption	MSE-8671: 6W
	MDE-8672: 12W

Service Information

Troubleshooting Checklist

Routine maintenance to this openGear product is not required. In the event of problems with your card, the following basic troubleshooting checklist may help identify the source of the problem. If the frame still does not appear to be working properly after checking all possible causes, please contact your openGear products distributor, or the Technical Support department at the numbers listed under the “**Contact Us**” section at the end of the manual.

1. **Visual Review** — Performing a quick visual check may reveal many problems, such as connectors not properly seated or loose cables. Check the card, the frame, and any associated peripheral equipment for signs of trouble.
2. **Power Check** — Check the power indicator LED on the distribution frame front panel for the presence of power. If the power LED is not illuminated, verify that the power cable is connected to a power source and that power is available at the power main. Confirm that the power supplies are fully seated in their slots. If the power LED is still not illuminated, replace the power supply with one that is verified to work.
3. **Input Signal Status** — Verify that source equipment is operating correctly and that a valid signal is being supplied.
4. **Output Signal Path** — Verify that destination equipment is operating correctly and receiving a valid signal.
5. **Card Exchange** — Exchanging a suspect card with a card that is known to be working correctly is an efficient method for localizing problems to individual cards.

Bootload Button

In most cases, the MSE-8671 and MDE-8672 will detect the error and automatically fall back into the factory-default firmware load. If it does not:

1. Pull the card out.
2. Press and hold the **Default** switch.
3. Push the card back into the frame while still holding the **Default** switch.
4. You can release the **Default** switch once the **Status** LED turns orange.

This action causes the card to revert to the factory-default firmware.

★ Do not use this button unless advised by Ross Technical Support.

Contacting Technical Support

If you need support with your MSE-8671 and MDE-8672, you can contact Ross Video using the contact information provided on the back cover of this manual.

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

- A detailed description of the problem, and any actions taken to solve it.
- A detailed description of the environment around the MSE-8671 and MDE-8672. This includes the make and model of any MSE-8671 and MDE-8672 being used, as well as the connection network (IP or ASI) between the MSE-8671 and MDE-8672 and other devices.
- The Technical Support information file downloaded from the MSE-8671 and MDE-8672 itself. The file contains the current configuration of the MSE-8671 and MDE-8672 and 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 MSE-8671 and MDE-8672.

To download the technical support information for your MSE-8671 and MDE-8672

1. Select the **Support** tab.
2. Click **Save** to save a file called `TECHSUPPORT.TXT` to the computer running the DashBoard client.
3. E-mail this file to Ross Technical Support.

Warranty and Repair Policy

The MSE-8671 and MDE-8672 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of FIVE (5) years from the date of shipment from our factory. In the event that your MSE-8671 and MDE-8672 proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this MSE-8671 and MDE-8672 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the FIVE (5) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This User Manual provides all pertinent information for the safe installation and operation of your openGear Product. Ross Video policy dictates that all repairs to the MSE-8671 and MDE-8672 are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your MSE-8671 and MDE-8672, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your MSE-8671 and MDE-8672. If required, a temporary replacement frame will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Glossary

The following terms are used throughout this guide:

“**Board**” and “**Card**” both refer to the MSE-8671 and MDE-8672, including all components and switches.

“**CBR**” refers to constant bit rate.

“**CDN**” refers to content distribution network.

“**DashBoard**” refers to the DashBoard Control System.

“**DF**” refers to Do-not-Fragment.

“**DS**” refers to Differentiated Services.

“**Encoder**” refers to the MSE-8671 and the MDE-8672 unless otherwise noted.

“**HLS**” refers to HTTP Live Streaming.

“**HTTP**” refers to Direct Hypertext Transfer Protocol.

“**MIB**” refers to management information base.

“**openGear frame**” refers to the OG3-FR and OGX-FR series frames and all available options unless otherwise indicated.

“**Operator**” and “**User**” both refer to the person who uses the MSE-8671 and MDE-8672.

“**PCR**” refers to program clock reference.

“**PID**” refers to packet identifier.

“**RTMP**” refers to Real Time Messaging Protocol.

“**Stream**” refers to a transport stream present at the port.

“**System**” and “**Video system**” both refer to the mix of interconnected production and terminal equipment in which the card operates.

“**TCP**” refers to Transmission Control Protocol.

“**TOS**” refers to Type-Of-Service.

“**TPG**” refers to Test Packet Generator.

“**TTL**” refers to Time-To-Live.

“**UDP**” refers to User Datagram Protocol.

